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The Balance sheet as information model

Kulikova L.I., Garyntsev A.G., Gafieva G.M.

Institute of Management, Economics and Finance, Kazan Federal University, 4 Butlerova street, Kazan 420008, Russia

Abstract

The article examines the opportunity of using the balance sheet determinants as information model for the economic-mathematical modeling of financial position of an organization. It is proved that one of the main determinants presented in a balance sheet and indicating the efficiency of a company is the determinant of retained earnings and the factors affecting the amount of retained earnings are studied. The article suggests an economic-mathematical model of multiple regression and states the balance sheet profit maximization pattern.

Keywords: balance sheet, blance model, retained earnings, regression

1. Introduction

The centuries-long history of accounting development offers a great amount of different balance models [1-4,6,7,15-17,19]. The traditional balance sheet model can be introduced in a formula

$$A = P \tag{1}$$

where A stands for assets and P for liabilities side of the balance-sheet.

This model makes a distinction of transactions from the perspective of their impact on the currency of balance. The accounting equation can be introduced in a different way:

$$A = C + O \tag{2}$$

where C stands for equity and O for liabilities.

This kind of accounting equation shows that assets are formed by means of an organization's equity and liabilities planned for payment. If we divide equity into owners' contributed capital and accumulated capital, the accounting equation becomes:

$$A - O = CC + AC,$$ (3)

where CC is contributed capital and AC is accumulated capital.

This equation claims that assets value addition or liabilities decrease within a period lead to net profit increase within this period as contributed capital and retained earnings remain constant.

On this basis it is possible to assume that one of the main determinants presented in a balance sheet and proving the efficiency of the company is the retained earnings determinant. In this regard it is interesting to define the impact of these factors on retained earnings determinant basing on balance sheet data.

2. Method

The possibility of using a balance sheet as information model reflecting an organisation's financial position is mainly determined by the applying of double entry accounting of economic life factors. Double entry not only predetermines the equality of assets and liabilities totals in a balance sheet, but also causes correlation between its items [11-13]. It is defined by the fact that representing of each transaction is performed simultaneously on two accounts. Consequently, at the moment of registration on this record there is a functional relationship between the accounts.

Therefore, it is possible to make conclusions from the assumption that balance sheet data can be used for the economic-mathematical modeling of financial position of an organization.

The research of relations and correlations between objectively existing processes and phenomena plays an important role in economics [8-10]. The complex arrangement of economic determinant correlations is being successfully studied by means of mathematical methods and particularly by performing a correlation-regression analysis of the balance sheet.

Correlation-regression analysis lets the relation of economic determinants changes caused by a number of cumulatively affecting factors be precisely defined in mathematical form. This again allows influencing the defined factors, interfering with the corresponding economic process aiming to achieve certain results.

Scientists distinguish the following objectives of correlation-regression analysis of a balance sheet:

- determination of the prime factors affecting the result characteristics and the estimation of their affect rate;
- forecasting of the regressand value if the value of factors are fixed

The most interesting for us is studying of different variables' impact on "Retained earnings" determinant. Basing on this data set it is possible to construct a regression equation.

3. Result

It is necessary to analyze the impact of factors on the balance profit of an organisation. Factor analysis of profit is of a great scientific interest and has a practical importance in terms of profit markup reserves detecting and elaborating of measures to maximum use of the detected reserves.

To construct a retained earnings analysis model it is necessary to classify the factors, data of which can be obtained from a balance sheet. Here it is important to choose the factors for correlation-regression analysis correctly as this kind of analysis is performed basing on a balance sheet where all the factors are strongly connected [5,14,18].

For the purpose of solution of the assigned task we obtained several factors, quantitative impact of which will be estimated by constructing an economic-mathematical model of multiple regression. Analysis was performed with the help of STATGRAPHICS Plus program.

The factors obtained for the analysis of their impact on balance profit are property, plant & equipment (*x1*), long-term financial investment (*x2*), inventory (*x3*), short-term receivables (*x4*), long-term borrowings (*x5*), payables (*x6*). The list of factors is given in Table 1.

Table 1. Factors affecting the balance profit determinant.

Factor	Factor name
x1	Fixed assets (property, plant & equipment), RUR000's
x2	Long-term financial investment, RUR000's
x3	Inventory, RUR000's
x4	Short-term receivables, RUR000's
x5	Long-term borrowings, RUR000's
x6	Payables, RUR000's

The choice of factors was made basing on the determinant dynamics analysis of Progress JSC balance sheets of 2008-2014. The determinants were chosen if they affected the change of balance profit [2, 11,12].

Estimating the possibility of using the balance sheet data for correlation-regression analysis performance, we proceeded from the following statements:

- all data of balance sheet is given in digital form;
- the scale of total data being analyzed is quite big (we obtained data of Progress JSC balance sheets over 24 periods – from December, 31 2008 to October, 31 2014);
- certain consistency of business activities and applied methodology of accounting allows assuming a quite high homogeneity of the total being studied.

The analysis of factors having double impact on the balance profit proved the multidimensionality of retained earnings determinant which conditions the need of constructing a multifactor model of this determinant.

Aiming to define the impact of factors on balance profit change it is appropriate to use regression-correlation analysis approach which allows researching the whole complex of factors affecting the balance profit.

The multifactor model of balance profit determinant built applying this approach gives a clear picture about the size and degree of impact of any of studied factors on the profit. It also stated that depending on the character of that impact it is possible to plan balance profit grow by positive factors supporting and negative factors decreasing.

Multifactor regression model of balance profit determinant is constructed in several steps:

- choice of relation form between the factors and the resulting determinant;
- building and solving a system of normal equations;
- estimation of quality of the constructed multifactor regression model by means of statistical criteria.

In general terms the problem of regression-correlation analysis comes to function search:

$$y = f(x1, x2, ..., xn) \tag{4}$$

Balance profit determinant model building allows to find a mathematical formula, which characterizes the relationship between argument factors and balance profit, for the estimation of results of factors impact on profit determinant over the current period and for planning of balance profit growth taking objective possibilities into account.

According to the whole observation being analysed the following multiple regression equation was obtained:

$$y = -4{,}816 + 0{,}263x1 + 1{,}994x3 + 0{,}290x4 \tag{5}$$

Therefore, the increase of fixed assets of 1000RUR leads to balance profit increase of 0,263RUR or 263RUR. The increase of inventory of 1000RUR leads to balance profit of 1,994RUR or 1994RUR. The increase of short-term receivables of 1000RUR results in the balance profit increase of 0,290RUR or 290RUR.

To estimate the relative impact of factors on profit it is necessary to calculate the coefficient of elasticity using a formula:

$$E = b_i \bar{x}/\bar{y} \tag{6}$$

where bi stands for the coefficient of corresponding *x* factor.

Values of elasticity coefficient according to the factors of balance profit changes are stated in Table 2.

Table 2. Elasticity coefficients values.

Factor	Elasticity coefficient
Fixed assets	0,43
Inventory	0,99
Short-term receivables	0,17

4. Conclusion

The results obtained from elasticity coefficients calculation prove that fixed assets growth of 1% provides 0,43% increase of balance profit. Inventory growth of 1% makes 0,99% of profit, and short-term receivables increase of 1% leads to 0,17% growth of profit.

Therefore, to maximize the balance profit of an organization it is necessary to gain fixed assets, increase inventory and short-term receivables. At a later stage the analysis and the control of those determinants should be analysed in greater details.

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