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Research on budget quota standard measurement method of special public fund of provincial transport department

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ABSTRACT

With the rapid development of transport industry in China, and the budget constraints strengthened of the financial department, the transport department needs to further improve the standardization of quota budget management, especially the budget quota of special public projects, which are based on business characteristics of the transport department and set by themselves. The previous scholars mostly predict the total financial budget by time series data, but it is not suitable for detailed management of special public projects. Provincial government officials basically use the method of base plus growth to set budget quota, while it is somewhat more subjective. The paper is combined with the actual work of transport sector, applying the thought of activity based costing for survey of special public fund items detailed, using the method of weighted moving average and regression analysis to comprehensively measure budget quota. It is proved that the method is simple, and deviation between measuring quota and actual expenditure is less, so the effect is better for provincial transport department.

KEYWORDS

INTRODUCTION

With the rapid development of transport industry in China, the budget quota in the past can not meet the needs of the transport infrastructure budget. How to choose the right model among a lot of predictive models is a key issue before data measurement, and it is also an important step to decide the correctness of budget data. There is great significance to select the appropriate measurement model of budget quota.[1-3]

The content of the budget quota of provincial transport department includes four parts: personnel expenses, the normal public funds, special public funds and special project funds. Among them, personnel expenses and the normal public funds provided by the provincial department of finance is very detailed, and the special project funds are calculated by using very complete local engineering construction norm, so the quota for the provincial transport department to budget is the special public funds, which need to be independently estimated. This paper studies on the budgeting method of the budget quota of special public funds.

THE MAIN CONTENTS OF THE BUDGET QUOTA OF SPECIAL PUBLIC FUNDS

Based on the field of traffic management involved, the budget quota of special public funds is divided into four sections, [4]such as special public expenditure quota of highway management, special public expenditure quota of road transport management, special public expenditure quota of waterway and port management, special public expenditure quota of local railway.[5]

Special public expenditure quota of highway management

Special public expenditure quota of highway management includes: budget quota of operating funds of highway management, budget quota of operating funds of managing overrun and overloaded, budget quota of operating funds of traffic volume and Origin-Destination survey, special operating funds of road quality supervision, etc.

Special public expenditure quota of road transport management

Special public expenditure quota of road transport management includes: special funds of inspection and law enforcement of transportation administration, funds of statistical sampling survey, funds of data compiled and issued and activity of transportation management system, special operating funds of administrative (road transport administrative license document fee), etc.

Special public expenditure quota of waterway and port management

Special public expenditure quota of waterway and port management includes: Special funds of maritime administration, Special funds of water planning and design projects, Special funds of quality supervision of waterway engineering, special funds of management.

Special public expenditure quota of local railway

Special public expenditure quota of local railway includes: special funds of engineering quality supervision of local railway, special funds of management.

THE MAIN BUDGETING METHOD OF SPECIAL PUBLIC FUNDS QUOTA

Base quota

Base quota method, is also known as incremental budget method. That is, the total amount of funds actually occurred last year of each unit as the base, considered factors that increase or decrease in the budget year, to appropriately adjust more or less, and to determine the budget.[6]

Activity Based Costing

Activity Based Costing is a cost counting methodology and management tool, it is based on the thinking "products consume activities and activities consume resources". Harvard University Professor Kaplan (Robert S. Kaplan) in his book "Management Accounting correlation disappeared," offered Activity-based Costing, and the study of the value focusing on "Resources→Activities→product" process, rather than the traditional "Resources→products" process.

STANDARD CALCULATION OF SPECIAL PUBLIC FUNDS QUOTA

The investigation of special public funds

For fine calculation of quota standard of special public fund, the questionnaire needs to be prepared and be reported by subordinate administrative units of provincial transport department. [7-8]In 2013, the questionnaire was designed as shown in the following TABLE 1, taking Waterway Office of the Port and Shipping Authority as an example.

TABLE 1: Special public expenditure questionnaire

Name of institution	Waterway Office of the Port and Shipping Authority		
Item Name	Beacon management, setup and maintenance	Item Category	Special public item（√） Special project（ ）
An overview of the setting basis and content	According to relevant laws and regulations, as well as the technical standards of state and province, it is to carry out routine maintenance management for provincial coast, river, lake, reservoir, and other navigable waters.		
Expenditure details	**Annual expenditure Amount（¥）**		
No.	Economic Classification	2010	2011	2012

No.	Economic Classification	2010	2011	2012
1	Office expenses	65,942.76	57,352.40	27,054.20
2	Travel expenses	28,915.10	1,1054.50	52,544.20
3	Maintenance cost	—	—	—
4	Rental fee	250,000.00	316,587.39	173,500.00
5	Conference fees	—	—	—
6	Training fee	—	—	—
7	Official reception	38,104.90	145,120.60	20,254.70
8	The cost of materials	671,846.24	507,656.36	789,169.67
9	Engineering construction	54,028.00	54,028.00	54,028.00
10	Other	61,287.00	3,000.00	34,500.00
Subtotal		1,170,124.00	1,094,799.25	1,151,050.77

The model selection of budget quota criterion

Though there are a lot of models to choose for budget quota, combined with the actual operation of the provincial transportation department, this paper considers the weighted moving average model and regression model. Then based on these forecasts as the basis, from the actual situation demand as the beginning, this paper designs a predictive model of the budget quota standard of the special public funds for the provincial transportation department.[9]

Idea of construction

The main idea of study on estimate the budget quota of special public funds of provincial transportation department is as follows[10]:

Step 1: In 2013, the provincial transportation department issued the special public expenditure questionnaire to subordinate administrative units, and required subsidiary to report the actual funds and funds approved quota in 2010, 2011, and 2012.

Step 2: Considering the activity cost factor, performance factor, and the inflation factor, by weighted moving average model, using 2010 and 2011 data to deduce the amount of funds in 2012. Firstly, artificially setting the weight coefficient in 2010 and 2011 0.4 and 0.6, with the standard deviation method to measure the calculation effect, and then set up the weight coefficient in 2010 and 2011 0.3 and 0.7, for comparison.

Step 3: By using regression model, all details items of questionnaires in 2010 and 2011 are as independent variables, all details items of questionnaires in 2012 are as the dependent variable, calculating weight coefficient by SPSS16.0. Finally, the predicted results are compared with step 2.

CONSTRUCTION AND VALIDATION OF THE BUDGET QUOTA ESTIMATING MODEL

Construction of weighted moving average model of provincial highway authority

The construction of Weighted moving average model, firstly according with actual experience artificially giving the weight of 2010 and 2011 (0.4, 0.6) or (0.3, 0.7), and then multiply activity coefficient, inflation coefficient, and the performance coefficient behind. The inflation coefficient here is the index of provincial fixed assets price, and the formula as follows:

$$y = (\beta_1 x_1 + \beta_2 x_2) \times \frac{a_1}{a_2} \times \frac{b_1}{b_2} \times \gamma$$

(1)

In the formula, y represents the prediction value of 2012, β_1,β_2 indicating the weight coefficients, x_1,x_2 are respectively the actual value of 2010 and 2011, α_1,α_2 respectively are the activity in 2010 and 2011 of highway authority, corresponding to

the main highway mileage etc., b_1, b_2 are respectively the actual value at the end of the year and budget quota at the beginning of the year, γ shows the inflation rate in 2011 is 1.055 (data from provincial statistical Yearbook).

Select weight coefficient (0.4, 0.6) as β_1, β_2, to calculate the full detail items quota data of provincial highway authority, and use standard deviation to represent the estimated effect. Because there are a lot of data content, so the data here only lists the quota of Jinghu office of provincial highway authority at the following TABLE 2:

TABLE 2: The prediction effect of budget quota under the standard deviation method (0.4,0.6)

Agency	Item	Classification	2010	2011	2012（actual）	2012（Forecast）	Standard deviation
	Operation vehicle special fee	Operation and maintenance costs of official vehicles	296.77	147.02	127.53	228.38	71.31
	Personnel files escrow fee	Commission business fee	26.00	26.00	26.00	28.70	1.91
	Conservation projects working expenses	Other expenses	20.00	20.00	7.00	22.07	10.66
	Electricity fee of special charge items	electricity fee	285.76	297.22	287.16	322.99	25.34
	Education and training special funds	Training fee	18.28	31.11	44.95	28.67	11.51
		Other expenses	15.00	15.00	15.00	16.56	1.10
	Special charges of non-tax revenue collection and comprehensive management	Official reception fee	10.60	11.60	12.60	12.36	0.17
		Other expenses	24.40	23.40	43.40	26.27	12.11
Jinghu office	Heating cost of toll stations	Heating fee	213.62	293.57	393.27	288.73	73.92
	Domestic water special fee	Water fee	10.62	8.79	43.68	10.51	23.45
	bills printed fee of receipt in charge business	Printing cost	17.25	21.48	21.36	21.84	0.34
	Road property insurance	Other expenses	114.83	110.22	116.27	123.69	5.25
	Unforeseen expenses	The wages and welfare expenses	37.00	10.00	8.00	22.96	10.58
	Toll stations Cash remit freight charges	Commission business fee	23.13	115.63	111.00	86.79	17.12
	Quilt purchase cost	Quilt purchase cost	68.14	105.45	95.11	99.92	3.40
		Training fee	5.00	5.00	2.00	5.52	2.49
	Management Certification	Official reception fee	2.00	2.00	2.00	2.21	0.15
		Commission business fee	7.00	7.00	7.00	7.73	0.51
		Other expenses	6.00	6.00	3.00	6.62	2.56
Subtotal							273.88

Then select weight coefficient (0.3, 0.7) as β_1, β_2, to calculate the full detail items quota data of provincial highway authority, the calculating process is the same with the steps of weight coefficient (0.4, 0.6)

Construction of regression model

Assuming actual amounts in 2012 has linear correlation with actual amounts of 2010 and 2011, the actual amount in 2012 as the dependent variable y, and the actual amounts in 2010 and 2011 as the independent variables x_1, x_2, correction factor for β_0, the linear regression equation: $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2$, input the actual data of detail item into SPASS17.0 in regression analysis.

TABLE 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.935[a]	.874	.873	49.46910

a. Predictors: (Constant), 2010, 2011

As can be seen from the table, the overall effect of the equation fit better, R reaches 0.935, and equation overall level of significance also passed the test of significance, and t statistic for each regression coefficients is also adopted the test of significance in the 0.1 level.

Through data analysis, $y = 10.315 + 0.25x_1 + 0.75x_2$. So the regression coefficients of β_1 and β_2 are 0.25 and 0.75.

TABLE 4: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	10.315	3.812		2.706	.007
1	2010	0.249	0.056	0.148	2.373	.018
	2011	0.752	0.059	0.797	12.797	.000

a. Dependent Variable: 2012

Take 0.25 and 0.75 by calculating with regression model as weight coefficient in 2010 and 2011, and then multiplied by the activity coefficient, performance coefficient, and inflation coefficient.

Comparison of Models

Each of the three algorithms comes to the standard deviation between the difference of quota and actual value in 2012, as TABLE 7:

TABLE 5: Comparison of budget quota of three methods

Agency	Standard deviation of the first method (0.4,0.6)	Standard deviation of the second method (0.3,0.7)	Standard deviation of regression method
	71.31	47.9	47.43
	1.91	0.32	1.01
	10.66	9.44	9.97
	25.34	8.29	16.54
	11.51	12.17	10.97
	1.1	0.18	0.58
	0.17	0.78	0.44
	12.11	13.64	13.05
	73.92	84.15	28.3
Jinghu office	23.45	24.17	0.17
	0.34	0.56	0.13
	5.25	1.93	0.87
	10.58	7.36	6.84
	17.12	15.27	9.48
	3.4	0.55	4.45
	2.49	2.18	2.32
	0.15	0.02	0.08
	0.51	0.09	0.27
	2.56	2.19	2.35
Subtotal	273.88	231.21	155.25

By comparing the three standard deviations, and using the data in TABLE 5 and TABLE 6 in comparative analysis, and TABLE 7summarizes the analysis, we conclude that the third method has high goodness of fit.

CONCLUSION

(1)The paper takes activity-based cost as the theoretical basis, does the detail item investigation of special public funds of subordinate administrative units of the provincial transportation department, to measure the budget quota, in favor strict control of administrative costs, strengthening budget constraints, reducing discretionary budget.

(2)By using the weighted moving average method and regression analysis through actual values of detailed items in 2010 and 2011, the paper estimates the quota in 2012, taking into account the business expansion, the performance completion, the inflation situation, strengthening the decision of budget quota greatly objectivity, and reducing the artificiality of budget, then promote the fine development of budget management.

(3)The study in the paper is in favor of budget management in the provincial transport department, to reduce the current phenomenon of budgeting overruns, making budgeting more fair and reasonable, and expenditure more transparent.

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