

Analysis of Influencing Factors of Fujian Province's Fiscal Revenue

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Abstract

Fiscal revenue serves as the core financial source for governments to perform their functions, provide public services (such as education, healthcare, and national defense), and construct infrastructure, ensuring the smooth operation of society and meeting people's livelihood needs. Meanwhile, it achieves macroeconomic regulation through means like tax adjustments and transfer payments, promoting social equity, stabilizing economic fluctuations, and driving sustainable development. To analyze the factors affecting Fujian Province's fiscal revenue, this study selects relevant influencing factors from 2015 to 2024 for statistical analysis. First, it uses Lasso to select key variables, and then applies the grey prediction model to forecast Fujian's fiscal revenue for the next two years.

Keywords

Fiscal Revenue; Lasso; Grey Prediction Model.

1. Introduction

Fiscal revenue is the money collected by the government to perform its functions, mainly from sources like taxes and revenue from state-owned assets. Its importance lies in supporting public services, macroeconomic regulation, and social equity protection. It serves as the core material foundation for government governance and people's livelihood security, playing a fundamental role in advancing the modernization of the national governance system. Therefore, studying fiscal revenue is of great significance.

Some scholars have already studied the factors affecting fiscal revenue. Song X[1] explored the main influencing factors of fiscal revenue in Guangxi Zhuang Autonomous Region, using ridge regression, Lasso regression, and adaptive Lasso regression for variable selection. Then, she evaluated the three models and found that Lasso regression provided the best fit. Ruichao N[2] used ridge regression and Lasso regression to study the factors affecting Beijing's fiscal revenue. Kun Lin[3] analyzed the main factors affecting China's fiscal revenue and their relationships by collecting data with Eviews 8.0 software and building regression models. Xinjing Ma[4] conducted an empirical analysis of fiscal revenue influencing factors in Heilongjiang Province using STATA.

2. Data Selection

To predict Fujian Province's fiscal revenue, this study utilizes data from 2015 to 2024 and selects ten key factors influencing fiscal revenue (Y) based on relevant sources. These factors include: X1 (number of employed persons), X2 (regional GDP), X3 (primary industry output), X4 (ratio of tertiary to secondary industry output), X5 (year-end permanent population), X6 (average wage of employed persons), X7 (per capita disposable income of urban residents), X8 (per capita living consumption expenditure of urban residents), X9 (Consumer Price Index),

and X10 (total retail sales of consumer goods). All related data is sourced from the Fujian Provincial Statistical Yearbook[5].

2.1. Descriptive Statistics

First, performed a descriptive statistical analysis on the original data of Fujian Province's local fiscal revenue and its influencing factors. This analysis provided the minimum, maximum, mean, and standard deviation of the variable data. The results are shown in Table 1.

Table 1. Descriptive Statistics Analysis Results

	MIN	MAX	MEAN	STD
X1	2174	2255	2211.5	28.47
X2	27307.47	57761.02	43156.97	10445.54
X3	1932.84	3287.67	2648.38	473.55
X4	0.85	1.2	1.05	0.12
X5	3984	4193	4121.8	76.7
X6	58719	114987	87747.86	20585.15
X7	33275.34	58763.43	46306.65	8690.49
X8	23520.19	39910.41	31130.19	5577.01
X9	99.9	102.6	101.34	0.9
X10	12273.03	24370.76	18750.61	4083.45
Y	25442357	36152930	31077408	3723050

According to the descriptive statistical analysis, from 2015 to 2024, Fujian Province's fiscal revenue has more than doubled. During this period, Fujian targeted the main direction of high-quality development, with the three major industries advancing toward the mid-to-high end in a coordinated manner. This progress not only relied on the effective guidance and support at the national level but also on the overall planning and coordination of local governments, which promoted the accelerated formation of Fujian's industrial system and ultimately led to the rapid rise in fiscal revenue.

2.2. Correlation Analysis

Correlation analysis is a method in statistics to quantify the strength of associations between variables. It reveals linear or nonlinear relationships by calculating correlation coefficients. Below, we use simple correlation coefficients for a preliminary analysis and create a heatmap of the variables, as shown in Figure 1.

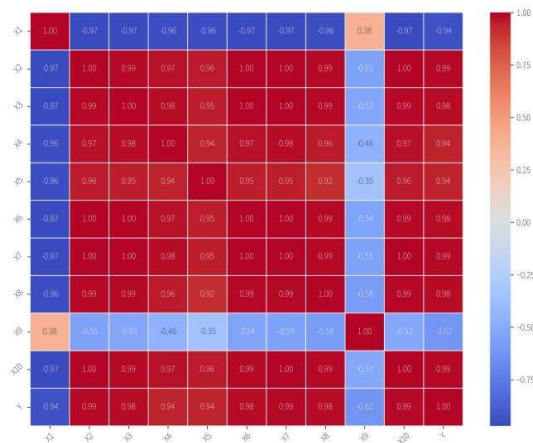


Figure 1. Correlation Heatmap

Based on the results in Figure 1, it can be concluded that the Consumer Price Index (X9) and fiscal revenue (Y) have a weak correlation. Meanwhile, other variables show a high degree of correlation with local fiscal revenue in Fujian Province. The correlation coefficient between regional GDP (X2) and urban residents' per capita disposable income (X7) reaches 0.99, while that between total retail sales of social consumer goods (X10) and urban residents' per capita living consumption expenditure (X8) stands at 0.97. This indicates a strong synergistic effect among economic development indicators, resident income, and consumption markets, aligning with the economic logic of the "industry-income-consumption" virtuous cycle in the high-quality development stage. The -0.55 correlation between Consumer Price Index (X9) and X7 suggests that inflationary pressure may exert an inhibitory effect on residents' real income. Meanwhile, the -0.46 correlation between the ratio of tertiary to secondary industry output (X4) and primary industry output (X3) reflects potential resource reallocation effects between traditional industries and modern service sectors during the process of industrial structure upgrading.

3. Model Construction

3.1. Lasso Regression

Lasso regression is a type of regularization method and belongs to shrinkage estimation. It creates a penalty function to build a more refined model. This method compresses some coefficients while setting others to zero. It retains the advantages of subset shrinkage and serves as a biased estimation approach for handling data with multicollinearity issues.

The estimation definition of Lasso parameters is presented as shown in Equation (1).

$$\hat{\beta}(Lasso) = \arg \min_{\beta} \left\| y - \sum_{j=1}^p x_j \beta_j \right\|^2 + \lambda \sum_{j=1}^p |\beta_j| \quad (1)$$

This study uses the LASSO regression method to select key attributes. Through code implemented in Python software, we obtained the regression coefficients of 10 influencing factors on Fujian Province's fiscal revenue: 0, 2227734, 0, -739682, 750163, 0, 0, 0, -426755, 971200. Variables with coefficients of 0 were removed, specifically variables X1, X3, X6, X7, and X8. Ultimately, five variables with higher impact on Fujian Province's fiscal revenue were selected: X2, X4, X5, X9, and X10.

3.2. Grey Prediction Model

The Grey Prediction Method is a way to predict systems with uncertain factors.

Let the feature $X^{(0)} = \{X^{(0)}(i), i = 1, 2, \dots, n\}$ be a non-negative, monotonic original data sequence. The Grey Prediction Model is established as follows:

(1) First, perform a cumulative sum on $X^{(0)}$ to obtain the first accumulated sequence $X^{(1)} = \{X^{(1)}(k), k = 1, 2, \dots, n\}$.

(2) For X_1 , a first-order linear differential equation can be set up, as shown in Equation (2), which is the GM(1,1) model.

$$\frac{dX^{(1)}}{dt} + aX^{(1)} = u \quad (2)$$

(3) By solving this differential equation, the prediction model is obtained, as shown in Equation (3).

$$\hat{X}^{(1)}(k+1) = [X^{(0)}(1) - \frac{\mu}{a}]e^{-ak} + \frac{\mu}{a} \quad (3)$$

(4) Since the GM(1,1) model gives accumulated values, the data $\hat{X}^{(1)}(k+1)$ from the GM(1,1) model is restored through inverse cumulative sum to $\hat{X}^{(0)}(k+1)$. Thus, the Grey Prediction Model for $X^{(0)}$ is as shown in Equation (4).

$$\hat{X}^{(0)}(k+1) = (e^{-\hat{a}} - 1)[X^{(0)}(n) - \frac{\hat{u}}{\hat{a}}]e^{-\hat{a}k} \quad (4)$$

After selecting variables using LASSO feature selection, we input them into the Grey Prediction Model to predict the values of each influencing factor for 2025-2026 (see Table 2).

Table 2. 2025-2026 Grey Prediction Model Results for Influencing Factors

year	X2	X4	X5	X9	X10
2025	59862.59	1.24	4196	99.7	25759.38
2026	62289.73	1.32	4201	99.3	26787.76

To check if the model passes validation, we use the posterior difference test method after prediction to evaluate model accuracy. After running the code, the model accuracy for each influencing factor is "Grade 1 (Good)", meaning the model passes the validation. Based on the key variables selected through LASSO regression, we build the Grey Prediction Model to predict Fujian Province's fiscal revenue for 2025 and 2026. The results are shown in Table 3.

Table 3. Predicted values of fiscal revenue for 2025 and 2026

year	y_pred
2025	37520315
2026	39093846

The prediction results show that Fujian Province's fiscal revenue will reach 37,520,315 ten thousand yuan in 2025 and 39,093,846 ten thousand yuan in 2026.

4. Summary

This paper first conducts data analysis on the influencing factors of Fujian Province's fiscal revenue. Then, it uses the Lasso regression method to select feature variables. Finally, through the Grey Prediction Model, it predicts Fujian Province's fiscal revenue for 2025 and 2026, estimating 37,520,315 ten thousand yuan in 2025 and 39,093,846 ten thousand yuan in 2026. Finally, it provides a recommendation that increasing regional GDP is beneficial for improving fiscal revenue.

References

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