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ECONOMIC MARGIN MODELS AS BASIC METHODS OF THE ECONOMIC EFFICIENCY OF RUSSIAN COMPANIES[2]

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ПРИМЕНЕНИЕ МОДЕЛИ ЭКОНОМИЧЕСКОЙ МАРЖИ ДЛЯ АНАЛИЗА ЭКОНОМИЧЕСКОЙ ЭФФЕКТИВНОСТИ ДЕЯТЕЛЬНОСТИ РОССИЙСКОЙ КОМПАНИИ[3]

The greatest goal of management is to use assets of a company most efficiently and to increase its market value (capitalization, profits) through the introduction of controlling mechanisms which help the company adapt itself to the changes of external environment, ensure the company's economic growth, lead to successful application of advanced technologies, and result both in the increased quality of products and crucial competitive advantages.

ECONOMIC EFFICIENCY. VALUE BASED METHOD (VBM). COMPANY'S ASSETS. ECONOMIC ADDED VALUE. PROFITABILITY.

Раскрыта основная цель управления активами предприятия – это увеличение рыночной стоимости предприятия (прирост экономической прибыли и капитализации) на основе внедрения механизма управления стоимостью.

ЭКОНОМИЧЕСКАЯ ЭФФЕКТИВНОСТЬ. СТОИМОСТНОЙ ПОДХОД. АКТИВЫ КОМПАНИИ. ЭКОНОМИЧЕСКАЯ ДОБАВЛЕННАЯ СТОИМОСТЬ. РЕНТАБЕЛЬНОСТЬ

1. Introduction

The suggested approach is based on the major principle of the market value of a company: transformation of operating results into financial ones. The object of the study is efficient management of a company's assets. Our goal is to define approaches and ways which affect a company's market value and factors which has to be taken into account, namely, to define the value based method (VBM) principle model and its elements; to define methods for analyzing economic efficiency of a company; to give an example to discuss.

EVA® is a modified version of residual income or economic profit, where the modifications consist of accounting adjustments designed to convert accounting income and accounting capital to economic income and economic capital. Many authors (e.g. Stewart (1991); Young and O'Bryne (2001); Stephens and Bartunek, 1997; Milunovich and Tsuei, 1996; Jackson, 1996; Mayfield, 1997; O'Bryne, 1996; Biddle, Bowen, and Wallace, 1997 and 1999; Martin and Petty, 2000; Feltham et al., 2004; D.J. Obrycki, R. Resendes 2000. Holler, 2009) described EVA® to prove a company's value. EVA® is estimated by major firms, e.g. Goldman Sachs, First Boston, and Stern Stewart (Weaver, 2003), Delloitte to name just a few.

2. Economic efficiency and management of company's available assets

Economic efficiency of a company's asset management is determined by many factors. However, an innovation company introduces changes in approaches and methods which are used to evaluate efficiency, puts forward specific requirements, and defines the parameters not reflected in traditional approaches. So, the market value of a company is part of the overall

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assessment of economic efficiency, distinctive and determining factor which leads to the development of innovation process and changes dramatically all internal and external conditions. The analysis of the asset value is based on the principles and approaches of the economic cost-benefit analysis. It includes models and criteria for investment analysis, analysis of a company's present value (discounted cash flows), and uncertainty and risks analysis (methods of mathematical economics, economic theory of options concept of margin). There are restrictions on the practical application of the VBM concept for the adapted management methodology and mechanisms to form market value of a company available for a company management in the process of innovative activities and environmental uncertainty. In order to manage the market value of enterprises, it is necessary to identify new methods and criteria for assessing the efficiency of asset allocation (for example, the economic value added (EVA), the discounted cash flows model (DCF)). Tab. 1 provides a comparative analysis of the two main approaches to VBM.

Table 1

Comparison of evaluation methods: DCF model and EVA

Collation	EVA	DCF
Cash flow	Only part of future cash flows «added» to a company's market value	Overall cash flow projections within a long period of time
To identify the current market value of a company and to monitor its change	Close links between current and long-term indicators	Evaluation is made at any time given, but monitoring is not
To view all previously generated assets	All the invested assets are taken into account	Past activities are not considered

As you can see in Tab. 1, the DCF method ignores information concerning existing assets and a significant amount of cash flows which are not included in projections and is reflected as the so-called extended value (according to the principle of residual income). The EVA method is less susceptible to this effect because it is based on the assessment of real investment, economic profits, and cost of capital. These are just part of cash flows, which increases future economic benefits. The key feature of the method is a combination of new requirements for EVA evaluation and standard financial reporting which needs correction of the corresponding figures in accounting reports, including capital, to reflect the typical character, repeatable operations and to avoid speculative effects.

Tab. 2 shows that according to the EVA model investing in innovation to create the additional market value of the enterprises within a specified period shall be the ratio ROI > WACC (where ROI-return on invested capital), which is a measure of performance. Similar terms IRR > WACC (or NPV > 0) must be observed for DCF.

3. Models of optimal control over investments in company assets

3.1. *Main components of a company's market value, their relationship*

One of the most important theoretical problems is to develop models of the company's value management. The approaches which exist, in fact, are not «managerial» because they do not define ways to influence the value of a business and do not indicate the factors which should be used to increase it. A commercial appraisal of a company's value is based on retrospective indicators and profiles used for projections. However, there is no accumulated statistics in innovation process. That is because all the parameters related to the market, business,

Table 2

Criteria to evaluate the efficiency of a company's market value management

Methods	Creating value	Stabilizing value (equilibrium)	Damaging (lost) value
DCF	IRR > WACC, MIRR > WACC, ROI > WACC	IRR = WACC, MIRR = WACC, ROI = WACC	IRR < WACC, MIRR < WACC, ROI < WACC
EVA	EVA > 0, CFROI > k_m	EVA = 0, CFROI = k_m	EVA < 0, CFROI < k_m

technology, management, product life-cycles are new and have both unknown characteristics and unknown impact of their implementation, in addition to the so-called «multiplicative» effects on innovation. The effectiveness of innovative solutions is confirmed only when the effect is multiplicative in nature. This is because the innovation cycle is of long duration (up to 55 years). Therefore, current (discounted) value of future economic benefits will be slow and insufficient to demonstrate the commercial viability of investments in innovative projects. Moreover, the parameters of innovation development and multiplicative effects are probabilistic in nature, i. e. increased market value of assets is a mathematical expectation. Consequently, it must be seen as a random process and appropriate management methods should be used (economic margin, optional approach). Key principles of the factors contributing to a company's market value, which provides increased economic value, are as follows: appropriate right goals, i. e. corporate strategy aimed at maximizing the value for each level of management; differentiation of corporate strategy which is used to identify features differentiating a company from its industry competitors so that additional value will be created; allocation of resources through optimized financial flows to create additional value; compromise between shareholders and consumers, i. e. search for new opportunities which would increase the financial result not only for shareholders, but which would also create value for their customers.

3.2. *The ways of optimizing the invested capital of a company*

The indicator of economic value added (EVA®) [8] is used as a performance indicator of a company engaged in innovation so as to measure its value, which can be defined by the following formula:

$$\text{EVA} = \text{IC}(\text{ROI} - \text{WACC}), \qquad (1)$$

where IC – invested capital; ROI – return on invested capital; WACC – weighted average cost of capital.

A more profound analysis of the EVA measure can be used to explain the regularities of the economic value formation and factors affecting this indicator. In terms of the economic theory, return on invested capital has the property of marginal revenue: $\text{ROI(IC)} = -\frac{dY(\text{IC})}{d\text{IC}}$, where Y(IC) – income derived from invested capital.

Given this assumption, the formula for EVA in each period of time can be transformed into an expression:

$$\text{EVA(IC)} = \text{IC}(\text{ROI(IC)} - \text{WACC}).$$

This approach allows optimizing the value of a company engaged in innovation, considering the corresponding optimization model:

$$\text{EVA(IC)} \to \max. \qquad (2)$$

The optimal value of the invested capital is determined by the condition $\frac{d\text{EVA(IC)}}{d\text{IC}} = 0$, which, after algebraic manipulations, becomes:

$$\text{ROI(IC)}\left(\frac{d\text{ROI(IC)}}{d\text{IC}}\frac{\text{IC}}{\text{ROI(IC)}} + 1\right) = \text{WACC}. \quad (*)$$

From the above formula, the terms of optimization can be determined by the value of the invested capital that achieves maximum value EVA(IC). It is achieved when the condition remains maximum:

$$\frac{d^2\text{EVA(IC)}}{d\text{IC}^2} = \left[\left(\frac{d\text{ROI(IC)}}{d\text{IC}}\right)^2 + \text{ROI(IC)}\frac{d^2\text{ROI(IC)}}{d\text{IC}^2} + \frac{d\text{ROI(IC)}}{d\text{IC}}\right] < 0. \quad (**)(3)$$

It has a negative value. The optimality condition takes the form: ROI(IC)(E(IC) + 1) = = WACC. So, the above analysis lets us conclude as follows. In case the capital investment is made by an operating company, return, obviously, must be greater than the average cost to raise capital, which is to be satisfied $\frac{\text{WACC}}{\text{ROI(IC)}} \le 1$. Based on the optimality conditions, this provision can only be achieved in case the negative character on the coefficient of elasticity E (IC) in absolute value is less than unit, i. e. in the inelastic range of the marginal return on investment that meets the conditions of a perfect competitive market where the marginal return on investment tends to have

a fixed value. We can write a principled optimization model. For a fixed elasticity and a certain value of invested capital, ROI and WACC of its involvement are inversely related, so that an increase (decrease) in one of the variables will require an increase (decrease) in the other. With increased investment capital, the cost of capital is committed to the market interest rate. This result is quite understandable since represents the profit earned as a function of invested capital, as well as the assumption of diminishing marginal returns on investment, according to neo-classical concepts.

In reality, a company usually has more than one investment project (investment program). In this case, the optimal investment program for any number of projects (the case of two projects) should meet the following requirements:

$$\mathrm{ROI}_1(\mathrm{IC}_1)w_1 + \mathrm{ROI}_2(\mathrm{IC}_2)w_2 \to \max. \quad (4)$$

Provided $\mathrm{IC}_1 + \mathrm{IC}_2 = \mathrm{IC}$. If we consider that $w_1 = \dfrac{\mathrm{IC}_1}{\mathrm{IC}}$, $w_2 = \dfrac{\mathrm{IC}_2}{\mathrm{IC}}$, we obtain with the same restriction $\mathrm{ROI}_1(\mathrm{IC}_1)\mathrm{IC}_1 + \mathrm{ROI}_2(\mathrm{IC}_2)\mathrm{IC}_2 \to \max$.

Solving the problem of the Lagrange method, we obtain:

$$L = \mathrm{ROI}_1(\mathrm{IC}_1)\mathrm{IC}_1 + \mathrm{ROI}_2(\mathrm{IC}_2)\mathrm{IC}_2 + \\ + \lambda(\mathrm{IC} - \mathrm{IC}_1 - \mathrm{IC}_2) \to \max. \quad (5)$$

There is a condition for optimization after transformations:

$$\mathrm{ROI}_1(\mathrm{IC}_1)\left(\frac{\partial \mathrm{ROI}_1(\mathrm{IC}_1)}{\partial \mathrm{IC}_1}\frac{\mathrm{IC}_1}{\mathrm{ROI}_1(\mathrm{IC}_1)} + 1\right) = \\ = \mathrm{ROI}_2(\mathrm{IC}_2)\left(\frac{\partial \mathrm{ROI}_2(\mathrm{IC}_2)}{\partial \mathrm{IC}_2}\frac{\mathrm{IC}_2}{\mathrm{ROI}_2(\mathrm{IC}_2)} + 1\right). \quad (6)$$

Or, considering that the first terms in the right and left brackets of the equation are the elasticity of the marginal return on the invested capital value:

$$\mathrm{ROI}_1(\mathrm{IC}_1)(E(\mathrm{IC}_1) + 1) = \\ = \mathrm{ROI}_2(\mathrm{IC}_2)(E(\mathrm{IC}_2) + 1) = \lambda. \quad (7)$$

If we interpret the argument as a possible cost of capital (or required return on investment), then in a perfect market $E(\mathrm{IC}_1) = E(\mathrm{IC}_2) = 0$ and the optimal investment program should include only those projects which yield equal opportunity costs of capital. However, real market elasticity of marginal return on invested capital is not necessarily zero and compensates, to some extent, for a project with lower returns.

3.3. *Use of economic value added (EVA) for capital optimization*

The principle capital optimization model, according to economic value added, is the following:

$$\begin{cases} \mathrm{ROI}_1(\mathrm{IC}_1)\mathrm{IC}_1 + \mathrm{ROI}_2(\mathrm{IC}_2)\mathrm{IC}_2 \to \max \\ \mathrm{EVA}(\mathrm{IC}) = \mathrm{IC}\left(\mathrm{ROI} - \mathrm{WACC}\right) \\ w_1 = \dfrac{\mathrm{IC}_1}{\mathrm{IC}},\ w_2 = \dfrac{\mathrm{IC}_2}{\mathrm{IC}},\ \mathrm{IC}_1 + \mathrm{IC}_2 = \mathrm{IC} \\ E(\mathrm{IC}) = \dfrac{d\mathrm{ROI}(\mathrm{IC})}{d\mathrm{IC}},\ \dfrac{d\mathrm{EVA}(\mathrm{IC})}{d\mathrm{IC}} = 0 \\ \text{or}\ \dfrac{\mathrm{WACC}}{\mathrm{ROI}(\mathrm{IC})} \le 1. \end{cases} \quad (8)$$

where $Y(\mathrm{IC})$ – income from invested capital; $E(\mathrm{IC})$ – coefficient of elasticity.

The model (8) is used for choosing an innovative program. Expression in the formula (8) uses Lagrange method. Optimization condition is seen in formulas (6) and (7), where λ is the opportunity cost of capital (the required return on investment). The criterion of investment in a company's innovation program will increase (decrease) the company's market value:

$$\Delta V_m - \mathrm{PVI}_m = \\ \frac{p_m \sum_{i=1}^{N}\left(P_i X_i\left(1 - \dfrac{1}{k_{im}}\right)\right)}{\mathrm{WACC}(1 + \mathrm{WACC})^{T_m - 1}} - \mathrm{PVI}_m > 0, \quad (9)$$

where $\Delta \mathrm{V}_m$ is gains of the company through m-alternative development increase (decrease) the company's market value; PVI_m – present value of investment in the company's innovation program according to m-alternative development; pm-probability of successful completion of an innovative program according to *m*-alternative development; P_i, X_i – price and volume i – the kind of productive resource to busy production; $k_i = q_{i1} / q_{i0}$ efficiency gains from the sale of

m-the company's innovation program on the level of effectiveness of *i*-type of productive resource; q_i – evel of effectiveness of i-the type of resource, $i = 1$ ч N; T_m – time implementation of m-technology in the production system; WACC – weighted average cost of capital.

3.4. *Using economic margin (EM) for capital optimization*

The economic margin [6] is based on the principle of economic profit, expressed in terms of cash flow. The method combines the advantages of EVA and CFROI (return on investment based on cash flow) and takes into account cost of capital, inflation, amendments to life cycle stages, presence of balance-sheet accounts. EM is a value indicator of those businesses whose value is above or below the price of the stock market.

EM is based on four factors (economic profit, competition, growth, cost of capital). EM models the effect of competition on the gradual loss of excess profits (in contrast to the principle of residual income). Unlike the EVA, EM takes into account the depreciation and includes the cost of capital invested in the capital expenditure. Unlike in the case of CFROI, only equity financing is taken into account (the cost of borrowing to calculate economic feasibility is not considered). However, the EM method is based on the total amount of the asset. Condition assessment of economic effectiveness is $\Delta EM > 0$.

$$
\begin{gathered}
EM = \frac{OCF - CC}{GIC}; \\
OCF = NI + Am + ATIntEx + REx + \\
+ RDEx \pm n\,Rec; \\
CC = f(r_e, ROE, CAMP); \\
GIC = TA + {}^{Acc}Am + \\
+ Infl + {}^{Cap}REx + {}^{Cap}RDEx - n\,DebtCL,
\end{gathered}
\qquad (10)
$$

where EM – economic margin in %; OCF – operational cash flow, CC-impact at capital; GIC – gross invested capital; NI – net income; ${}^{Acc}Am$ and Am – is the accumulated annual amortization and depreciation; RD*Ex* and ${}^{Cap}RDEx$ annual and cumulative development expenses and R&D; RE*x* and ${}^{Cap}REx$ – annual and cumulative rental payments; ATIntE*x* = (1 – *T*)Int – costs of interest after tax; $n\,Rec$ – change of off-balance sheet accounts; Infl – adjustment for inflation; *n*DebtCL – payables.

Table 3

Definition of investment efficiency in the assets of two projects

Indicators	m_0	m_1	m_2	Total ($m_0 + m_1 + m_2$)
NOPAT, million dollars.	7 433	15 669	13 093	36 195
IC, m.d.	73 541	93 371	92 081	258 993
Gross cash flow (GCF), m.d.	6 486	26 576	30 306	63 368
Salvage value (SV), m.d.	1 856	3 136	3 676	8 668
Gross Invested Capital (incl. inflation)(GIC), m.d.	4 672	86 760	67 116	158 548
Operating cash flow (OCF), m.d.	891	28 751	29 229	58 871
WACC, %.	10.12	10.12	10.12	10.12
ROI, %	10.11	16.78	14.22	13.98
EVA = NOPAT – WACC · IC, m. d.	–9.3	6 220.2	3 774.4	9 985.3
EVA = (ROIC – WACC) · IC, m.d.	–9.3	6 220.2	3 774.4	9 985.3
$CFROI = \frac{GCF + SV}{GIC}$, in %	1.786	0.342	0.506	0.454
Economic Margin (EM = (OCF – WACC · GIC) / GIC), %	8.94	23.02	33.43	27.01
$\frac{WACC}{ROI} \le 1$	1.001	0.603	0.712	0.724
$E(IC) = \frac{dROI}{dIC}$		0.603	0.544	0.393

As you may see (Tab. 3), the base state of a company (m_0) is characterized by negative economic added value. The company considers choosing two innovative projects (m_1 and m_2). It is important to emphasize that the elasticity coefficient of 0.393 shows how much profit is brought by additional investment in the company. Please, note that elasticity decreases.

4. Conclusion

Today, it is not quite correct to see risk only as a negative factor in asset management. Since risk can be considered as a possible additional competitive advantage, it is directly linked to the concept of real option in practice. Assessment and management of the added value is getting more and more importance. To optimize asset management of a company at the time of investing, one has to create conditions which help to increase the company's value, and include the following activities:

1. Improved operating activities due to the production factors, intangible assets, new technologies, innovation as a whole.

2. Choice of investments with ROI higher than costs to attract the capital required for their implementation.

3. Improved asset management, e. g. through selling or eliminating non-core, secondary, unprofitable assets, decreased periods of accounts receivable turnover, stocks (so-called «disinvestment»); management of institutional factors of development.

4. Improved management of the capital structure.

Methods and models which can simulate risks, uncertainties, respond to a changed external environment and internal factors over time have the priority significance in the effective asset management. Thus, the authors have identified the following benefits of VBM according to the principle of value maximization towards the problem of a company's asset management:

– improved development strategy of a company and its subsidiaries on the basis of the principle of consistent maximizing of the company's market value to achieve common objectives at all levels of management;

– substantial improvement of the quality and effectiveness of managerial decisions based on clear priorities in management, optimal combination of long-term and short-term objectives, provision of flexibility when implementing innovative programs;

– improvement of corporate transparency, promotion of innovations and their success, creation of conditions for sustainability of a company while assets are restructured (mergers, acquisitions) and prevention of hostile takeover and undervaluation of shares.

The authors find it necessary to point out flaws in the concept of value. Firstly, it is underestimation of negative factors, which contributes to the destruction of a company's market value (excessive diversification, poor distribution of resources, underestimation of risk). Secondly, it is the lack of information on the relationship between the parameters and methods of economic efficiency evaluation for Russian companies, which delays the development of this approach in Russia. Thirdly, these are institutional issues (diversity of terminology in the financial reports (NOPAT or EBIT $(1 - T)$, FCF, OCF, FCFE etc.).

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