# The Influence of Tax and Fee Reduction on Enterprise Profits and Revenues

# -- Based on the Analysis of Shanxi Province

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## Abstract

**This paper selects the panel data of a-share listed companies and macro finance in Shanxi Province from 2016 to 2020, and chooses the time series data of financial statements in Shanxi Fenjiu (stock code: 600809.SH) from 1990 to 2020, studing the impact of tax reduction and fee reduction on enterprise profits and government revenue by establishing multiple linear regression model, ARIMA model, static panel model and dynamic panel model. The conclusions are as follows: tax reduction and fee reduction can significantly and continuously promote enterprise profits. The promotion effect of tax reduction and fee reduction on enterprise profits has tax type differences and regional differences. Both enterprise income tax reduction and value-added tax reduction have an inhibitory effect on the fiscal revenue of Shanxi Province in short term, and the inhibitory effect of value-added tax reduction is greater, while the enterprise income tax reduction and value-added tax reduction can promote the fiscal revenue of Shanxi Province in long term. There are regional differences in the impact of tax reduction and fee reduction on fiscal revenue at the same time.**

## Keywords

**Tax and fee reduction; Enterprise profits; Local fiscal revenues.**

## 1. Background Introduction

### 1.1. Introduction

Tax and fee reduction includes two parts: tax reduction and exemption and abolition of administrative fees. In 2016, the implementation of the policy of replacing business tax with value-added tax further optimized the tax structure. In 2020, thanks to the pandemic, China cut taxes and fees by more than 2.5 trillion yuan.[1]

In 2020, Shanxi Taxation Bureau of the State Administration of Taxation actively promoted 10 tax support policies, and data showed that the province reduced new taxes and fees by 12.601 billion yuan, and handled deferred income tax of 3.173 billion yuan for enterprises with business difficulties affected by the epidemic.

Tax and fee reduction will reduce government revenue and thus affect government expenditures, especially rigid expenditures. However, after tax cuts and fee cuts, enterprises will be less burdened and better able to expand production. Therefore, it actually uses the subtraction of government revenue in exchange for the addition of enterprise efficiency and the multiplication of market vitality.[2] The fiscal gap caused by tax and fee reduction can be made up by optimizing the structure of fiscal expenditure. In fact, with the expansion of the tax base, government fiscal revenue will also increase.

## 1.2.  Literature Review

After replacing business tax with value-added tax in 2016, with the implementation of the government's measures to cut taxes and fees, domestic studies mainly focused on the revenue and economic effects of tax cuts and fees. J.Wang (2021)[3] held that the policy of tax reduction and fee reduction is from a long-term perspective to realize the long-term optimization of fiscal management, effectively relieve the financial pressure at the present stage, and reduce all kinds of risks to meet the current development needs. S.N.He and L.Wang (2021)[4] thought that under the background of large-scale tax and fee reduction, local governments at all levels will face more pressure of fiscal revenue and expenditure, and the normal performance of various functions of local governments will be hindered when the pressure of rigid expenditure of local governments only increases, which is not compatible with the goal of high-quality economic development in China. Some scholars also analyzed the impact of tax and fee reduction policies on corporate profits, such as Y.L.Wu (2022)[5] showed that the central and local intensive tax preferential policies, strongly released the government to support the development of small and micro enterprises signal. Such as X.X.Cao (2021)[6] concluded that the reduction and exemption of social insurance expenses can reduce the labor cost of enterprises to a great extent, alleviate the problem of enterprise personnel reduction caused by insufficient funds due to high social insurance rate, and help to stabilize and expand employment. Previous studies on tax reduction and fee reduction in Shanxi Province only stayed at the level of data and theory, and did not establish a model for in-depth analysis of the specific impact and relationship between tax reduction and fee reduction in Shanxi Province in recent years on corporate profits and government fiscal revenue. Therefore, this paper makes a comprehensive analysis based on the two-way subject of tax reduction and fee reduction by government and enterprises.

## 1.3.  Research Hypothesis

After the implementation of the policy of tax and fee reduction, the overall tax burden of enterprises is reduced. Due to the changes in tax structure, the changes in net profit of enterprises are directly affected by this year's profits and indirectly affected by operating costs and cash flow. At the same time, tax reduction and fee reduction policies mainly affect the tax revenue of Shanxi Province, and fiscal revenue of Shanxi Province mainly comes from tax revenue, so tax reduction and fee reduction has a transmission effect on local fiscal revenue.Therefore, the following assumptions can be put forward:

1. Promoting effect of tax and fee reduction on enterprise profits and tax differences

Tax and fee reduction cover a wide range of areas, such as corporate income tax, value-added tax reduction and fee reduction, and social insurance premium reduction. Because tax reduction and fee reduction have a great impact on enterprise production and operation, this paper focuses on tax reduction and fee reduction. Mainly from the enterprise income tax and value-added tax, the two tax methods and standards are different, the former mainly affects the production and operation results of enterprises, while the latter directly affects the production cost, so different taxes should have different impacts on enterprise profits.

2. Regional differences in the impact of tax and fee cuts on corporate profits

Taiyuan, the capital of Shanxi Province, and other prefecture-level cities are distributed with different enterprises of different nature. Each enterprise applies different tax reduction and fee reduction policies and enjoys different tax preferences. Enterprises in different regions are also different in their sensitivity to policies, thus making regional differences in the impact of tax and fee reduction on enterprise profits.

3. Continuity of the impact of tax and fee cuts on corporate profits

Not only the tax reduction and fee reduction in the current period, but also the tax reduction and fee reduction in the previous period may have an indirect impact on corporate profits. The

tax reduction and fee reduction in the previous period promoted the upgrading of production equipment and the research and development of new products, which directly promoted the expansion and reproduction of enterprises in the current period, affected the effect of tax reduction and fee reduction in the current period, and indirectly affected corporate profits in the current period.

4. Tax heterogeneity of the impact of tax reduction and fee reduction on fiscal revenue

The reduction of different taxes and fees has different effects on fiscal revenue. The effects are large and small, and there are differences between short-term and long-term effects.In the short term, tax reduction reduces fiscal revenue, but with the development of enterprises, it can increase tax revenue by increasing tax base in the long term. Take corporate income tax and value-added tax for example, they have different impacts on corporate profits, so they also play different roles in local fiscal revenue.

5. Regional heterogeneity of the impact of tax and fee cuts on fiscal revenue

Taiyuan, the capital of Shanxi Province, and other prefecture-level cities are home to enterprises of different nature. In some areas, for example, coal mining is relatively undiversified, so the impact of tax and fee cuts may be relatively undiversified.At the same time, different tax policies are applied to each enterprise, resulting in different tax burdens. Enterprises located in the center of provincial capitals may enjoy more preferential policies and are more sensitive to policy adjustment. Therefore, fiscal revenues in different regions are different in their sensitivity to tax and fee reductions.

6. Continuity of the impact of tax and fee cuts on fiscal revenue

In the short term, tax reduction reduces fiscal revenue, but with the development of enterprises, it can increase tax revenue by increasing tax base in the long term and promote the recovery and development of local economy. Therefore, the impact of tax and fee cuts is long-term and continuous, and there is a certain cumulative effect.

## 1.4. Research Value

From the perspective of the impact of tax and fee reduction on enterprises, it shows the implementation of tax and fee reduction in Shanxi Province. While stimulating the vitality of enterprises, it strengthens the confidence of the government to continue to promote tax reduction and fee reduction measures, and encourages the government to deepen the reform of tax reduction and fee reduction policies. From the perspective of the impact of tax reduction and fee reduction on government fiscal revenue, the long-term effects of tax reduction and fee reduction on economic situation and increase of government fiscal revenue are demonstrated, and the government's confidence in further promoting tax reduction and fee reduction measures is further strengthened. In combination with the method of literature research of innovation at the same time, the optimization of tax cuts JiangFei, promote regional economic growth to give practical advice and guidance, and further study of tax cuts JiangFei influence on enterprise development and fiscal revenue, Shanxi Province, through comparing and developed cities in Shanxi Province and the related model and the data analysis, Based on the analysis of the current situation, this paper tries to give more realistic and time-valued suggestions to help the take-off and development of Shanxi Province.

## 2. Data Sources and Description

### 2.1. Sample Selection and Data Sources

#### 2.1.1. Data Sources

Select all a-share listed companies in Shanxi Province in Shanghai and Shenzhen stock markets from 2016 to 2020 as research samples, and establish panel data supplemented by basic data

and financial data of Shanxi Province from 2016 to 2020, and select Shanxi Fenjiu (stock code 600809.SH) as research samples for time series analysis. Obtain relevant financial statement data from 1990 to 2020. Use Wind database to download the link of the annual report of relevant companies, collect the annual report data and export the fiscal data of Shanxi Province; Use Python to crawl the company's annual report data and shanxi's financial data from the annual Report link and shanxi's statistical yearbook; Collect and verify the data of specific companies, such as taxes payable and annual profits, by using NetEase Finance; Find relevant data directly in Shanxi Statistical Yearbook; Data integration and missing data search were carried out by using the statistical database of regional development of CNKI. Find and estimate the basic data and financial data of Shanxi Province in 2020 from the announcement on the official website of Shanxi Provincial Bureau of Statistics.

### 2.1.2. Sample Selection

By eliminating some samples with negative net profit and data with obvious deviation in calculation results to ensure the accuracy of model estimation, 315 effective sample data of a-share listed companies in each year were finally obtained, and the time series data of tax and fee reduction and annual profit of Shanxi Fenjiu from 1990 to 2020 were obtained. And panel data combining listed company data with macro financial data.

## 2.2.   Variable Definition and Description

### 2.2.1. Variable Definition Table

**Table 1.** Variable definition table

| Variable types | symbol | Variable meaning | Variable declaration |
|---|---|---|---|
| Explained variable | Revenue | Per capita fiscal revenue | General budget revenue/population |
| | Profit | Corporate profits | The total amount of profit in an enterprise's annual report |
| Explanatory variables | RIT | Corporate income tax reduction | (25%- Income tax expense/Total profit)*100 |
| | VRT | VAT reduction | (17%- total VAT/operating revenue)*100 |
| Control variables | Employ | Number of employed persons | From Statistical Yearbook of Shanxi Province |
| | Invest | Investment in fixed assets | From Statistical Yearbook of Shanxi Province |
| | Revenue | Fiscal revenue | General budget revenue |
| | Expense | Fiscal spending | General budget expenditure |
| | GDP | Regional GDP | From Statistical Yearbook of Shanxi Province |

### 2.2.2. Variable Definition Table

As shown in Table 2, the standard deviation of per capita fiscal income of local governments in Shanxi Province is 1886.37, indicating that the per capita fiscal income of cities varies greatly among regions. The mean value of corporate income tax reduction in each city is smaller than VAT reduction, and the standard deviation is larger than VAT reduction, indicating that the range of corporate income tax reduction is smaller, but the difference is larger. The standard deviation of corporate profits is very large, indicating that the profits of a-share listed companies in Shanxi Province are very different.The standard deviation of the control variable is large, indicating that the sample difference is large, which meets the requirements of the control variable.At the same time, all the data are normalized, and then the data are substituted

into the model for operation, eliminating the influence of dimension on the model, making the fitting more accurate.

**Table 2.** Descriptive statistics of main variables

| variable | The mean | The standard deviation | The minimum value | The maximum |
|---|---|---|---|---|
| Revenue | 3984.01 | 1886.37 | 1114.19 | 8664.89 |
| Profit | 110850.10 | 282030.20 | 293890.00 | 2070646.00 |
| RIT | 6.67 | 18.93 | 55.58 | 71.39 |
| VRT | 10.97 | 6.50 | 20.24 | 38.55 |
| Employ | 184.24 | 55.76 | 73.12 | 280.56 |
| Invest | 743.74 | 381.37 | 214.90 | 2027.71 |
| Expense | 326.94 | 116.30 | 95.73 | 647.35 |
| GDP | 1465.95 | 804.19 | 622.86 | 4350.79 |

## 3. Modeling and Analysis of Linear Regression of Tax and Fee Reduction on Enterprise Profits

### 3.1. Data Preprocessing

Firstly, the natural logarithm of corporate profits, income tax reduction and value-added tax reduction is taken to remove the impact of negative values on the results and reduce the impact of dimensions on the results, making the relationship between the two more obvious in the scatter diagram. The scatterplot shows that corporate profits are inversely proportional to income tax reduction and VAT reduction, which deviates from the previous prediction. It is not difficult to observe the above figure carefully to find that there are particularly large deviations in both figures, which directly affect the establishment of the model. Through consulting materials, it is found that the scale of deduction and benefit of enterprises is also different due to the different industrial chain. Since 2019, at the same time increasing the state administration of taxation on tax audit and investigate all kinds of tax evasion behavior and the way of reasonable tax reduction, tax and fee reduction promotes the enterprises to expand reproduction, thereby directly increasing corporate profits has a certain amount of time lag, corporate profits will not immediately increased significantly. To sum up, it can be considered that the existence of the above outliers is based on specific circumstances, and we can remove them appropriately without having a great impact on the results of model establishment.
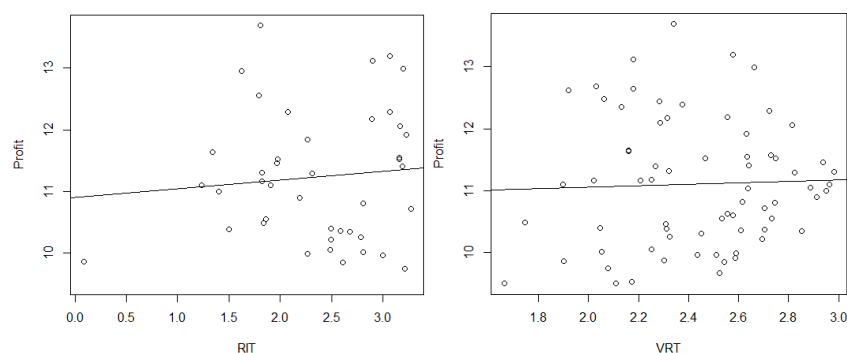


**Figure 1.** Outlier processing results

After processing the outliers for many times, the expected direct proportion relationship between corporate profits and income tax reduction and VAT reduction was obtained, and the data points were basically evenly distributed on both sides of the regression line, which had a relatively significant relationship, facilitating the establishment of subsequent models. Of course, this is only a separate scatter plot of corporate profits, income tax reduction and VAT reduction, which mainly emphasizes that there is a relatively significant relationship between them, and the initial inverse relationship is properly discussed. After removing the outliers, expected results can be obtained.

### 3.2. Collinearity Test

Firstly, corporate profit in the above variable definition table is selected as the explained variable, corporate income tax reduction and value-added tax reduction as the explained variable, and fiscal revenue, fiscal expenditure, employment number, regional GDP and fixed asset investment as the control variables to construct the following model:

$$\ln(\text{Profit}_{t,i,n}) = \beta_0 + \beta_1\ln(\text{RIT}_{t,i,n}) + \beta_2\ln(\text{VRT}_{t,i,n}) + \beta_3\ln(\text{Employ}_{t,i}) + \beta_4\ln(\text{Invest}_{t,i}) + \beta_5\ln(\text{Revenue}_{t,i}) + \beta_6\ln(\text{Expense}_{t,i}) + \beta_7\ln(\text{GDP}_{t,i}) + \varepsilon_{t,i} \qquad (1)$$

Where, t represents the time, i represents a city, n represents an enterprise, and $\text{Profit}_{t,i,n}$, $\text{RIT}_{t,i,n}$, $\text{VRT}_{t,i,n}$ represent the profits, corporate income tax reduction and value-added tax reduction obtained by the n enterprise iniin the year of t; $\text{Revenue}_{t,i}$, $\text{Expense}_{t,i}$, $\text{Employ}_{t,i}$, $\text{GDP}_{t,i}$, $\text{Invest}_{t,i}$ represent the annual fiscal revenue, fiscal expenditure, employment number, regional GDP and fixed asset investment of the city; $\varepsilon_{t,i}$ is the residual term and $\beta_0$ represents the constant term.

OLS least square method was used to fit the above model, collinearity test was carried out according to VIF variance inflation factor, and correlation coefficient matrix and graph were obtained for auxiliary judgment. The VIF of $\text{Revenue}_{t,i}$, $\text{Expense}_{t,i}$ and $\text{GDP}_{t,i}$ are over than 10, at the same time, referring to the correlation coefficient matrix, their correlation coefficients are large and highly linear, so it can be considered that the model is colinear, and the correlation between explanatory variables should be eliminated to obtain the optimal model.

### 3.3. Model Selection

Stepwise regression analysis was conducted on the model and AIC criterion was used as the judgment basis to select the model with the minimum AIC value. The relevant results are shown in Table 3.

**Table 3.** Stepwise regression analysis of the model

| model | AIC |
|---|---|
| $\ln(\text{Profit}_{t,i,n}) = \beta_0 + \beta_1\ln(\text{RIT}_{t,i,n}) + \beta_2\ln(\text{VRT}_{t,i,n}) + \beta_3\ln(\text{Employ}_{t,i}) + \beta_4\ln(\text{Invest}_{t,i})$ $+ \beta_5\ln(\text{Revenue}_{t,i}) + \beta_6\ln(\text{Expense}_{t,i}) + \beta_7\ln(\text{GDP}_{t,i}) + \varepsilon_{t,i}$ | 85.59 |
| $\ln(\text{Profit}_{t,i,n}) = \beta_0 + \beta_1\ln(\text{RIT}_{t,i,n}) + \beta_2\ln(\text{VRT}_{t,i,n}) + \beta_3\ln(\text{Employ}_{t,i}) + \beta_4\ln(\text{Invest}_{t,i})$ $+ \beta_5\ln(\text{Expense}_{t,i}) + \beta_6\ln(\text{GDP}_{t,i}) + \varepsilon_{t,i}$ | 83.63 |
| $\ln(\text{Profit}_{t,i,n}) = \beta_0 + \beta_1\ln(\text{RIT}_{t,i,n}) + \beta_2\ln(\text{VRT}_{t,i,n}) + \beta_3\ln(\text{Employ}_{t,i}) + \beta_4\ln(\text{Expense}_{t,i})$ $+ \beta_5\ln(\text{GDP}_{t,i}) + \varepsilon_{t,i}$ | 81.7 |

Through screening, the optimal model under AIC criterion is obtained:

$$\ln\left(\text{Profit}_{t,i,n}\right) = \beta_0 + \beta_1\ln\left(\text{RIT}_{t,i,n}\right) + \beta_2\ln\left(\text{VRT}_{t,i,n}\right) + \beta_3\ln\left(\text{Employ}_{t,i}\right) + \beta_4\ln\left(\text{Expense}_{t,i}\right) + \beta_5\ln\left(\text{GDP}_{t,i}\right) + \varepsilon_{t,i} \quad (2)$$

## 3.4. Residual Test

Firstly, residual histogram and normal QQ chart were used to observe whether the residual distribution of samples was in line with normal distribution.
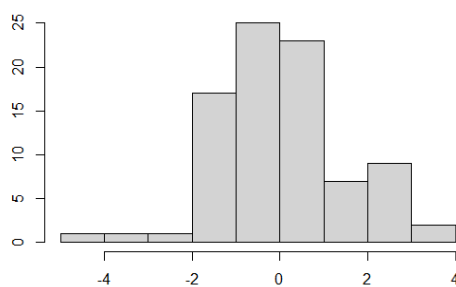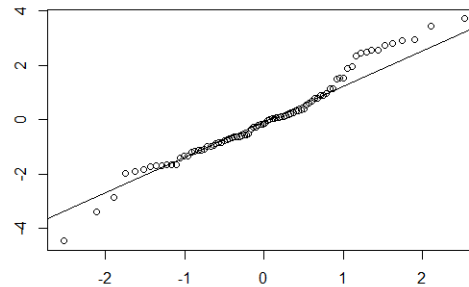


**Figure 2.** Residual histogram          **Figure 3.** Normal QQ diagram

It can be observed from the residual bar chart and the normal QQ chart that sample residuals basically follow the normal distribution, which conforms to the basic hypothesis of OLS least square method.From skewness, kurtosis and D.W. test to determine whether the residual is normal distribution. The skewness of sample residual is 0.2229 close to 0, and the kurtosis is 3.2930 close to 3, which meets the requirements of normal distribution.At the same time, the D.W. test value was close to 2, and the p-value was 0.45, greater than 0.05. There was no sequence correlation between the residuals. If the null hypothesis was accepted, it could be considered that the residuals followed normal distribution, and the sample data passed the residual test.

## 3.5. Model Modification

VIF variance inflation factor test and correlation coefficient matrix test were performed on the optimal model under the AIC criterion: the VIF obtained after automatic screening was less than 10, but the VIF of Expense$_{t,i}$ is 9.4281 which is close to 10, and it is related to the correlation coefficient of GDP$_{t,i}$ is large and has significant correlation in scatter plot. Therefore, separate variables were removed and AIC values were compared for further analysis, and model explanatory variables were optimized.

After cutting off the Expense$_{t,i}$, the increase of RSS and AIC is minimal, so consider deleting Expense$_{t,i}$. And correlation collinearity test was performed. The VIF of the final model is very small, and the correlation coefficient matrix does not have significant correlation. Although the scatter distribution diagram of the correlation coefficient still exists collinearity, its influence on the interpretation of the model can be basically ignored, and a relatively good model can be considered as follows:

$$\ln\left(\text{Profit}_{t,i,n}\right) = \beta_0 + \beta_1\ln\left(\text{RIT}_{t,i,n}\right) + \beta_2\ln\left(\text{VRT}_{t,i,n}\right) + \beta_3\ln\left(\text{Employ}_{t,i}\right) + \beta_4\ln\left(\text{GDP}_{t,i}\right) + \varepsilon_{t,i} \quad (3)$$

In conclusion, the model design passes collinearity test, and there is basically no multicollinearity between explanatory variables.The sample data passed the residual test, and the residual items basically had no sequence correlation, followed the normal distribution and met the basic assumptions of OLS.

## 3.6.   Analysis of Model Results

Table 4 shows the fitting results of the above final model. It can be seen that corporate income tax reduction and VAT reduction are very significant for corporate profits, and the explanatory variables of the model have a high significance, which has a good explanatory effect. $R^2$ And the adjusted $R^2$ relatively small, the goodness of fit of the model is not high, but considering the short history of tax and fee reduction, there are few samples that can be collected, and some outliers are removed in the modeling process, the explanatory variable alone is strong, F statistic and p-value also explain the overall interpretation effect of the model well.

**Table 4.** Model fitting results

|  | Estimate | Std.Error | t value | Pr(>\|t\|) |  |
|---|---|---|---|---|---|
| $\beta_0$ | 22.8476 | 4.1817 | 5.4640 | 5.01 e-07 | * * * |
| $RIT_{t,i,n}$ | 0.6491 | 0.1668 | 3.8910 | 0.0002 | * * * |
| $VRT_{t,i,n}$ | 0.8417 | 0.3346 | 2.5150 | 0.0139 | * |
| $Employ_{t,i}$ | 1.6476 | 0.8747 | 1.8840 | 0.0632 | . |
| $GDP_{t,i}$ | 0.5579 | 0.3605 | 1.5480 | 0.1256 |  |
| $R^2$ | 0.2942 | | | | |
| Adjusted $R^2$ | 0.2594 | | | | |
| F statistic | 8.442 | | | | |
| P values | 9.59 e-06 | | | | |
| T statistic significance: 0 '* * *' 0.001 '* *' 0.01 '*' 0.05 '.' '0.1' 1 ' | | | | | |

In particular, the parameter estimation value can be obtained as follows:

$$\ln\left(Profit_{t,i,n}\right) = 22.8476 + 0.6491\ln\left(RIT_{t,i,n}\right) + 0.8417\ln\left(VRT_{t,i,n}\right) - $$
$$1.6476\ln\left(Employ_{t,i}\right) + 0.5579\ln\left(GDP_{t,i}\right) \qquad (4)$$

Corporate income tax reduction and value-added tax reduction are directly proportional to corporate profits, which verifies the previous hypothesis that tax reduction and fee reduction do promote the increase of corporate profits, which is consistent with economic significance.At the same time, the two coefficients are different, which verifies that different tax and fee reduction policies have different effects on enterprise profits. Comparatively speaking, VAT tax reduction has a stronger promoting effect on the increase of enterprise profits than income tax reduction. This is because VAT tax reduction reduces the direct operating cost of enterprises, so enterprises have more working capital to expand production in their daily operation activities, and achieve an increase in operating profits while reducing production costs.For the enterprise income tax tax cuts, is at the end of the production and operation of an enterprise for secondary distribution of corporate profits, can increase the enterprise surplus reserves, but corporate profits may be distributed to shareholders in the form of dividends, at the same time, surplus reserves accumulation of short-term won't be directly used in production and operation, so for corporate profits. Relatively speaking, the increase of regional employment population will increase the cost expenditure of enterprises and reduce their profits.GDP reflects the overall economic level of the society, so the improvement of GDP will promote the increase of corporate profits.

## 3.7. Modeling and Analysis of Samples from Different Regions

With reference to the above models, the enterprise profit, enterprise income tax reduction, value-added tax reduction, regional employment population and regional GDP models are established for enterprises in Taiyuan, capital of Shanxi Province and other regions respectively, and the differences and connections between the two are compared.

$$(1)\ln\left(\text{Profit}_{t,n}\right) = \gamma_0 + \gamma_1\ln\left(\text{RIT}_{t,n}\right) + \gamma_2\ln\left(\text{VRT}_{t,n}\right) + \gamma_3\ln\left(\text{Employ}_t\right) + \gamma_4\ln\left(\text{GDP}_t\right) + \varepsilon_t \quad (5)$$

Where t represents the time, n represents an enterprise, and $\text{Profit}_{t,n}\text{RIT}_{t,n}\text{VRT}_{t,n}\text{nEmploy}_t$ represent the corporate profits, corporate income tax reduction and value-added tax reduction obtained by the enterprise in Taiyuan in t years; $\text{Employ}_t$ and $\text{GDP}_t$ represent the number of employed persons in Taiyuan and the GDP of the region; $\varepsilon_t$ Is the residual term and $\gamma_0$ represents the constant term.

$$(2)\ln\left(\text{Profit}_{t,i,n}\right) = \delta_0 + \delta_1\ln\left(\text{RIT}_{t,i,n}\right) + \delta_2\ln\left(\text{VRT}_{t,i,n}\right) + \delta_3\ln\left(\text{Employ}_{t,i}\right) + \delta_4\ln\left(\text{GDP}_{t,i}\right) + \varepsilon_{1t,i} \quad (6)$$

Where t represents the time, i represents a city, n represents an enterprise, and $\text{Profit}_{t,i,n}$, $\text{RIT}_{t,i,n}$, $\text{VRT}_{t,i,n}$ represents the profits, corporate income tax reduction and value-added tax reduction obtained by the n enterprise in i in the year of t; $\text{Employ}_{t,i}$ and $\text{GDP}_{t,i}$ represent the number of employed persons in the i city and the GDP of the region in the year of t; $\varepsilon_{1t,i}$ is the residual term and $\delta_0$ represents the constant term.

The modeling results are as follows:

**Table 5.** Fitting results of model (1)

|  | Estimate | Std.Error | t value |
|---|---|---|---|
| $\gamma_0$ | 147.0469 | 508.8187 | 0.2890 |
| $\text{RIT}_{t,n}$ | 0.3507 | 0.2668 | 1.3140 |
| $\text{VRT}_{t,n}$ | 0.3043 | 0.5095 | 0.5970 |
| $\text{Employ}_t$ | 31.1896 | 105.6991 | 0.2950 |
| $\text{GDP}_t$ | 1.5549 | 8.3205 | 0.1870 |

**Table 6.** Fitting results of model (2)

|  | Estimate | Std.Error | t value |
|---|---|---|---|
| $\delta_0$ | 18.2347 | 7.6255 | 2.3910 |
| $\text{RIT}_{t,i,n}$ | 0.8517 | 0.2109 | 4.0380 |
| $\text{VRT}_{t,i,n}$ | 1.5882 | 0.4565 | 3.4790 |
| $\text{Employ}_{t,i}$ | 1.8765 | 0.9732 | 1.9280 |
| $\text{GDP}_{t,i}$ | 0.0904 | 1.3786 | 0.0660 |

Tax and fee reduction measures on corporate profits promote the rest of the region is higher than Taiyuan in Shanxi Province, the specific analysis of the reason is that the rest of a-share listed companies in Shanxi Province is mainly engaged in energy industry, heavy industry, such as coal tax relief for the cost reduction is significant, the expansion of production speed and

effect is better than that of general enterprises.At the same time, there are generally only one or two a-share listed companies in a prefecture-level city in the rest of Shanxi Province, and the government's tax and fee reduction system is more targeted, which benefits more.

## 3.8. Conclusions and Recommendations

The results show that tax and fee reduction has a significant and continuous promotion effect on enterprise profits.The promotion effect of tax reduction and fee reduction on enterprise profits has different tax types and regional differences. The promotion effect of VAT reduction is stronger. The promotion effect of enterprise income tax reduction in Taiyuan city is stronger, while the promotion effect of VAT reduction in other regions is stronger.At the same time, regional GDP is positively correlated with corporate profits, while the increase in local employment will restrain the increase in corporate profits.

Based on the above research conclusions, the following suggestions are made: First, the government should pay close attention to the macroeconomic situation and innovate tax reform plans to benefit more enterprises. Second, due to unbalanced regional development, the government should adopt policies to cut fees and taxes in accordance with local conditions. Third, corporate profits are affected not only by tax and fee cuts, but also by GDP and regional employment.

## 4. Modeling and Analysis of Time Series of Tax and Fee Reduction on Enterprise Profits

### 4.1. Description of Sample Selection

Shanxi Fenjiu, as the earliest listed company in Shanxi Province with stock code 600809.SH, has been among the best listed companies in Shanxi Province since it was listed in Shanghai Stock Exchange with obvious advantages. In the recent two years, with the popularity of liquor industry, its stock price in the secondary market has performed strongly, ranking the fifth in liquor industry. Its market value has exceeded 300 billion yuan, and as the highest listed company in Shanxi Province, its market value will reach 317.132 billion yuan in 2020.

Therefore, Shanxi Fenjiu is the most suitable object and sample for time series analysis of the impact of tax reduction and fee reduction on corporate profits among all a-share listed companies in Shanxi Province, no matter from the perspective of its own development strength, its ability to implement policies or the inclination of the government's tax reduction and fee reduction measures.

### 4.2. Stability and White Noise Test

#### 4.2.1. Data Pre-Analysis

As shown in figure, for incom tax and VAT tax images of the change over time, tax and VAT tax cuts can preliminary observed trends and laws change over time to a certain extent, is not a random changes, at the same time, combined with the realistic significance to economics, data selection is correct, can analyze the next step. But at the same time, it is also found that the time series images of income tax reduction and value-added tax reduction fluctuate greatly, and the time series is not stable. After testing and analyzing the autocorrelation coefficient and partial autocorrelation coefficient, the time series should be processed for stability.
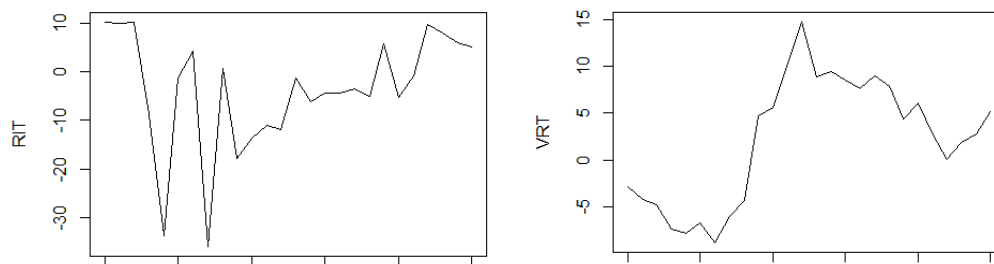
**Figure 4.** Time series changes of original data of income tax reduction and VAT reduction

### 4.2.2. Test of ACF Autocorrelation Coefficient and PARTIAL PACF Autocorrelation Coefficient

As shown in figure, both the ACF and PACF charts of the original data, whether income tax reduction or value-added tax reduction, have large fluctuations. The correlation coefficient and partial autocorrelation coefficient of the high-order lag term are large, and there is no obvious trend toward zero, no obvious truncation or trailing phenomenon, and an upward trend.At the same time, the FAC chart of VAT tax reduction has many data beyond the upper confidence interval and the lower confidence interval, namely the two-fold interval, so it can be considered that the time series of the two are not stable. Therefore, the time series data are processed differentially, and the ACF autocorrelation coefficient and PACF partial autocorrelation coefficient are tested again, hoping to get the stationary series.
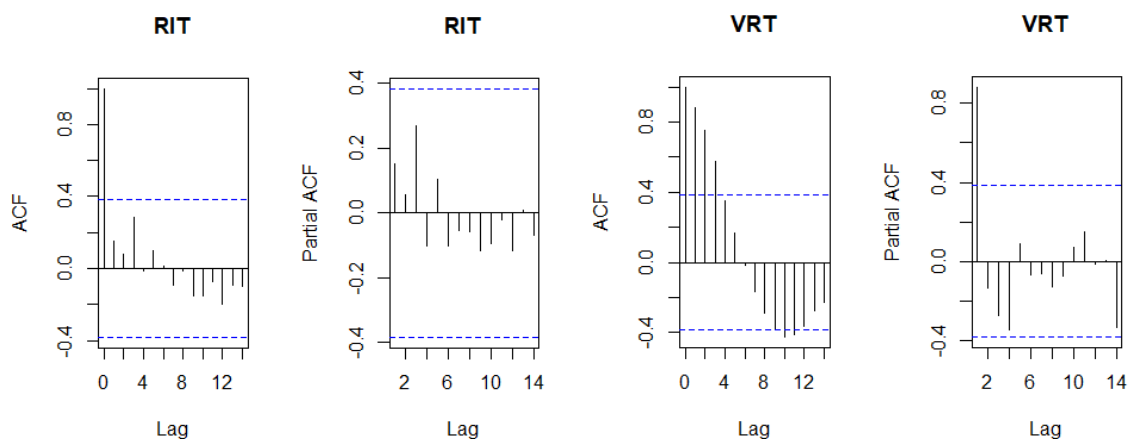


**Figure 5.** ACF and PACF of original data of income tax reduction and VAT reduction

The data of income tax reduction and value-added tax reduction after first-order difference still have a certain trend and rule over time, preserving the original data characteristics. The ACF chart and PACF chart of income tax reduction and value-added tax reduction have little fluctuation and do not have obvious trend of change, with certain truncation and trailing phenomenon. It can be considered that the time series is stable and passes the ACF and PACF tests.

### 4.2.3. Unit Root Test

The unit root test was performed on the two groups of time series data after the above first-order difference, and the p value of the calculated first-order difference time series data was greater than 0.05. Therefore, the null hypothesis could not be rejected, that is, the time series data was considered to be unstable, and the multi-order difference was needed, and the unit root test was performed on the newly obtained data until it passed the test.

After second-order difference and third-order difference, the p-value of time series data unit root test is eventually less than 0.05.The time series type of income tax reduction after third-

order difference has no constant mean, no trend and P-order autoregressive process, and the lag order is 3.After third-order difference, the time series of VAT tax reduction has no constant mean value, no trend of p-order autoregressive process, and the lag order is 2. Through the unit root test, the time series is considered to be stable, and the optional values of parameters are given.

### 4.2.4. White Noise Test

Ljung-box method is used to test the time series data of income tax reduction and value-added tax reduction after third-order difference.It can be found that the P-values of the LB test of the 12-order lag terms are all less than 0.05, which rejects the null hypothesis, that is, the time series tested is not white noise series and passes the white noise test.

## 4.3. Model Identification and Parameter Selection

It can be seen from the autocorrelation diagram and partial autocorrelation diagram after third-order difference that the ACF value of income tax reduction and value-added tax reduction time series data fell into the confidence interval rapidly without convergence trend, showing a trailing property. PACF value fell rapidly into the confidence interval, showing no trend of convergence, showing a trailing property.Therefore, the ARMA model is considered to fit the two time series. Considering that it is the time series after third-order difference, the ARIMA model is used for the original series.
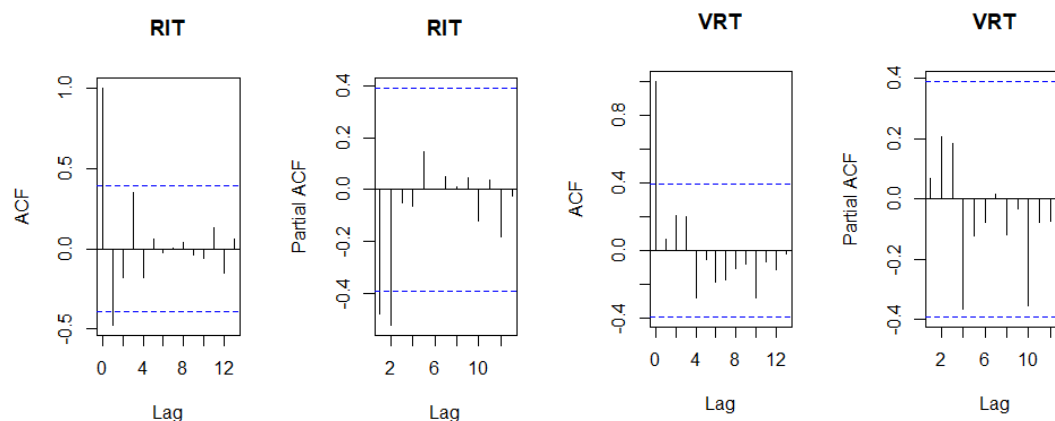


**Figure 6.** ACF and PACF of third-order differential income tax reduction  and VAT reduction

By observing Fig. 6, after the third-order difference, the time series data of income tax reduction ACF attenuates to zero after the third order, and PACF attenuates to zero after the second order, and the difference order is 3, so q=3, p=2, n=3. Considering the error of parameter selection, ACF attenuates to zero after the third order, that is, q=1. Therefore, ARIMA(2,3,3) and ARIMA(2,3,1) models were established respectively. After third-order difference, the VAT tax reduction time series data ACF attenuates to zero after order 0, and PACF attenuates to zero after order 4. The difference order is 3, so q=0, p=4, n=3. Considering the results of unit root test and the error of parameter selection, ARIMA(4,3,0) and ARIMA(3,3,0) models are established respectively. Finally, the ARIMA model of the original time series data of income tax reduction and VAT reduction is established.

## 4.4. Model Testing

### 4.4.1. Residual Test

Firstly, the residual normal QQ map is drawn, and the sample residual conforms to the basic requirements of the model for the residual to follow a normal distribution with a mean of zero.

White noise test was performed on the residual sequences of the two time series models. Since the p-values of LB statistics of the two residual sequences were significantly greater than 0.05 under each order lag, it could be considered that the residual sequences of the two fitting models were white noise sequences, that is, the fitting model was significantly effective.

According to the results, the p-value of income tax reduction is 0.9046, and the P value of VAT reduction is 0.6951, indicating that the residual of the model does not pass the LB test, that is, it can be considered that the autocorrelation coefficient of the residual is zero, and the ARIMA model can better fit this data.However, the model fitting degree needs to be improved, so try to establish GARCH model for auxiliary analysis of time series data of VAT tax reduction.

### 4.4.2. Significance Test of Variables

The T-test p-values of all variables of ARIMA model fitting results established by the time series of Shanxi Fenliquor income tax reduction and VAT tax reduction are all greater than 0.05. Through the T-test, it is believed that all variables are significant in the model, which can well explain the model and the model fitting effect is good.

### 4.4.3. Model Optimization

The AIC value of ARIMA(2,3,3) model established by time series of income tax reduction is 197.51, and the AIC value of ARIMA(2,3,1) model is 206.86, so ARIMA(2,3,3) model is selected. The AIC value of ARIMA(4,3,0) model established by time series of VAT tax reduction is 135.96, and the AIC value of ARIMA(3,3,0) model is 134.12, so ARIMA(3,3,0) model is selected. At the same time, the GARCH model was established for the original time series data of VAT tax reduction, and the autocorrelation coefficient of the residual was tested. The p-value was 0.51, that is, the autocorrelation coefficient of the residual was considered to be zero, and the GARCH model could better fit the data.

## 4.5. Analysis of Model Results

### 4.5.1. Arima Model Results of the Original Time Series of Income Tax Reduction and Value-Added Tax Reduction

The original model of ARIMA model is:

$$\begin{cases} \Phi(B)\nabla^d x_t = \Theta(B)\varepsilon_t \\ E(\varepsilon_t) = 0, \ Var(\varepsilon_t) = \sigma_\varepsilon^2, E(\varepsilon_t \varepsilon_s) = 0, s \neq t \\ Ex_s\varepsilon_t = 0, \forall s < t \end{cases} \tag{7}$$

Through the above analysis, the ARIMA model established from the original time series data of income tax reduction has passed various tests and can fit the data well. According to the fitting results in Table 7, the following model is established:

$$\nabla^3 RIT_t = -0.3429\nabla^3 RIT_{t-1} - 0.3952\nabla^3 RIT_{t-2} + \varepsilon_t - 2.5520\varepsilon_{t-1}2.4555\varepsilon_{t-2} - 0.8604\varepsilon_{t-3} \tag{8}$$

**Table 7.** ARIMA model results of corporate income tax reduction

|          | ar1      | ar2            | ma1      | ma2      | ma3      |
|----------|----------|----------------|----------|----------|----------|
|          | 0.3429   | 0.3952         | 2.5520   | 2.4555   | 0.8604   |
| s.e.     | 0.2330   | 0.2023         | 0.2919   | 0.5705   | 0.3378   |
| sigma^2  | 105.1000 | log likelihood | 92.7500  | aic      | 197.5100 |

According to the fitting results in Table 8, the original time series data of VAT tax reduction is established to establish the ARIMA model:

$$\nabla^3 VRT_t = -1.3572\nabla^3 VRT_{t-1} - 0.9870\nabla^3 VRT_{t-2} - 0.2422\nabla^3 VRT_{t-3} + \varepsilon_t \tag{9}$$

**Table 8.** ARIMA model results of VAT tax reduction

|  | ar1 | ar2 | ar3 |
|---|---|---|---|
|  | 1.3572 | 0.9870 | 0.2422 |
| s.e. | 0.1990 | 0.2721 | 0.1941 |
| sigma^2 | 12.8100 | | |
| log likelihood | 63.0600 | | |
| aic | 134.1200 | | |

The standard deviation of each estimated value of the above model is small, and it has a good fitting degree, which proves the correctness of the model again.Specific observations, through mathematical analysis combined with relevant theory can know a tax and VAT tax cuts actually has time correlation, past data will affect the current data, at the same time tend to influence degree of the data of the previous period is greater than the previous data is greater than the influence of past data again, that means tax cuts JiangFei system has certain effects on real time lag. At the same time, the influence coefficient of the previous data is positive, indicating that the data of tax reduction and fee reduction in the previous period has a positive impact on the data of tax reduction and fee reduction in the current period. Tax reduction and fee reduction directly affect the enterprise cost, indirectly affect the enterprise profit, and increase the total enterprise profit, confirming the previous assumption of the continuity of the impact of tax reduction and fee reduction on the enterprise profit. Not only the tax reduction and fee reduction in the current period, but also the tax reduction and fee reduction in the previous period may have an indirect impact on corporate profits. The tax reduction and fee reduction in the previous period promoted the upgrading of production equipment and the research and development of new products, which directly promoted the expansion and reproduction of enterprises in the current period, affected the effect of tax reduction and fee reduction in the current period, and indirectly affected corporate profits in the current period.

### 4.5.2. GARCH Model Based on Original Time Series Data of VAT Tax Reduction

The original model of GARCH model is:

$$\begin{cases} x_t = f(t, x_{t-1}, x_{t-2}, \cdots) + \varepsilon_t \\ \varepsilon_t = \sqrt{h_t}e_t \\ h_t = \omega + \sum_{i=1}^{p} \eta_i h_{t-i} + \sum_{j=1}^{q} \lambda_j \varepsilon_{t-j}^2 \end{cases} \tag{10}$$

Through the above analysis, the GARCH model established by the original time series data of VAT tax reduction has passed various tests and can better fit the data. According to the fitting results of Table 9, the following model is established:

$$\sigma_t^2 = 1.057 * 10^1 + 1.309 * 10^{-1}\varepsilon_{t-1}^2 + 4.720 * 10^{-15}\sigma_{t-1}^2 \tag{11}$$

**Table 9.** GARCH model results

|  | Estimate | Std. Error | t value |
|---|---|---|---|
| a0 | 1.057 e+01 | 3.033 e+01 | 0.349 |
| a1 | 1.309 e-01 | 2.3628 e-01 | 0.554 |
| b1 | 4.720 e-15 | 2.654 | 0.000 |

The model again confirm VAT tax cuts actually has time correlation, past data will affect the current data, the volatility between them also has relevance, the early stage of the VAT tax cuts will affect the effect of the current VAT tax cuts, which affect corporate profits, confirm the previous assumptions tax cuts JiangFei the continuity of the impact on corporate profits.

### 4.5.3. Model Prediction

Forecast model and map under the confidence level of 95% forecast graph, as shown in Fig. 7, in the next five years, income tax and VAT tax cuts will further enhance, this is the result of the years before the implementation of the tax cuts JiangFei system and promote enterprise burden will reduce further, to expand the enterprise development space, to stimulate further improvement in corporate profits.
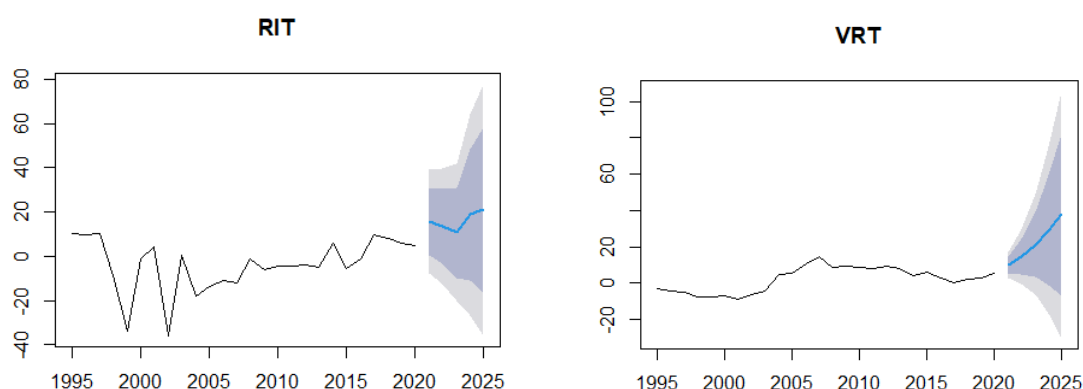


**Figure 7.** Time series forecast of income tax reduction and VAT reduction

## 4.6. Conclusions and Recommendations

Income tax cuts and VAT cuts are time-dependent, and past data will affect current data. At the same time, the real effect of tax and fee reduction system has a certain time lag, and the influence degree of data in the previous period is usually greater than that in the previous period. In addition, the data of tax reduction and fee reduction in the past have a positive impact on the data of tax reduction and fee reduction in the current period. Tax reduction and fee reduction directly affect the cost of enterprises, indirectly affect the profits of enterprises, and increase the total profits of enterprises.In short, the continuity of tax and fee reduction impact on corporate profits, not only is the tax break this JiangFei, chooses tax and fee reduction still may have indirect effects on corporate profits, tax cuts of the previous period JiangFei promote enterprise upgrading of production equipment and new product research and development, which directly promote the current enterprises expand reproduction, current policies prevailing worldwide tax effect, indirect impact current corporate profits.In the future, income tax reduction and value-added tax reduction will be further enhanced, which is due to the implementation and promotion of tax reduction and fee reduction system in the past years. The burden on enterprises will be further reduced, the development space of enterprises will be expanded, and the further improvement of corporate profits will be stimulated.

Based on the above research conclusions, the following suggestions are made: First, the corporate income tax reduction and value-added tax reduction have a continuous impact on

corporate profits. Over the years, the government has promoted the implementation of the tax and fee reduction system, and its practical effect is slowly showing. Second, enterprises should seize the opportunity in institutional dividends, actively expand production, promote industrial upgrading, transform quantitative changes into qualitative changes, and make tax and fee cuts bring tangible benefits to enterprises. Third, the continuous deepening of tax and fee reduction has brought new challenges to the government's innovation of tax and fee reduction methods and implementation of tax and fee reduction measures..

## 5. Modeling and Analysis of Panel Data on the Impact of Tax and Fee Cuts on Fiscal Revenue

### 5.1. Model Design

In order to test the impact of tax and fee reduction on fiscal revenue of Shanxi Province, this paper constructed the following multivariate panel regression model:

$$(1)\text{Revenue}_{i,t} = \alpha_0 + \beta_1 \text{RIT}_{i,t} + \beta_2 \text{VRT}_{i,t} + \beta_3 \text{Employ}_{i,t} + \beta_4 \text{Invest}_{i,t} + \beta_5 \text{Expense}_{i,t} +$$
$$\beta_6 \text{GDP}_{i,t} + \varepsilon_{i,t} \tag{12}$$

$$(2)\text{Revenue}_{i,t} = \alpha_0 + \beta_1 \text{L}_{-1} \text{Revenue}_{i,t} + \beta_2 \text{RIT}_{i,t} + \beta_3 \text{L}_{-1} \text{RIT}_{i,t} + \beta_4 \text{L}_{-2} \text{RIT}_{i,t} + \beta_5 \text{VRT}_{i,t} +$$
$$\beta_6 \text{L}_{-1} \text{VRT}_{i,t} + \beta_7 \text{L}_{-2} \text{VRT}_{i,t} + \beta_8 \text{Employ}_{i,t} + \beta_9 \text{Invest}_{i,t} + +\beta_{10} \text{Expense}_{i,t} +$$
$$\beta_{11} \text{GDP}_{i,t} + \varepsilon_{i,t} \tag{13}$$

Model (1) is a static model to study the impact of tax reduction and fee reduction on fiscal revenue of Shanxi Province. Model (2) includes time lag into explanatory variables to simulate the impact of tax reduction and fee reduction on fiscal revenue in dynamic changes. In the model, t represents time, i represents a certain city, $\varepsilon_{i,t}$ represents residual term, $\alpha_0$ represents constant term. In model (2), $\text{L}_{-1}\text{Revenue}_{i,t}$, $\text{L}_{-1}\text{RIT}_{i,t}$ $and$ $\text{L}_{-1}\text{VRT}_{i,t}$ represent the first-order lag terms respectively; Also, $\text{L}_{-2}\text{RIT}_{i,t}$ $and$ $\text{L}_{-2}\text{VRT}_{i,t}$ respectively represent the second-order lag term.

### 5.2. Data Preprocessing

By integrating and processing the data from the source channels mentioned above, the panel data is established according to the established panel model. Collect and integrate the per capita fiscal revenue data, and calculate the average corporate income tax reduction and VAT reduction of each region in each year based on the previously used corporate income tax reduction and VAT reduction by region, using fiscal expenditure and regional GDP as control variables. At the same time, all variables are normalized to facilitate parameter estimation of the model.

Collinearity test was performed on explanatory variables, and variance inflation factor VIF and Kappa test were used to judge respectively. Also, variance inflation factors were all less than 10 and Kappa test result 13.6707 was less than 100, indicating that there was no multicollinearity between explanatory variables.

### 5.3. Static Panel Data Model

### 5.3.1. Model Results

Table 10 is the estimation result of static panel data model of model (1), ① removes the effect of corporate income tax reduction, consider the effect of VAT reduction alone; the joint effect of

corporate income tax reduction and VAT reduction is studied in ②, while ③ is the original model.

**Table 10.** Static panel data model results

| variable | ① | ② | ③ |
|---|---|---|---|
| RIT | 0.021590 | | 0.030940 |
| VRT | | 0.138759 * | 0.170267 |
| Employ | 8.877162. | 10.612700 | 9.806263 * |
| Invest | 0.066544 | 0.060802 | 0.056899 |
| Expense | 0.418285. | 0.533206 * | 0.572219 * |
| GDP | 0.717350. | 0.779188. | 0.696332 |
| $R^2$ | 0.853940 | 0.856660 | 0.860970 |
| Adjusted $R^2$ | 0.789500 | 0.793430 | 0.793550 |
| p-value | 7.964 e-13 | 5.818 e-13 | 2.187 e-12 |
| Significance: 0 '* * *' 0.001 '0.01' * '* *' 0.05 '. '0.1' 1 ' | | | |

### 5.3.2. Result Analysis

In general, $R^2$ and adjusted $R^2$ are close to 1, the p value is very small, and the significance of variables is good, which proves that the model fitting effect is good. According to the results of panel model ① to ③, the effect coefficients of VAT reduction and enterprise income tax reduction on fiscal revenue of Shanxi Province are both negative.Shows that in the short term, the enterprise income tax and value-added tax cuts have reverse effect in shanxi finance income, value-added tax cuts the reverse effect is stronger, in line with the above research, the result of the VAT tax effectively promote corporate profits, similar inhibitory effect on the financial income in Shanxi Province. At the same time, the above results verify the hypothesis that tax cuts and fees have different effects on fiscal revenue.

Compare three models of the coefficient of enterprise income tax and VAT tax cuts as a result, found in after considering both at the same time, its coefficient absolute value with different degree rise, suggests that the role of mutual promotion between the two, the side reflects only tax supporting measures to perfect the policies prevailing worldwide and cooperate with each other, to make policies prevailing worldwide tax role play to the largest degree.

### 5.4. Dynamic Panel Data Model

### 5.4.1. Model Results

Table 11 shows the estimation results of correlation coefficients after the dynamic panel data model is established through Model (2).

### 5.4.2. Result Analysis

The results of dynamic panel regression model are analyzed in detail. Firstly, the lag first-order coefficient of local fiscal revenue is positive, indicating that the increase of local fiscal revenue in the previous year will promote the increase of local fiscal revenue in the current year. Secondly, the coefficients of corporate income tax reduction and VAT reduction are both negative, and the absolute value of VAT reduction coefficient is larger and the impact is more significant, which is consistent with the results of static panel regression model above.

**Table 11.** Dynamic panel data model results

|  | Estimate | Std. Error | t-value |  |
|---|---|---|---|---|
| $L_{-1}$Revenue | 0.444992 | 0.125222 | 3.5536 | ** |
| RIT | 0.040227 | 0.027100 | 1.4844 |  |
| $L_{-1}$RIT | 0.004622 | 0.025811 | 0.1791 |  |
| $L_{-2}$RIT | 0.018680 | 0.015350 | 1.2170 |  |
| VRT | 0.191585 | 0.078167 | 2.4510 | * |
| $L_{-1}$VRT | 0.134839 | 0.084814 | 1.5898 |  |
| $L_{-2}$VRT | 0.054901 | 0.069775 | 0.7868 |  |
| Significance: 0 '* * *' 0.001 '0.01' * '* *' 0.05 '. '0.1' 1 ' | | | | |

$L_{-1}$RIT and $L_{-2}$The coefficients of RIT are all positive, indicating that the historical corporate income tax reduction can indeed have a positive promotion effect on the fiscal revenue of Shanxi Province in the future by increasing the tax base, which further proves that the tax reduction and fee reduction have time continuity, and $L_{-2}$The absolute value of RIT is greater than $L_{-1}$RIT indicates that this continuity has an additive effect, with historical data influencing more future data.

Although Coefficient of $L_{-1}$VRT and $L_{-2}$VRT were negative, but it is clear the absolute value of second-order lag coefficient decreases, and showed that inhibitory effect on decreasing, indirect evidence history VAT tax cuts will be more greater impact on the future of data, that the same as the enterprise income tax tax cuts, and historical data for the future of inhibition decreased and gradually become a role in promotion. This is consistent with the hypothesis that tax and fee cuts will increase fiscal revenue in the long run.Combined with the characteristics of value-added tax, value-added tax cuts than tax cuts for enterprise income tax revenue impact is bigger, can greatly reduce the current fiscal income, so it need a relatively long time for a cumulative effect, but in the long term and the role of enterprise income tax tax cuts, the same can increase the local fiscal revenue in the future.

**Table 12.** Results of dynamic panel data model for regional differences

|  | Taiyuan | In other parts of the |
|---|---|---|
| $L_{-1}$Localrevenue | 0.22834 * | 0.379453 * |
| RIT | 0.16440 | 0.015562 |
| $L_{-1}$RIT | 0.103209 | 0.020886 |
| $L_{-2}$RIT | 0.136210 | 0.047055 |
| VRT | 0.690321 | 0.256303. |
| $L_{-1}$VRT | 0.143782 | 0.239028 |
| $L_{-2}$VRT | 0.119640 | 0.145950 |
| $R^2$ | 0.984020 | 0.929910 |
| Adjusted $R^2$ | 0.758300 | 0.696290 |
| p-value | 0.009868 | 0.014748 |
| Significance: 0 '* * *' 0.001 '0.01' * '* *' 0.05 '. '0.1' 1 ' | | |

## 5.5. Regional Difference Testing

Model (2) is adopted here to study the impact of tax reduction and fee reduction on local fiscal revenue of Taiyuan, the capital of Shanxi Province, and other prefecture-level cities of Shanxi Province. The dynamic panel model is established to verify the hypothesis that the impact of tax reduction and fee reduction on fiscal revenue has regional differences. The results are shown in Table 12.

As can be seen from the coefficient of $L_{-1}$Localrevenue, the fiscal revenue of the previous year in Taiyuan has a restraining effect on the fiscal revenue of the current year, while the situation is opposite in other regions. On the whole, except that the corporate income tax reduction in other regions has a positive effect on fiscal revenue, which is different from the above statistical data on the overall situation of Shanxi Province, the results of other data are similar to those above, so the reliability of the conclusion above is proved again.

This paper mainly analyzes the regional differences in the impact of corporate income tax reduction and value-added tax reduction on fiscal revenue. The corporate income tax reduction in Taiyuan this year has a restraining effect on fiscal revenue, while other regions have a weak promoting effect. For the first order lag term $L_{-1}$RIT, Taiyuan and other parts of the coefficient is positive, confirm historical tax and fee reduction to boost revenue, and in other parts of the promoting effect compared with this year's data, but it is still less than the promoting effect of Taiyuan, this suggests that the influence of the tax and fee reduction is much more intense to fiscal revenue change because of Taiyuan, where the size of listed companies is more big. They are also more sensitive to policies and have a stronger ability to expand production and increase income by cutting taxes and fees. The coefficients of $L_{-2}$RIT are both positive, and the absolute value of the coefficients increases for both regions, thus confirming that tax and fee reduction  in the past have a greater impact on current fiscal revenue. The growth rate of Taiyuan is relatively low, while the growth rate of other regions is much higher than that of Taiyuan, but it is still less than the promotion effect of Taiyuan. Therefore, the historical tax and fee reductions have a limited impact on the fiscal revenue of this year.

The regional differences of VAT tax reduction are also analyzed, as shown by $L_{-1}$VRT and $L_{-2}$VRT, the coefficients of VRT were all negative and showed a decreasing trend in absolute value, indicating that the inhibition effect was decreasing.Taiyuan, but in addition to this year's VAT tax inhibitory effect than other parts of the lag of first-order and second-order coefficient absolute value is less than other regions, the reason may be rooted in the year of Taiyuan policy is more sensitive in listed companies, the government tax revenue to reduce, but after the rapid development of the enterprise for tax base increased role in facilitating the inhibition to reduce gradually. In turn, it will boost fiscal revenue.

## 5.6. Conclusion and Generalization

Through establishing static panel model and dynamic panel model, this paper studies the influence of tax and fee reduction on government financial revenue. It is found that both short-term corporate income tax reduction and VAT reduction have a reverse effect on fiscal revenue in Shanxi Province, and VAT reduction has a greater inhibitory effect. The effect of tax and fee reduction on fiscal revenue has a time continuous and cumulative effect. In the short term, it will reverse the effect on fiscal revenue, but in the long run, it will eventually achieve a positive effect on fiscal revenue. At the same time, the impact of tax and fee reduction on fiscal revenue varies from region to region. Due to micro and macro economic factors, the impact in Taiyuan is more intense in degree and speed than that in other regions.

At the same time through D.J.He, Y.P.Sun's tax reduction and fee reduction impact on fiscal revenue -- based on the analysis of Guangdong Province.[7] The relevant data and conclusion of research and compared with conclusions in this paper, the data can be found, although guangdong province is located in China's southern coast, in central Shanxi Province is located

in the hinterland, but the effect of tax and fee reduction policy for the government revenue is similar, both tax differences, time continuity and regional differences, this also verify this conclusion relative accuracy. However, by comparison, it can also be found that the range of corporate income tax reduction and value-added tax reduction in Shanxi is not as high as that in Guangdong province, and significant tax reduction data only appeared in the last three years. At the same time, the degree of impact of tax reduction and fee reduction on various aspects in Shanxi Province is far less than that in Guangdong Province, which indicates that the strength and effect of Promoting tax reduction and fee reduction policies in Shanxi Province is not as good as that in Guangdong Province. Considering that Guangdong's economic level is much higher than Shanxi Province, such results are reasonable.However, the direction of cutting taxes and fees to bring real benefits to enterprises and inject vitality into them remains unchanged. Only with the better development of enterprises can Shanxi's economy soar, get rid of the dilemma of energy dependence, achieve transformation and upgrading, and promote the modernization process.

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