Application of Flexible Budget Based on Company Profit Model: Taking VK's Financial Data as an Example

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Abstract

There are many types of budgeting, and budgeting based on profit models is rare. This paper combines financial big data with management accounting methods to build a profit model in financial big data; and uses model data as the basis and basis for preparing flexible budgets, making budget preparation and execution more scientific and feasible; The company's budget preparation method has been introduced; more importantly, financial accounting and management accounting are integrated, and the forecasting and budgeting functions of management accounting applications are really brought into play and applied.

Keywords: big financial data, profit model, flexible budget

1. Introduction

The biggest difference between management accounting and financial accounting is that financial accounting highlights institutional accounting. Its subject setting and measurement criteria are all artificial. The institutional arrangement for achieving accounting goals is expressed as the social attribute of accounting; while management accounting It is expressed as the natural attribute of the connection between accounting and mathematics. The basic function of financial accounting is to keep accounts; management accounting has the functions of forecasting budgets and making decisions. In the accounting discipline, although our textbook curriculum arranges "management accounting", the theoretical arrangement is far from the practical application. Financial accounting and management accounting have always been two skins, which is difficult to merge. The author of this paper believes that the key point of the integration of financial accounting and management accounting lies in the decomposition of the total cost of the enterprise under the background of extensive application of Internet-based big data and computer software. Although the current textbook introduces many methods of total cost decomposition, such as: direct identification method, regression model method, empirical method, etc., but the acceptance variable is always dependent on the production and sales volume, which is not useful for enterprises that has no product (commodity) quantity or with a wide variety of production and sales. And even if a method of decomposing the total cost is found, it may not be possible to construct a cost model that meets the total cost equal to the fixed cost plus the variable cost, which is often a waste of nothing.

Through a lot of management accounting experiments, this article finds the opportunity to integrate financial accounting and management accounting, which is the decomposition of total cost (mixed cost). The variable explained is the operating income. Some people call the cost driver. As long as it is an enterprise, there will be business. Revenue and operating costs (banks and other institutions are called operating expenses). Operating revenue is the result of sales volume and sales price. For those companies that do not have sales data or sales varieties, it is appropriate to use operating income to decompose and explain operating costs (operating expenses) However, compared to the simple usage explanation, the price factor is added, because operating income is the result of sales volume and price. Instead of using operating revenue to explain costs, it is better to use sales volume and price to explain the total cost. In this way, our cost decomposition can be carried out in all enterprises, because as long as it is an enterprise, it will have to account for profits, and as long as the profits are accounted for, it will have to account for operating income and operating costs.

2. Total Cost Breakdown

2.1 Scattered Point Method

Set operating cost as y, operating income as x, fixed cost as b, and total cost as follows:

$$y=ax+b \tag{1}$$

The financial data of VK, a-share listed company from 1997 to 2019 are shown in the table. The financial data from 1997 to 2001 are semi-annual reports and annual reports. Quarterly and annual reports from 2002 to 2019; A total of 80 sample observation points.

As shown in the figure, the overall fitting level of the linear cost model and the curve cost model is more than 99%.
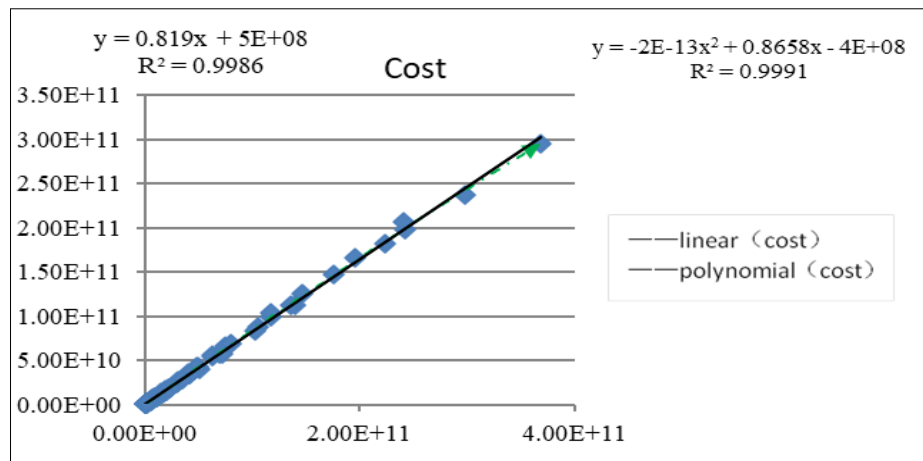

Figure 1. Straight-line model of scatter cost behavior decomposition

In order to obtain more accurate model data, we used the Excel add-on data "analysis tool base -- multiple regression" to reconstruct the company's cost line model as follows: regression statistics.

Table 1. Regression statistics

Multiple R	0.9993	R Square	0.9986	Adjusted R Square	0.9986	sd	2.3E+9	N 81

Table 2. Analysis of variance

	df	SS	MS	F	Significance F
Regression	1	2.92E+23	2.92E+23	55376.37	3.3E-114
Residual	79	4.16E+20	5.27E+18		
Total	80	2.92E+23			

The results of multiple regression, a data analysis tool, are consistent with the results of scatter plus trend line method, except that multiple regression has more adjusted R squared, variance analysis, student t test of regression coefficient, and the standard deviation and value range of regression coefficient.

3. Cost-Volume-Profit Analysis

3.1 Cost-Benefit Analysis of Linear Model

Let's say the operating profit of the company is m. Compared with the net profit, it does not include non-operating income, expenditure and income tax. Other letters express the same meaning as the letters in the above cost model, and we get the operating profit model of the company:

$$m=x-y=x-(ax+b)=(1-a)x-b \tag{2}$$

The cost model of the above regression results is:

$$y=0.819042x+5.32(E+08) \tag{3}$$

The profit model is:

$$m=0.180958x-5.32(E+08) \tag{4}$$

trinomial decomposition of the cost model and the profit model. Of course, the cu The straight-line model of the company's total cost is formula (3), and the operating profit model of the company is formula (4).

Assuming that the company's profits are m=0 and m=7.65E+10 yuan, the company's operating income (break-even operating income and poly operating income) x is calculated, and the m value is substituted into formula (4), and the operating income is obtained to be 2.94E+9 yuan and 4.26E+11yuan, respectively. That is, the breakeven operating revenue was 2.94 billion yuan. If an enterprise wants to achieve operating profit of 76.54 billion yuan, its operating income should reach 425.91 billion yuan.

3.2 Curve Cost-Cost-Benefit Analysis

We use the total cost curve model of the scatter trend line as $y=ax^2+bx+c,$ and the total cost model of the company is:

$$y = -2E\text{-}13x^2 + 0.8658x - 4E+08 \tag{5}$$

Operating profit curve model:

$$m=x-y=x-(-2E\text{-}13x^2+0.8658x-4E+08) = 2E\text{-}13x^2-0.1342x+4E+08 \tag{6}$$

In the total cost curve model (5), since the quadratic coefficient is less than 0, we can minimize the total cost of operating revenue. In the operating profit curve model (6), the quadratic term coefficient is greater than 0, so we can calculate the operating income (marginal income) when the company has the minimum operating profit. Suppose formula (6) is equal to 0, then we get the operating income is breakeven operating income (there may be two breakeven operating income).

Sometimes when we use the linear decomposition of the total cost of the company, the constant term is negative, which is not consistent with the definition of total cost as fixed cost plus variable cost. In this case, we have to rely on the quadratic rve model can also be transformed into a line model, the author has another introduction. The straight-line cost model and curvilinear cost model established in this paper should have been tested internally and externally, but model testing was not allowed because of the following simulation calculation.

4. Binary Regression Net Profit Model and Elastic Budget

Considering that the following is the flexible budgeting of the company's operating income, operating cost and operating profit based on the company's volume-profit model, the flexible budgeting of the company's operating profit based on the cost model is omitted. We try to construct a binary regression model that directly explains net profit by directly using the operating income and operating cost indexes, and compile a flexible budget of net profit based on the regression results.

4.1 The Net Profit Model Based on the Binary Structure of Operating Revenue and Operating

Table 4. Descriptive statistics

	N	Minimum	Maximum	Sum	Mean	Standard Deviation
NP	81	3.06E+07	5.51E+10	5.27E+11	6.51E+09	1.06E+10
OI	81	5.5E+08	3.68E+11	3.93E+12	4.85E+10	7.37E+10
OC	81	5.09E+08	2.94E+11	3.26E+12	4.02E+10	6.04E+10

Table 5. Correlation

		NP	OI	OC
NP	Pearson Correlation	1	.989**	.983**
	Significance bilateral		.000	.000
0I	Pearson Correlation	.989**	1	.999**
	Significance bilateral	.000		.000
OC	Pearson Correlation	.983**	.999**	1
	Significance bilateral	.000	.000	
	N	81	81	81

**. Correlation was significant at 0.01 layer (double-tailed).

Table 6. Overall simulation level

Model	R	R^2	Adjust R^2	Sd	Change of statistics					Durbin-Watson
					R^2	F	df1	df2	Sig. F	
1	997[a]	994	0.993	8.59E+8	0.99	6082.14	5	8	0.000	1.563

a. Predictive value: (constant), operating cost, operating income b. Variable: net profit

Table 7. Variance analysis a

Model	Sum squares	df	Mean square	F	Sig.
Regression	8.95E+21	2	4.47E+21	6082.14	0.000[b]
Residual	5.74E+19	78	7.36E+17		
Total	9.01E+21	80			

a. Dependent variables: net profit b. Predictive value: (constant), operating cost, operating income

Table 8. Regression coefficients

	Coefficients	Standard error	t Stat	P-value
Intercept	-7.28E+07	1.16E+8	-.626	0.533
0I	.625**	0.034	18.152	0.000
0C	-.590**	0.042	-14.033	0.000

a.   Dependent variable: net profit, the significance level of constant term is low and is usually not considered.

Using Excel-simulation analysis-simulation calculation table function, the net profit above the table is the logical data item, and the data column of the business profit peer is the "operating income increase and decrease change column", the following data of the operating profit is the "operating cost increase and decrease change data" , The column between operating income increase and decrease change and operating cost increase and decrease change is the operating profit area corresponding to income and cost, and the intersection of operating income and operating cost is positive, indicating profit; negative, indicating loss.

4.2 Flexible Budget Table Based on Operating Income, Operating Cost, Operating Profit

Table 9. Flexible budget table based on the net profit model

-7.3E+07	Income coefficient	0.6253929	Initial value income	3.68E+11		Cost factor	-0.589881	Initial cost	2.94E+11
5.64E+10	5.15E+11	4.97E+11	4.78E+11	4.60E+11	4.40E+11	4.23E+11	4.05E+11	3.86E+11
4.12E+11	7.90E+10	6.75E+10	5.60E+10	4.45E+10	3.30E+10	2.15E+10	9.95E+09	-1.60E+09
3.97E+11	8.77E+10	7.62E+10	6.46E+10	5.31E+10	4.20E+10	3.01E+10	1.86E+10	7.13E+09
3.83E+11	9.63E+10	8.48E+10	7.33E+10	6.18E+10	5.00E+10	3.88E+10	2.73E+10	1.58E+10
3.68E+11	1.05E+11	9.35E+10	8.20E+10	7.05E+10	5.90E+10	4.75E+10	3.60E+10	2.45E+10
3.53E+11	1.14E+11	1.02E+11	9.07E+10	7.92E+10	6.80E+10	5.62E+10	4.47E+10	3.32E+10
	3.68E+11	3.49E+11	3.31E+11	3.13E+11	2.90E+11	2.76E+11	2.58E+11	2.39E+11
4.12E+11	-1.30E+10	-2.50E+10	-3.60E+10	-4.80E+10	-6.00E+10	-7.10E+10	-8.20E+10	-9.40E+10
3.97E+11	-4.40E+09	-1.60E+10	-2.70E+10	-3.90E+10	-5.00E+10	-6.20E+10	-7.30E+10	-8.50E+10
3.83E+11	4.31E+09	-7.20E+09	-1.90E+10	-3.00E+10	-4.00E+10	-5.30E+10	-6.50E+10	-7.60E+10
3.68E+11	1.30E+10	1.48E+09	-1.00E+10	-2.20E+10	-3.00E+10	-4.50E+10	-5.60E+10	-6.80E+10
3.53E+11	2.17E+10	1.02E+10	-1.30E+09	-1.30E+10	-2.00E+10	-3.60E+10	-4.70E+10	-5.90E+10

In the table: the first two cells in the left column -7.3E + 07 are constant items; 5.64E + 10 is the net profit corresponding to the initial assignment; the horizontal bar is bolded as operating income (operating income changes within ±5% of the initial assignment), Column bolding is the operating cost (the initial operating cost is assigned a ±5% change), the horizontal column is changed to the vertical column, and the operating cost is listed twice; the remaining data area is net profit.

5. Conclusion

a) High level of simulation, with emulation. In this paper, time series historical data of VK is used to explain operating costs with operating income, and a straight-line total cost model is constructed. The overall simulation level R square is 0.999, and the adjusted R square is 0.9986; Student t test for regression coefficients has significant simulation. It can be said that the level of simulation is close to simulation, and the total cost of the company is simply decomposed into "fixed cost + variable cost", that is, "fixed cost + unit variable cost ×operating income", which can be applied to social practice.

b) Adapt to big data, with a wide range. The total cost model constructed in this paper uses the company's historical data for many years. This mining and application of the same company 's big data resources use historical and current data to explore the laws of economic development dependence, infer the future, and make historical resources forecast for the company. Provide basis; for a new company, you can use the cross-sectional data of the same industry to build a cost model, which can also be used as a basis for the company's development forecast budget. Big data is a valuable resource available in both old and new enterprises.

c) Management and accounting are integrated. For a long time, management accounting and financial accounting have been two books, which are difficult to merge. This article applies the company's big data to the decomposition of total cost habits. One of them has found an opportunity to solve the inconsistency of the two types of accounting. It is that management accounting has long been based on the case of production and sales. In terms of cost drivers, production and sales are certainly the cause of costs, but operating income is also the driver of costs. It not only considers the problem of sales, it is also a common result of sales and sales prices. The cost, profit and forecast in management accounting are based on "production and sales (assuming that production and sales are consistent)". We changed it to be based on operating income. Fundamentally speaking, using operating income to explain the factors of total cost, the main operating income is the result of the combined effect of sales volume and sales price. Traditional management accounting uses the "cause" (product or sales volume). We use the result to decompose the variable cost of the total cost. (The result of the combined effect of sales volume and price). Use operating income to explain variable costs, so that those companies that have no production and sales, but those with operating income can implement the real application of management

accounting in companies. The choice of this variable enables the integration of traditional financial accounting with modern management accounting.

d) Computer operation, advanced. Accounting measurement tools have experienced the evolution of knotted notes, engraved contracts, simple engraved symbols, chips, handwriting, abacus, calculators, computers and their software applications. We are in an era where digital and computers are widely used, and accounting activities should adapt to the development of the era. In this example, computer operation is used, mainly Excel software, in which the linear cost model is constructed, and the regression equation is obtained by "selecting data-inserting-scatter plot-selecting scatter in the jump window-loading trend line"; In the same way, a "quadratic" curve cost model is constructed. Its path: data-scatter plot-linear model (formula). Its flexible budgeting tool uses "simulation calculations" in Excel functions. The entire data processing program, computer operation, is simple and easy to implement, and is more advanced than traditional computing tools.

e) Accounting modeling, scientific. With the help of the Excel data menu, this article calls up "Data Analysis" in "File-Add-In-Select Called Data Analysis Tool Library", which embeds the principle of least squares, statistical probability distribution, and constructs a multiple regression empirical model to make a description. Statistics, correlation analysis of variables, etc. It can also flexibly convert data and construct a hybrid (curve) model, which is more in line with big data and scientific processing requirements.

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