Analysis of the Filatov model of the construction industry in the Baikal region

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Abstract. In recent years, due to the slowdown in industrial development and the decline in the economic growth of the Russian Federation in trade and services, many companies from these activities in order to minimize their costs stop expanding production through new construction and at the same time freeze what they have started. In these conditions, managing the profitability of construction companies is one of the most important tasks for all levels of management: operational, tactical and strategic. Return on assets is the most important indicator of the efficiency of a commercial company, the main standard or average value in a market economy, with which individual indicators of companies are correlated to justify their competitiveness. The article suggests a way to manage the return on assets by decomposing the Filatov model (return on assets) into factors that reflect various aspects of the company's activities. The object of the study is construction companies (construction of residential and non-residential buildings) in the Baikal region of the Russian Federation (Irkutsk region, Republic of Buryatia, Zabaikalsky Krai). The article presents the method No. 2 of integral analysis developed by Filatov E. A. The article was carried out within the framework of the
1. **Introduction**

Profitability is a relative indicator of the company's level of profitability, it characterizes the efficiency of work. Profitability, in contrast to profit, more fully reflects the final results of management, as it shows the ratio of the effect with cash or consumed resources. The efficiency of any commercial company's business activities and the economic feasibility of their operation are directly related to their profitability (Alexandrov, O. A., 2016; Kazakova, N. A., 2016; Kireeva, N. V., 2019; Kogdenko, V. G., 2015; Lysenko, D. V., 2019; Markin, Yu. P., 2018; Rusakova, E. V., 2018).

Profitability indicators are used to evaluate the company's performance and as a tool in investment policy and pricing. The construction complex of the Russian Federation is one of the largest and most important sectors of the economy, which largely determines the socio-economic development of the country. The profitability of the construction industry is slightly higher than the average for the entire Russian economy as a whole.

2. **Research questions**

The Filatov model is a modified factor analysis that allows you to determine which factors caused the change in profitability. The basis of the factor model in the form of a tree structure is the indicator of return on assets (ROA), and the signs are the characterizing factors of the enterprise's activity. Simply put, the factors that affect the ROA are broken down to find out which factors more or less affect the return on assets. The main three factors:

1. return on equity (this ratio is calculated as the ratio of net profit to equity);
2. the author introduced the coefficient of income coverage with equity (this coefficient is calculated as the ratio of equity to revenue (net) from all types of sales);
3. asset turnover (the asset turnover ratio or total capital return is calculated as the ratio of revenue from all types of sales to the total amount of assets).

The difference between return on assets (ROA) and return on equity (ROE) is that ROA shows the effectiveness of all assets of the enterprise, and ROE only those that belong to the owners.

The advantage of the Filatov model is the «splitting» of complex indicators into factors that make up them. This allows you to determine the root causes and the relationship of changes in complex performance indicators of the
company. With the help of a factor analysis scheme for key indicators, you can clearly trace the influence of primary factors on the formation of complex indicators, give their comparative characteristics and determine the reasons for their change.

Return on equity, the ratio of return on equity and asset turnover characterize simultaneously three types of company's activities: investment, financial, and operating.

3. Materials and methods
The initial data for the analysis of the Filatov model (return on assets) of the construction industry in the Baikal region using the Filatov integral method No. 2 (Filatov, E. A., 2019) are presented in table 1.

The object of the study is construction companies (construction of residential and non-residential buildings) in the Baikal region.

The sources of the information base on the financial results of construction companies in the Baikal region were financial statements according to Russian accounting standards: the Balance sheet as of December 31, 2017 and 2018; the Report on financial results for 2017 and 2018 (IS «BIR-Analyst», 2019).

| No | Indicators | No. factor's | 2017 year Plan (0) | 2018 year Fact (I) | Deviation (Δ) |
|----|------------|-------------|-------------------|--------------------|--------------|
| 1  | V – Revenue from sales, thousand $ | 1 194 149 | 1 086 591 | -107 559 | |
| 2  | P – Net profit, thousand $ | 33 980 | -21 583 | -55 562 | |
| 3  | A – Total assets, thousand $ | 1 633 701 | 1 459 641 | -174 060 | |
| 4  | SK – Own capital, thousand $ | 126 426 | 180 520 | 54 094 | |
| 5  | ROE – Return On Equity (2/4) | F₁ | 0.268774 | -0.119560 | -0.388334 |
| 6  | EICR – Equity Income Coverage Ratio (4/1) | F₂ | 0.105871 | 0.166134 | 0.060263 |
| 7  | AT – Asset Turnover (1/3) | F₃ | 0.730947 | 0.744423 | 0.013476 |
| 8  | ROA – Return On Assets 2/3 = (5 * 6 * 7) | | 0.020799 | -0.014787 | -0.035586 |
where: * 0 - past (basic) period (year), taken as reference base; ** I – reported (current) period (year); *** Δ – change for the period, calculated as the difference between the fact and the plan (I − 0).

To formalize the integral method No. 2, a multiplicative dependence is chosen – this is a dependence in which all factors are multiplied among themselves. In this case, the original formula for factor analysis will have the following form (formula 1):

$$\text{ROA} = \text{ROE} \times \text{EICR} \times \text{AT} = F_1 \times F_2 \times F_3 = \prod_{n=1}^{3} F_n$$

(1)

The total deviation of the resulting indicator (ΔROA) is determined by the formula 2:

$$\Delta \text{ROA} = \sum_{n=1}^{3} \Delta \text{ROA}(F_n)$$

$$= \Delta \text{ROA}(F_1) + \Delta \text{ROA}(F_2) + \Delta \text{ROA}(F_3)$$

(2)

The calculation of the influence of factors on the change of the effective indicator in the author's integral method No. 2 is presented in formulas 3.1–3.3:

$$\Delta \text{ROA} (F_1) = (\Delta \text{F}_1 \times \text{FON}_2) + \text{Z}_2$$

(3.1)

$$\Delta \text{ROA} (F_2) = (\Delta \text{F}_2 \times \text{FON}_2) + \text{Z}_2$$

(3.2)

$$\Delta \text{ROA} (F_3) = (\Delta \text{F}_3 \times \text{FON}_2) + \text{Z}_2$$

(3.3)

When using the traditional integral method, the additional increase in the effective indicator («non-decomposable remainder» – Z) formed as a result of the interaction of factors is distributed equally between them (formula 4).

$$\text{Z}_2 = \Delta \text{ROA} - \sum (\Delta \text{F}_n \times \text{FON}_2) / n$$

(4)

where: \text{FON}_2\text{ }_n – the main part of the formula of the author's integral method is calculated using formulas 5.1–5.3:

$$\text{FON}_2\text{ }_1 = \left( \left( F_{2(0)} \times F_{3(0)} \right) + \left( F_{2(0)} \times F_{3(0)} \right) \right) / 2$$

(5.1)

$$\text{FON}_2\text{ }_2 = \left( \left( F_{1(0)} \times F_{3(0)} \right) + \left( F_{1(0)} \times F_{3(0)} \right) \right) / 2$$

(5.2)

$$\text{FON}_2\text{ }_3 = \left( \left( F_{1(0)} \times F_{2(0)} \right) + \left( F_{1(0)} \times F_{2(0)} \right) \right) / 2$$

(5.3)
To form the main part of the formula (FON\#2\textsubscript{n}), it is necessary to use the principle of selecting factors disclosed in table No. 2.

**Table 2.** Selection of factors for the main part of the formula (FON\textsubscript{h}) by the author's integral methods

| Under influence No. factors | the sum of the factors |  
|-------------------------------|-----------------------|
|                              | The 1st factor | The 2nd factor |
|-------------------------------|---------------|---------------|
| 0                             | 0             | 1             |
| 1                             | 2             | 3             |
| 2                             | 1             | 3             |
| 3                             | 1             | 2             |

где: \( m \) – number of indicators in the main part of the formula (table 2). \( m \) is defined by the formula 6:

\[
m = n \times (2 \times (n - 1)) \tag{6}
\]

With 3 factors in the model \( n = 3 \), \( m \) will be 12 \((m = 3 \times (2 \times 2) = 3 \times 4)\).

4. Results

Testing of the author's method of factor integral analysis No. 2 presented above is presented in tables No. 3, 4.

**Table 3.** Components of the formula according to the author's integral method No. 2

| No. formula | \( \Delta F_\text{n} \) | part of the formula | the main part of the formula (FON\#2\textsubscript{n}) | Z |
|-------------|--------------------------|---------------------|------------------------------------------------------|---|
| 1           | \( \Delta \text{ROA (F}_1\text{)} = \Delta F_1 * \) | \(( (F_{2(0)} \times F_{3(1)}) + (F_{2(1)} \times F_{3(0)}) ) / 2\) | Z |
| 2           | \( \Delta \text{ROA (F}_2\text{)} = \Delta F_2 * \) | \(( (F_{1(0)} \times F_{3(1)}) + (F_{1(1)} \times F_{3(0)}) ) / 2\) | Z |
| 3           | \( \Delta \text{ROA (F}_3\text{)} = \Delta F_3 * \) | \(( (F_{1(0)} \times F_{2(1)}) + (F_{1(1)} \times F_{2(0)}) ) / 2\) | Z |

**Table 4.** The result of the author's integral method No. 2

| No. factor's | \( \Delta F_\text{n} \) | part of the formula | the main part of the formula (FON\#2\textsubscript{n}) | Z\#2 | Final result |
|--------------|--------------------------|---------------------|------------------------------------------------------|------|--------------|
Factor analysis allows you to obtain a quantitative assessment of the influence of factor deviations on the deviation of the value of the studied indicator. As can be seen from the final result of tables No. 1, No. 4, the goal of the author's method has been achieved – the determination of the influence of factors is disclosed without deviations.

Thus, the change in the return on assets of construction companies in the Baikal region was influenced by:
- decrease in return on equity by 38.83 %, caused a decrease in return on assets by 3.90 %;
- an increase in the equity income coverage ratio by 6.03 % caused a decrease in the return on assets by 0.33 %;
- increase in asset turnover by 1.35 %, caused a decrease in return on assets by 0.01 %.

The combined effect of three factors led to a decrease in the return on assets of construction companies in the Baikal region by -3.56 %.

The return on assets for the construction industry in the Baikal region in 2017 was 2.08 %, that is, 2 cents of net profit was received from $ 1 of the property of construction companies in the Baikal region. In 2018, the return on assets of the construction industry in the Baikal region decreased to -1.48 %, meaning that 1.5 cents of loss was received from $ 1 of the property of construction companies in the Baikal region.

|   | ∆ROA (F₁) = -0.388334 | 0.100124 | -0.000105 | -0.038986 |
|---|----------------------|---------|-----------|-----------|
| 1 |                      |         |           |           |
| 2 | ∆ROA (F₂) = 0.060263 | 0.056345 | -0.000105 | 0.003290  |
| 3 | ∆ROA (F₃) = 0.013476 | 0.015997 | -0.000105 | 0.000110  |
| Total | -0.035271 | -0.000315 | -0.035586 |

5. Discussion
Construction as an economic sector participates in the creation of fixed assets for all sectors of the national economy. This is one of the leading industries where the vital tasks of restructuring the material base of the country's entire production potential and developing the non-production sector are being solved. Both the rate of recovery from the crisis and the competitiveness of the domestic economy largely depend on the efficiency of the construction complex. It is not for nothing that it is said that if the economic situation in the country worsens, its construction industry first of all suffers.

According to the state and development of the construction industry in
Russia, we can judge our realities and aspirations. The global financial crisis affected all industries in Russia, as well as in other countries. First of all, banks were affected, and construction companies also felt the impact of the crisis.

If you take, in recent years, construction has developed at a high rate, thanks to lending and favorable investment conditions in the industry. A significant outflow of investment as a result of the crisis had a significant impact on construction.

6. Conclusion
Each weak financial ratio can be subjected to a deeper decomposition to get an accurate idea of the cause of the weakness. When the sources of problems are identified, the company's management can develop measures to improve the return on assets, for example, improve the efficiency of asset management, improve marketing, and so on (Ali, M., Boulden, G., & Brake, T., 2002; Corrado, C. J., & Yordan, B. D., 2002; Hill, C. W. L., & Jones, G. R., 2004; Kenneth, A. J., 1974; Ross, S. A., Westerfield R. W., & Jordan, B. D., 2006; Saunders, A., & Cornett, M. M., 2006; Teece, D. J., 1984).

Filatov's three-factor model shows the impact of investment, financial and operating activities (business activity) on the company's return on assets. Therefore, the return on the company's total capital (assets) directly determines both the overall return and the investment attractiveness.

Analysis based on the Filatov model allows you to determine the strengths and weaknesses of the company. The return on assets under the Filatov model depends on three factors: the level of return on equity, income coverage with own funds, and the speed of asset turnover. Thus, the directions for improving the return on assets are directly indicated.

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