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Measurement Analysis of the Influencing Factors of Fiscal Revenue in Fujian Province

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Abstract

In recent years, the economy of Fujian province has been developing steadily, its GDP has been improving continuously, and its economic development trend is good. Fiscal revenue is an important prerequisite for sustained and stable economic growth and an important financial tool for the government to perform its functions. Research and analysis of fiscal revenue is conducive to promoting economic development. This paper uses the analysis method of econometrics, using Eviews software, select tax revenue, Fujian province GDP, industrial output as the possible factors, combined with the relevant economic data of the fiscal revenue of Fujian province, establish multiple linear regression model, and deal with the model of multiple collinearity, heteroscedasticity and autocorrelation problem, finally concluded, put forward relevant Suggestions.

Keywords

Fiscal Revenue; Tax Revenue; Gross Regional Product.

1. Introduction

Fiscal revenue is the sum of all funds raised by the government to give full play to its functions and provide social public goods, which can be shown as the monetary income obtained by the government in a certain period of time. Fiscal revenue is an important indicator to measure the financial resources of a government. Fiscal revenue determines the quantity of social public goods that the government can provide and the scope of social public services. In recent years, the economy of Fujian province has been developing steadily. In 2021, the GDP of Fujian province reached 4881.036 billion yuan, up 8% year on year, and the growth of fiscal revenue also showed a steady growth trend. However, from the perspective of the whole country, the development level of fiscal revenue in Fujian province is still insufficient, and there is still a big gap between its total fiscal revenue and other provinces. Fiscal revenue is closely related to economic development. In order to further improve the economic development level of Fujian Province and improve its fiscal revenue level, it is necessary to investigate and analyze the influencing factors of fiscal revenue in Fujian Province. This paper selects the tax revenue, GDP and industrial output of Fujian Province as the main influencing factors, and uses econometric analysis methods to analyze the influencing factors of fiscal revenue in Fujian Province.

2. Model Setting and Data Collection

2.1. Analysis of the Influencing Factors

1. Tax revenue of Fujian Province

Tax revenue is the income levied by the state from taxpayers according to its political rights. It is the most important form of fiscal revenue and constitutes the main source of fiscal revenue. Tax revenue includes value-added tax, personal income tax, consumption tax and many other taxes.

2. The GDP of Fujian Province

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There is a close connection between fiscal revenue and economic development, and they are interdependent and indispensable. GDP is an important comprehensive statistical index in the accounting system, which reflects the economic strength and market size of a country (or region). Therefore, this paper selects the gross domestic product of Fujian Province to reflect its economic development level.

3. Total industrial output value

Industry is the main sector of the national economy and the main source of fiscal revenue. With the improvement of science and technology level, comprehensive quality of enterprises, economic benefits, profit and tax benefits, the total industrial output value is closely linked with fiscal revenue, which has become one of the essential factors affecting fiscal revenue.

2.2. Model Setting

Y: Represents the fiscal revenue of Fujian Province

X1: Represents the tax revenue of Fujian Province

X2: indicates Fujian gross domestic product (GDP)

X3: Total industrial output value

Based on the above data, the preliminary model is established, shown as follows:

$$Y=C+C1*X1+C2*X2+C3*X3+\varepsilon$$

Where C is the constant term, C1, C2, and C3 are the partial regression coefficient, and ε is the random error term.

2.3. Data Collection

This paper collects the relevant data of Fujian Province fiscal revenue in 2007- 2021, as shown in the following table:

Table 1. Fujian Province's fiscal revenue, tax revenue, GDP and industrial output value from 2007 to 2011 (Unit: 100 million yuan)

Year	Financial revenue of Fujian Province	Tax revenue in Fujian Province	The GDP of Fujian Province	Gross industrial output
2007	699.46	594	9365.62	14425.06
2008	833.40	704.5	10931.80	17141.44
2009	932.43	778.1	12418.09	18681.48
2010	1151.49	966.1	15002.51	23805.32
2011	1501.51	1254.3	17917.70	30330.59
2012	1776.17	1440.3	20190.73	32379.94
2013	2119.45	1723.3	22503.84	36724.66
2014	2362.21	1893.7	24942.07	41579.84
2015	2544.24	1938.7	26819.46	43888.84
2016	2654.83	1962.7	29609.43	47275.84
2017	2809.03	2052.6	33842.44	50061.66
2018	3007.41	2237.4	38687.77	57732.35
2019	3052.93	2209	42326.58	63172.56
2020	3079.04	2184.7	43608.55	63476.68
2021	3383.38	2493.1	48810.36	72674.18

Note: The above data are from Fujian Statistical Yearbook of each year

3. Estimation of the Model

Using the ordinary least squares method, the results are estimated as follows:

Equation: UNTITLED Workfile: UNTITLED::Untit...

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

Dependent Variable: Y
Method: Least Squares
Date: 01/01/23 Time: 01:15
Sample: 2007 2021
Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-164.3482	44.02014	-3.733477	0.0033
X1	1.337519	0.142018	9.417942	0.0000
X2	0.044405	0.019319	2.298546	0.0421
X3	-0.025979	0.017214	-1.509203	0.1594

R-squared	0.997146	Mean dependent var	2127.132
Adjusted R-squared	0.996367	S.D. dependent var	913.9704
S.E. of regression	55.08603	Akaike info criterion	11.07885
Sum squared resid	33379.17	Schwarz criterion	11.26766
Log likelihood	-79.09136	Hannan-Quinn criter.	11.07684
F-statistic	1280.993	Durbin-Watson stat	1.189082
Prob(F-statistic)	0.000000		

Fig 1. Regression model results

As shown from the figure above, the regression model is:

Y=-164.3482+1.337519*X1+0.044405*X2-0.025979*X3

(44.02014)(0.142018)(0.019319)(0.017214)

t=(-3.733477)(9.417942)(2.298546)(-1.509203)

R^2=0.9971 n=15 F=1280.993 DW=1.189082

3.1. Economic Test

The partial regression coefficient of 1.337519 indicates the marginal impact of tax revenue on the fiscal revenue of Fujian Province, That is, under the condition that the other influencing factors remain unchanged, For every one-unit increase in tax revenue in Fujian Province, Fujian province's fiscal revenue will increase by 133.7519 million yuan; similarly, While the other influencing factors remain unchanged, For each unit of GDP in Fujian, Its fiscal revenue will increase by 0.044405 million yuan; In an economic sense, The sign of the X3 parameter estimates is opposite as expected, This indicates an increase in industrial GDP, Fujian province's fiscal revenue will decrease, The result is not reasonable, The economic test fails, The model may have severe multicollinearity.

3.2. Statistical Tests

1. Judgment coefficient: R^2=0.9971 is close to 1, indicating that the model has a high goodness of fit to the sample data.

2. F test: F=1280.993, corresponding p=0.0000 < α, indicating that the combination of the three explanatory variables on the fiscal revenue of Fujian province is significantly passed.

3. T-test: For H_0: C_j=0 (j=0,1,2,3), given α =0.05, the p-value of industrial output (X3) t-test is greater than 0.05, indicating that industrial output has no significant impact on Fujian fiscal revenue (Y), and the p-value of t-test for other parameters is less than 0.05, and the linear relationship of the model is significant.

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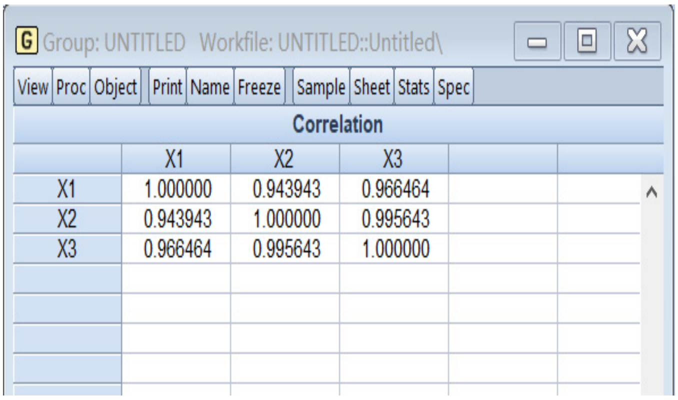
4. Econometrics Test and Revision of the Model

4.1. Multiple Ollinearity Test and Correction

1. Multiple ollinearity test

Because the model contains only the three explanatory variables (X1, X2, X3), the simple coefficient correlation method is used to perform the multicollinearity test of the model. COR command (COR X1 X2 X3) and the results are shown in the following below:



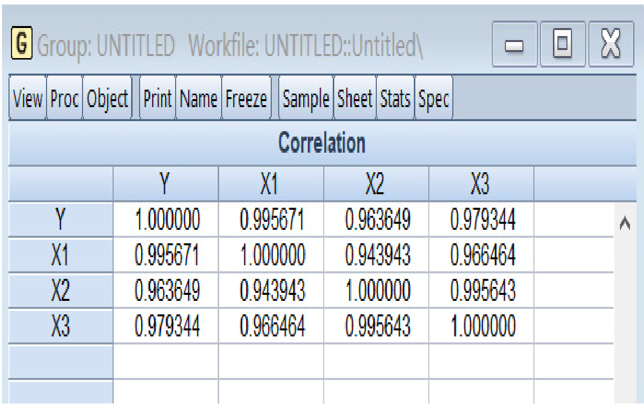
	X1	X2	X3
X1	1.000000	0.943943	0.966464
X2	0.943943	1.000000	0.995643
X3	0.966464	0.995643	1.000000

Fig 2. Correlation coefficient test

It can be concluded from the results of the figure above that the correlation coefficient between explanatory variable X1, explanatory variable X2 and explanatory variable X3 is all greater than 0.8. The regression model has serious multicollinearity. Therefore, it is necessary to correct the multicollinearity of the model.

2. Correction of the multicollinearity

In this paper, stepwise regression method is used to correct multicollinearity, and the correlation coefficient matrix of explained variable Y is obtained using Eviews software command (COR Y X1 X2 X3). The results are shown in the following figure:



	Y	X1	X2	X3
Y	1.000000	0.995671	0.963649	0.979344
X1	0.995671	1.000000	0.943943	0.966464
X2	0.963649	0.943943	1.000000	0.995643
X3	0.979344	0.966464	0.995643	1.000000

Fig 3. Y and X correlation coefficient test

As can be learned from the figure, X1 is the closest explanatory variable to the explained variables, so we first choose the annual data regression of tax revenue and fiscal revenue, so as to establish a one-yuan regression equation, as follows:

Equation: UNTITLED Workfile: UNTITLED::Untit...

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

Dependent Variable: Y
Method: Least Squares
Date: 01/01/23 Time: 01:27
Sample: 2007 2021
Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-239.2246	65.36304	-3.659938	0.0029
X1	1.452792	0.037617	38.62111	0.0000

R-squared	0.991360	Mean dependent var	2127.132
Adjusted R-squared	0.990695	S.D. dependent var	913.9704
S.E. of regression	88.16314	Akaike info criterion	11.91982
Sum squared resid	101045.6	Schwarz criterion	12.01423
Log likelihood	-87.39866	Hannan-Quinn criter.	11.91882
F-statistic	1491.590	Durbin-Watson stat	0.690986
Prob(F-statistic)	0.000000		

Fig 4. Benchmark regression model results

Using Eviews software, the benchmark regression model Y=1.452792*X1-239.2246, at which time R^2=0.9914 and F=1491.590. We then introduce X2 into the benchmark regression model:

Equation: UNTITLED Workfile: UNTITLED::Untit...

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

Dependent Variable: Y
Method: Least Squares
Date: 01/01/23 Time: 01:29
Sample: 2007 2021
Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-165.8552	46.29248	-3.582769	0.0038
X1	1.152066	0.074894	15.38263	0.0000
X2	0.015736	0.003699	4.253812	0.0011

R-squared	0.996555	Mean dependent var	2127.132
Adjusted R-squared	0.995981	S.D. dependent var	913.9704
S.E. of regression	57.94449	Akaike info criterion	11.13370
Sum squared resid	40290.77	Schwarz criterion	11.27531
Log likelihood	-80.50278	Hannan-Quinn criter.	11.13220
F-statistic	1735.558	Durbin-Watson stat	1.068750
Prob(F-statistic)	0.000000		

Fig 5. Y and X1,X2 regression model results

After the introduction of X2, R^2 changed from 0.9914 to 0.9966, which was significant, and the F value also changed greatly. At this time, the model regression equation was Y=-165.8552+1.152066*X1+0.015736*X2, R^2=0.9966 and F=1735.558.

Then we added X3 to the benchmark model, and then the results are as follows:

Equation: UNTITLED Workfile: UNTITLED::Untit...

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

Dependent Variable: Y
Method: Least Squares
Date: 01/01/23 Time: 01:31
Sample: 2007 2021
Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-173.4662	51.06951	-3.396668	0.0053
X1	1.087913	0.106615	10.20416	0.0000
X3	0.012927	0.003650	3.541173	0.0041

R-squared	0.995775	Mean dependent var	2127.132
Adjusted R-squared	0.995071	S.D. dependent var	913.9704
S.E. of regression	64.16855	Akaike info criterion	11.33776
Sum squared resid	49411.24	Schwarz criterion	11.47937
Log likelihood	-82.03320	Hannan-Quinn criter.	11.33625
F-statistic	1414.096	Durbin-Watson stat	1.133287
Prob(F-statistic)	0.000000		

Fig 6. Y and X1,X3 regression model results

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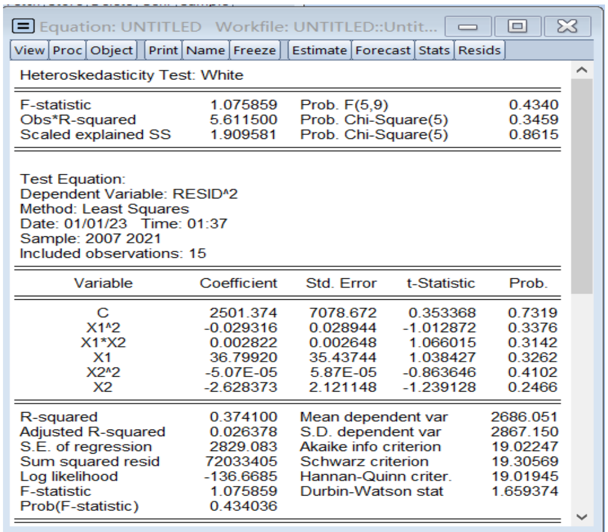
The regression equation at this time is Y=-173.4662+1.087913X1+0.012927X3,R^2=0.9958, and F=1414.96. Through comparison, we found that the R^2 values and F statistics of the binary regression equations established by X1 and X2 were greater than the R^2values and F statistics of the binary regression equations established by X1 and X3. Therefore, we eliminated the X3 variables and selected the binary regression model composed of the two explanatory variables X1 and X2.

In conclusion, the model with multicollinearity correction should be: Y=-165.8552 + 1.152066 *X1+0.015736*X2. The explanation of the coefficient estimate is as follows: under the condition that other influencing factors remain unchanged, when the tax revenue of Fujian province increases by 1 unit, the fiscal revenue of Fujian province will increase by RMB 1152066 million; when the GDP of Fujian Province increases by 1 unit, the fiscal revenue will increase by RMB 0.015736 million.

4.2. Test of Heteroscedasticity

In this paper, White test is used to test the model. The results are shown in the following figure:


Equation: UNTITLED Workfile: UNTITLED::Untit...

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

Heteroskedasticity Test: White

F-statistic	1.075859	Prob. F(5,9)	0.4340
Obs*R-squared	5.611500	Prob. Chi-Square(5)	0.3459
Scaled explained SS	1.909581	Prob. Chi-Square(5)	0.8615

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 01/01/23 Time: 01:37
Sample: 2007 2021
Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2501.374	7078.672	0.353368	0.7319
X1^2	-0.029316	0.028944	-1.012872	0.3376
X1*X2	0.002822	0.002648	1.066015	0.3142
X1	36.79920	35.43744	1.038427	0.3262
X2^2	-5.07E-05	5.87E-05	-0.863646	0.4102
X2	-2.628373	2.121148	-1.239128	0.2466

R-squared	0.374100	Mean dependent var	2686.051
Adjusted R-squared	0.026378	S.D. dependent var	2867.150
S.E. of regression	2829.083	Akaike info criterion	19.02247
Sum squared resid	72033405	Schwarz criterion	19.30569
Log likelihood	-136.6685	Hannan-Quinn criter.	19.01945
F-statistic	1.075859	Durbin-Watson stat	1.659374
Prob(F-statistic)	0.434036		

Fig 7. White test

Judging from the above figure, nR^2=5.611500 inches, given the significant level α =0.05, query the χ^2 distribution table to obtain the critical value $\chi^2_{0.05}(2)$ =5.991. Since nR^2=5.611500 <$\chi^2_{0.05}(2)$ =5.991, the null hypothesis was accepted, indicating no heteroscedasticity in the model.

4.3. Test of the Autocorrelation

1. The DW test method

According to the regression results after eliminating multicollinearity, DW = 1.068750, check DW statistical table, d_L=0.946, d_U=1.543, d_L<DW <d_U, it is impossible to determine whether the model has first-order autocorrelation.

2. Partial correlation coefficient test method

For the partial correlation coefficient method, the results are shown in the following figure:

As can be seen from the above figure, at order 1-12, PAC values are within the dotted lines on the left and right sides, therefore, there is no autocorrelation in the model.

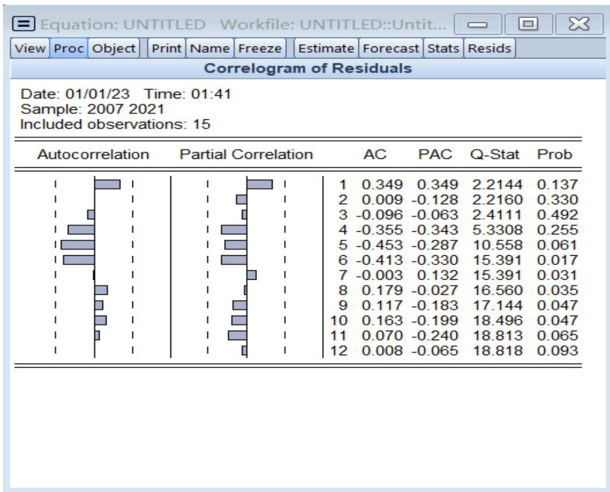


Fig 8. Partial correlation coefficient test

5. Experimental Conclusion

After the above experiments, we can finally get the results of the regression model established in this paper:

$$Y = -165.8552 + 1.152066*X1 + 0.015736*X2$$
$$(46.29248) \quad (0.074894) \quad (0.003699)$$
$$t = (-3.582769) \quad (15.38263) \quad (4.253812)$$
$$R^2 = 0.9966 \quad F = 1735.558 \quad n=15$$

From the regression results, we can know that R^2=0.9966 is close to 1, and the model certainty coefficient is high, indicating that the model has a high goodness of fit to the sample data. The model says that when other factors remain unchanged, the fiscal revenue will increase by RMB 1152066 million yuan; when other factors remain unchanged, the total output value will increase by RMB 0.015736 million yuan. From the model, we can also see that the tax revenue of Fujian Province has a significant influence on the fiscal revenue of Fujian Province.

6. Related Suggestions

6.1. We will Improve Tax Reform to Ensure a Balance between Government Revenue and Expenditure

Tax revenue is the main source of fiscal revenue. If the tax revenue is insufficient, the government fiscal revenue will decrease, and the government does not have enough capital operation, so it is difficult to ensure the normal realization of government functions. Fujian province should, based on the reality, improve the provincial tax reform, reasonably determine the scope of taxation, strengthen tax collection and administration, increase tax revenue, and reduce the loss of effective tax revenue. At the same time, Fujian province should strengthen the communication between finance and taxation, do a good job in the collection and management between tax revenue and non-tax revenue, ensure the stable growth of fiscal revenue, use fiscal revenue funds in the "edge", improve the management of fiscal budget expenditure, ensure the balance of fiscal revenue and expenditure, and enhance fiscal sustainability.

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6.2. We will Expand the Economic Aggregate and Improve the Efficiency of the Economic Operation

It can be seen from the model that the fiscal revenue of Fujian province is closely related to the regional GDP. Economic development is closely related to fiscal revenue. Only with the rapid economic development can the national economic level be improved and fiscal revenue can be guaranteed. Therefore, Fujian province should vigorously develop the economy, formulate corresponding strategies to promote economic development, improve the efficiency of economic operation, improve its own attraction, introduce foreign capital investment, increase market activity, improve the level of economic development, and improve the fiscal revenue of the province. Moreover, Fujian province can also increase the investment in fixed assets and social public goods, expand the scale of economic aggregate, and promote the increase of fiscal revenue.

6.3. We will Strengthen the Protection of the Natural Environment and Build a Sound Ecological Environment

Having a good ecological environment is the necessary basis for the sustainable social development, and the sustainable development concept is conducive to promoting the growth of social economy. Fujian province has many natural resources, so it should actively protect the natural resources owned by the province, and pay attention to the protection of the natural environment while pursuing the rapid economic development. At the same time, Fujian province should strive to improve the utilization rate of resources, avoid the phenomenon of resource waste, strengthen the awareness of the natural environment protection, build a good ecological environment, and provide a solid and reliable foundation for the sustainable and stable economic development in the future.

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