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Impact of Public Finance Budget Expenditure on Per Capita Disposable Income in China

Shujing Zhang *

School of Management Science and Engineering, Nanjing University of Information Science and Technology, Nanjing, China

* Corresponding Author Email: 202113630117@nuist.edu.cn

Abstract. Nearly ten years, with the rapid development of China's economic, the per capita disposable income in China has significantly increased. And China's annual public budget expenditure has also increased year by year. However, the factors which influence per capita disposable income are diverse. This study collects data from five aspects of the payment of public finance, and first reduces the dimension through factor analysis, then studies the relationship between these factors and per capita disposable income by linear regression. Besides, add other variables that affect per capita disposable income and carry out regression analysis again. The conclusion shows that there is a significant positive relationship between them, the per capita disposable income also increases with the increase of public budget expenditure. The purpose of this study is to help us understand the economic effects of fiscal policy and provide a basis for achieving more fair, open, competitive and orderly social and economic development.

Keywords: Public finance budget expenditure; Per capita disposable income; Factor analysis.

1. Introduction

Nowadays, per capita disposable income not only an indicator that measures people's living standard, but also represents a country's economic development level. Nearly 10 years, with the rapid development of Chinese economic, per capita disposable income is increasing year by year. China's per capita disposable income has risen from 18,310 yuan in 2013 to 39,218 yuan in 2023, an increase of 114%. The growth of per capita disposable income reflects the improvement of people's purchasing power ability, and how much disposable income of the residents directly determines their consumption ability, the higher the disposable income, the more money people can use to consume and invest. And also benefits to the national economic development. In addition, per capita disposable income is also a key indicator of redistribution in China. Different groups are redistributed according to different disposable incomes. Adjusting excessive income groups through taxation and other means, while increasing the disposable income of low-income groups. It can effectively narrow the income gap and improve people's sense of happiness and satisfaction in society. Therefore, analyzing the factors that affects per capita disposable income is of great significance to the formulation of effective economic policies and the promotion of social equity.

From a theoretical point of view, public finance budget expenditure, as an important means of government intervention in the economy, has a certain impact on per capita disposable income. First of all, fiscal spending on infrastructure, scientific research and other areas can create more employment opportunities and promote economic growth, thereby directly increasing the source of income of the population. Secondly, government spending on education, medical care, social security and other areas can raise the level of social welfare for residents and narrow the gap between the rich and the poor, thus indirectly raising their disposable income. In addition, investing public finance budget expenditure in the financial and economic sectors, can directly stimulate consumption, boost investment and enhance people's motivation. So that increase the average disposable income.

A number of previous researchers have paid attention to the relationship between public fiscal expenditures and per capita disposable income. Yang and Guo used Johansen's cointegration test and error correction model to empirically analyze that there is a long-run equilibrium relationship between

net household business income and fiscal agricultural expenditures by different sources [1]. Yuan, Yan and Yang analyze the indicators based on the perspective of fiscal revenue and expenditure, and from the perspective of per capita disposable income, they conclude that China's existing tax system has not achieved the expected results in regulating income distribution, and China needs to improve the structure of the tax system in the future [2]. Zhang analyzes the impact of Hebei Province's fiscal expenditure structure on the urban-rural income gap through a panel model, and the results show that the government's investment in education expenditures, social security expenditures, and expenditures on agriculture, forestry, and water affairs positively affect the reduction of the urban-rural income gap, whereas the fiscal expenditures on medical care and health care will increase the urban-rural income gap [3]. Caporale and so on examined the relationship between health care expenditures and disposable income in all 50 U.S. states over the period 1966-2009. The study found a long-term relationship between only 11 states [4]. Relevant studies in various countries have explored the correlation between expenditures and disposable income in various fields, but the existing studies tend to focus on the structure of expenditures and under-analyze the impact of the aggregate analysis, or do not take into account the impact of other factors such as the unemployment rate and the education coverage rate when considering the impact of public financial expenditures on per capita disposable income. This study attempts to remedy this deficiency to some extent by deepening the understanding of the relationship between public finance budget expenditures and per capita disposable income.

This study contributes to understand the economic effects of fiscal policy and provides some basis for the realization of a more equitable, efficient and sustainable socio-economic development. Since the China Statistical Yearbook is currently published until 2022, this study checks the time series data of relevant variables for a total of ten years from 2012 to 2022 in the study. After organizing the data, the five variables of public finance budget expenditure are standardized and downgraded to obtain the “public finance budget expenditure factor”, which is used to represent the public finance budget expenditure. Subsequently, the public finance budget expenditure factor and per capita disposable income are analyzed together in basic regression analysis to gain the correlation between them. Then the three variables of unemployment rate, GDP and gross enrolment ratio in tertiary education are introduced together with the factor of public finance budget expenditure to do combined regression analysis with per capita disposable income, so as to deeply analyze the influence of public finance expenditure on per capita disposable income.

2. Data

This study selects nine factors, which are Expenditure for Public Security, Expenditure for Education, Expenditure for Social Safety Net and Employment Effort, Expenditure for Medical and Health Care, Expenditure for Affairs of Housing Security, Per Capita Disposable Income, Unemployment Rate, GDP, Gross Enrolment Ratio in Tertiary Education. Among them, the three sets of data from 2012 to 2022: GDP, per capita disposable income, and tertiary gross enrollment ratio were all selected from the National Bureau of Statistics of China. The unemployment rate 2012-2022 is taken from the International Monetary Fund; Five sets of data (Expenditure for Public Security, Expenditure for Education, Expenditure for Social Safety Net and Employment Effort, Expenditure for Medical and Health Care, Expenditure for Affairs of Housing Security) were extracted from the General Public Budget Expenditure by Region section of the China Statistical Yearbook (2012-2022). The dimensionality reduction of these five sets of data was carried out to get the public finance budget expenditure factor. These 10 sets of data were described and counted, and the results were obtained in Table 1 below.

Table 1. Descriptive statistics of variables.

	N	Min	Max	Mean	standard deviation
Expenditure for Public Security (100 million yuan)	11	5928.13	12455.56	9742.8764	2542.55732
Expenditure for Education (100 million yuan)	11	20140.64	37923.33	28614.0755	6266.67012
Expenditure for Social Safety Net and Employment Effort (100 million yuan)	11	11999.85	35775.94	23438.7364	8107.38298
Expenditure for Medical and Health Care (100 million yuan)	11	7170.82	22316.16	14243.5591	4747.42790
Expenditure for Affairs of Housing Security (100 million yuan)	11	4068.71	6881.29	5693.8503	1005.43550
Unemployment Rate（%）	11	3.60	4.20	3.9909	.17581
Gross Enrolment Ratio in Tertiary Education	11	30.00%	59.60%	45.6273%	9.67720%
GDP(100 million yuan）	11	519322	1210207	840949.09	232443.212
per capita disposable income	11	16509.5	36883.3	26355.400	6857.6966
public finance budget expenditure factor	11	48575.81	113771.68	80565.0013	22160.38406
Number of valid cases (in columns)	11				

3. Model Construction and Results

The purpose of this paper is to analyze the impact of China's general public budget expenditure on per capita disposable income. Therefore, per capita disposable income is the explanatory variable in this paper. The unemployment rate, Gross enrolment ratio in tertiary education, GDP and public budget expenditure factor are the explanatory variables of this paper, and the public budget expenditure factor is the core explanatory variable of this paper.

3.1. Factor Analysis

Firstly, in order to derive the public budget expenditure factor, five sets of data (Expenditure for Public Security, Expenditure for Education, Expenditure for Social Safety Net and Employment Effort, Expenditure for Medical and Health Care, Expenditure for Affairs of Housing Security) need to be reduced. Before factor analysis, SPSS software was used to standardize the data to eliminate the influence of dimension, and then the dimensionality reduction operation was carried out on the basis of the standardized data. The Kaiser-Meyer-Olkin (KMO) and Bartlett tests were performed for the variables, and then get Table 2.

Table 2. KMO and Bartlett tests.

The number of KMO sampling appropriateness		.790
Bartlett sphericity test	Approximate chi-square	114.270
	degree of freedom	10
	P value	.000

As can see from Table 2, KMO is 0.79, very close to 0.8, it is suitable for factor analysis. The Bartlett sphericity test showed that the P value was 0.000, which was less than 0.05, indicating that the results were significant, and the selected indexes were suitable for factor analysis. The eigenvalues and variance contributions of each factor are obtained, as shown in Table 3 below.

Table 3. Total variance explained.

ingredients	Initial eigenvalues			Extract the sum of squares of the load		
	total	Variance percentage	Cumulative %	total	Variance percentage	Cumulative %
1	4.787	95.749	95.749	4.787	95.749	95.749
2	.144	2.877	98.626			
3	.062	1.246	99.872			
4	.005	.107	99.979			
5	.001	.021	100.000			
Extraction method: principal component analysis.						

As can see from Table 3, the former factor explains 95.749% of the total variance, indicating that one of the extracted factors can represent 95.749% of the above five public finance budget expenditure indicators, and the information loss is very small, which can better interpret the data, so the new factor extracted is named the public budget expenditure factor Y. Then calculate the scoring coefficient matrix and get Table 4 below, so as to calculate the comprehensive score of the factor. Y = 0.204X1 + 0.207X2 + 0.207X3 + 0.207X4 + 0.197X5.

Table 4. Component Score Coefficient Matrix.

	ingredients 1
Zscore: Expenditure for Public Security (100 million yuan)	.204
Zscore: Expenditure for Education (100 million yuan)	.207
Zscore: Expenditure for Social Safety Net and Employment Effort (100 million yuan)	.207
Zscore: Expenditure for Medical and Health Care (100 million yuan)	.207
Zscore: Expenditure for Affairs of Housing Security (100 million yuan)	.197

3.2. Base Regression

After the processing of data is completed, the benchmark linear regression analysis of the public budget expenditure factor and per capita disposable income shows that the R2 value of the model is 0.988, and the adjusted R2 value is 0.987, which is close to 1, indicating that the fitting effect of the model is very good. Looking at the ANOVA table (Table 5) of the model, it can be seen that the F value of the model is 772.255, and the P value is 0.000, which is much less than 0.05, indicating that the model is significant as a whole. The correlation analysis of the two is carried out to obtain Table 6, which shows that the correlation between the two reaches 0.994.

Table 5. ANOVA.

Model	Sum of Squares	Degree of Freedom	Mean Square	F	Distinctiveness
Regression	464862439.610	1	464862439.610	772.255	.000
Residuals	5417592.590	9	601954.732		
Total	470280032.200	10			

Table 6. Correlation analysis.

		public finance budget expenditure factor	per capita disposable income
public finance budget expenditure factor	Pearson correlation	1	.994**
	Sig. (Twin Tails)		.000
	Number of cases	11	11
per capita disposable income	Pearson correlation	.994**	1
	Sig. (Twin Tails)	.000	
	Number of cases	11	11
**. At the 0.01 scale (two-tailed), the correlation is significant.			

Looking at the coefficient table (Table 7), it can be seen that the per capita disposable income Y1=1.472X + 1570.488, that means, for increasing every 1 millon in public finance budget expenditure, the per capita disposable income will increase by 1.472 yuan on average. There is a positive correlation between per capita disposable income and public budget expenditure. Among them, the T value of the public finance budget factor is 27.789, and the P value is 0.000, which is much less than 0.05, so this independent variable is very significant.

Table 7. Benchmark regression model coefficients.

Model	Factors not normalized		Normalization factor	t	Distinctiveness	correlation			Colinearity statistics	
	B	Standard error	Beta			Zero-order	Slanting	Part	Tolerance	VIF
(Constant)	1570.488	922.050		1.703	.123					
Public Finance Budget Factor	1.472	.053	.994	27.789	.000	.994	.994	.994	1.000	1.000

3.3. Combined Regression

Consider to the other aspects that can influence per capita disposable income, this study uses per capita disposable income as dependent variable, the public finance budget factor, GDP, gross enrolment ratio in tertiary education and unemployment rate were used as independent variables to do linear regression analysis. The goodness of fit value of the model is closed to 1, which indicates that the model fits very well. Viewing the ANOVA table of the model, it shows that the F-value of the model is 7151.408 and the P-value is 0.000 which is much less than 0.05, indicating that the model is significant as a whole and the model passes the diagnosis of covariance. Checking the table of coefficients (Table 8), it can be seen that the per capita disposable income Y2=0.243X1 + 0.018X2+ 153.508X3+ 121.295X4 - 641.431. In this case, the T-value of the factor of the public finance budget is 3.095, and the P-value is 0.021, which is smaller than 0.05, so that the independent variable is significant. Corroborating the conclusion that per capita disposable income and public finance budget expenditure are positively correlated. And there is a significant correlation between them.

Table 8. Combining regression model coefficients.

Model	Factors not normalized		Normalization factor	t	Distinctiveness	correlation			Colinearity statistics	
	B	Standard error	Beta			Zero-order	Slanting	Part	Tolerance	VIF
(Constant)	-641.431	1083.471		-.592	.575					
Public Finance Budget Factor	.243	.078	.164	3.095	.021	.994	.784	.018	.012	80.214
GDP(100 million)	.018	.002	.622	11.634	.000	.999	.979	.069	.012	81.687
Gross Enrolment Ratio in Tertiary Education	153.508	47.338	.217	3.243	.018	.997	.798	.019	.008	127.676
Unemployment Rate(%)	121.295	231.294	.003	.524	.619	-.035	.209	.003	.994	1.006

4. Discussion

From the analysis of the above data, it can see that the average disposable income has a positive impact on the budgetary expenditures, which will be explained in the following five aspects.

4.1. Investment Budget Expenditures

When country increases the investment budget expenditures, such as increase the money in infrastructure development, can greatly facilitate people's transportation and reduce everyone's costs. Jin by using the multi-stage difference-in-differences (DID) and propensity score matching DID methods. Based on the impact of high-speed rail operation on Chinese residents' income from 2008 to 2018, it finds that both urban and rural residents in the central region and rural residents in the eastern region have benefited from high-speed rail [5]. Besides, increasing the spending on infrastructure construction has also promoted the circulation of goods and services to a certain extent and reduced logistics costs. Thereby improving the efficiency of economic activities. At the same time, increasing infrastructure spending can also attract more private investment and create more jobs, so that raising the income level of residents.

As for increasing spending on education can improve the quality and level of education and expand the coverage of it. In recent years, the model of higher education in China has rapidly shifted from “high tuition and low grants” to “low tuition and high grants” [6]. The government has given great financial support to higher education. It can upgrade the skills and knowledge of workers and enhance their employability. Ultimately increasing the income of individuals and families. Government pay for scientific research can promote the invention and application of new technologies. It improves production efficiency and creates new industries and jobs. Besides, technological advancements and innovations not only increase the profitability of firms, but also increase the productivity of workers. So that increasing their average disposable income.

4.2. Redistributive Spending

Increasing public budget spending for transfers and social welfare, such as pensions, unemployment benefits, health benefits, and other redistributive spending, can help reduce income inequality. Larch and Mohl analyzed the drivers of income redistribution in the EU and the world, and concluded that increased redistribution in the EU stabilized disposable income to a large extent [7]. By increasing redistributive spending, governments can ensure that all residents have access to basic livelihood security and improve the overall welfare of society. For example, according to research, additional costs due to disability account for more than 30% of disposable income and if this additional cost is taken into account, 4 out of 10 households with disabilities will be in monetary poverty [8]. But if increase financial subsidies for disabled families, the economic pressure of encountering major accidents can be reduced. So as to improve the living conditions of residents, increase the disposable income of low-income groups and also increase the average disposable income level of the whole society. And also enhance the stability of society.

4.3. Public Services Spending

Increase the expenditure on the provision of public services in the public budget expenditure, such as medical care, public security, defense diplomacy, environmental protection and so on. Their quality and accessibility directly affect the quality of life and productivity of residents. High-quality public services can increase the labor productivity of residents and then increase their incomes. The government's investment in medical research, development and the provision of basic medical insurance can ensure that residents have access to necessary medical services. At the same time, the spread of medical services also helps to reduce the phenomenon of poverty due to illness. After Evolocumab and alirocumab have been added to China's National Reimbursement Drug List through the National Drug Price Negotiation (NDPN) policy, The affordability of PCSK9 inhibitors in China has been significantly improved, with out-of-pocket expenses reduced by 92.97% [9]. It has greatly reduced the burden on families and enhanced household disposable income. A healthy workforce is better able to participate in economic activities and improve the overall welfare of society.

As for government spending in the fields of public safety, defense and foreign affairs can ensure that residents live in a safe environment, so that improving the quality of life of residents, enhancing their

confidence in participating in economic activities and promoting economic growth and income growth. Government spending in environmental protection can ensure that residents live in a healthy environment. Good environmental quality helps to improve the life satisfaction of residents, which is an important prerequisite for increasing per capita disposable income.

4.4. Stimulate Consumption

The government's increase in public financial budget expenditure can directly stimulate consumption and investment, especially in the financial sector or the issuance of treasury bonds, which often releases a signal for other individual and institutional investors to guide investment and promote consumption. Besides, when governments increase spending, those spending translates into demand for goods and services. The increase in demand will stimulate enterprises to expand production. So that increase employment and the income of residents. For example, during the epidemic, there was an urgent shortage of medical supplies in society, the insufficient supply of masks and related vaccines led to sky-high prices. The government's investment in R&D and production of the pharmaceutical industry and the construction of shelter hospitals have alleviated the employment pressure of related industries to a certain extent and also made the medical industry profitable.

Second, the increase in the government's public financial budget expenditure can further amplify its role in stimulating the economy through the multiplier effect. This is because an increase in government spending will first translate into income for some people, who will spend a portion of their income on consumption, which in turn will increase the income of others, creating a chain reaction. This ripple effect will continue to amplify the impact of government spending, eventually leading to a significant increase in national income. As Valerio and so on found in their study of the subgroup decompositions of income inequality in a dataset of cities in 12 provinces, the income growth of cities that received preferential treatment was higher than that of cities without preferential policies in each region [10]. The increase in fiscal expenditure has a positive effect on per capita disposable income. Besides, increasing fiscal spending in a particular area will also improve residents' confidence. When residents see the government's commitment and action on spending, they may be more optimistic about the future economic prospects, and then increase consumption. The increase in consumption will further stimulate production and raise the income of employment and residents.

4.5. Business Environment

Improving the business environment through public budget spending can promote macroeconomic stability, so that increasing per capita disposable income. When countries invest more in legislation and enforcement, they can ensure that market participants are trading under fair rules. This improvement in the legal environment reduces transaction costs, increases market efficiency and promotes the efficient allocation of resources. So that it increases the income of businesses and individuals. Secondly, the strengthening of market supervision can prevent market failure and market manipulation, ensure the fairness of market competition. Prevent monopoly and unfair competition, improve the transparency and circulation efficiency of market information. In this way, information asymmetry and the decision-making risk of the market will be reduced. However, more trading and investment activities will be promoted so that increasing the income of residents.

By investing in the construction of the intellectual property legal system, the government can encourage enterprises and individuals to carry out innovative activities and promote the development of new industries. Strengthening expenditures on agriculture, forestry, animal husbandry, fishery, and other basic industries can ensure the safe and smooth development of the country's industries on the basis. Provide a good market environment for the people and help stimulate economic activities, reduce unemployment and promote macroeconomic stability.

5. Conclusion

This study focuses on the key variable of public finance budget expenditure, simplifies dimensionality reduction by factor analysis, and then explores the relationship between it and per capita disposable income through linear regression analysis. The results show that there is a clear positive correlation between the two, that is, the increase in public financial expenditure and the increase in per capita disposable income are in tandem. Among them, the per capita disposable income can be increased by increasing public investment budget expenditure, redistribution expenditure, public service expenditure, financial expenditure to stimulate consumption, and expenditure to improve the business environment. This study deepens people's understanding of the relationship between these two indicators, and hopes to provide some theoretical support for policymakers, and at the same time provide reference for other countries or regions, and promote international policy exchanges and learning.

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