Financial controlling in electricity companies using enterprise resource planning software

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Abstract. The article is devoted to the study of financial controlling in corporate management based on ERP systems. The purpose of the study is to substantiate key top-level indicators for understanding the effectiveness of financial controlling in electricity companies. To achieve this goal, the stages of development of controlling from company cost management to complex financial processes and their implementation as part of ERP systems were studied. In the course of the study, we formulated a hypothesis that the most preferred key indicators for assessing financial controlling may be value management indicators. The choice and justification of key indicators for creating a financial controlling system were also carried out; financial controlling was considered as the basis for creating a value-oriented corporate management system. Based on the hypothesis put forward, a regression analysis was carried out, which showed a significant relationship between indicators for the sample of electricity companies under this study. The total sample size was about 600 observations. As a result of the study, it was proposed to use the indicator of economic value added (EVA) or monetary value added (CVA) as a basic indicator of effectiveness of financial controlling system in electricity companies, which, according to research, have a fairly high correlation with the indicator of market value added (MVA).

1 Introduction

The concept of controlling as a scientific category was firmly established in economics in the first half of the 20th century [1-15]. However, the origins of controlling lie in the field of public administration and have their roots in the Middle Ages [2]. Already in the XV century at the court of the English king there was a position called "Countrollour", whose objectives included documenting and controlling cash and commodity flows [6]. The widespread development of controlling in business management began only in the 1920s. The main reason for the emergence of controlling in corporate management is primarily the industrial growth in the United States in the late 19th and early 20th centuries, which caused the complication of management processes and the emergence of new approaches to planning. The growth in the size of enterprises and the complexity of production processes entailed, accordingly, the need for improved management methods. There was a need for some kind of integrating system, with the help of which it was possible to subordinate the

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process of managing material and financial resources to a single goal. The theory and practice of controlling developed gradually, passing through a series of successive stages (Tab. 1).

Table 1. Development of controlling concepts

The basis of the concept	Time period	Description of the concept
The accounting system of the corporation	20-70s of the XX century	Operational controlling focused on the accounting of costs and results, cost planning; creation of a management decision support system.
The information system	70-s of the XX century – beginning of the XXI century	Strategic controlling focused on systems of strategic indicators, marketing and logistics mechanisms in integration with corporate ERP systems.
VBM management	From the beginning of the XXI century to the present	Financial controlling focused on the growth of shareholder value and wealth of shareholders, ensuring long-term growth of financial performance.

A large number of publications are devoted to the development of theoretical and methodological aspects of operational and strategic controlling [1,3,5,7,8,9,14,15]. The idea of financial controlling gained popularity at the beginning of the 21st century. Some of its elements have already found application in the practice of corporate management, however, at the moment, there are an insufficient number of studies on this topic that are of a fundamental nature. Financial controlling is a set of techniques aimed at bringing the accounting policies and management reporting of structural divisions of corporations and holdings to such a form that they are effective for a given business, well analyzed, flexible in relation to future changes in the business and supported by integrated software products [4,12,13].

Initially, financial controlling was associated with liquidity management, while the main objective was to ensure the solvency of the company. Gradually, financial controlling began to be used to manage profitability. Then, for quite a long time, financial controlling was associated with the integrated management of the financial condition of an enterprise. Recently, there has been a shift in the focus of controlling to information support for value-oriented management of enterprise development, based on an analysis of economic value drivers.

Currently, the objective of financial controlling is seen as improving the business, based on the financial criteria for the success of the enterprise, as well as substantiating the requirements for the corporate information ERP system. With the help of financial controlling, the following traditional accounting and management problems can be solved: low payment discipline of structural divisions, uncontrolled receivables, poor cost management (lack of a clear understanding of the cost structure and their appropriateness), incorrect determination of the profitability of branches and types of business, lack of working capital, paying unreasonably high taxes. At the same time, financial controlling includes such types of activity as controlling working capital, controlling receivables, controlling stocks, controlling current liquidity, controlling short-term cash surplus and deficit, financial planning and forecasting.

2 Materials and methods

When formulating the research hypothesis, the following provisions were taken into account. Financial controlling is focused on the functional support of financial management, which determines its content and main objectives. When the company's management system is reoriented to the indicator of value growth, a new dimension is added to the strategic and operational controlling system - the value of the business. In the system of strategic financial controlling, the objective of the controller will be to promote the system of value-oriented financial planning and forecasting of value growth indicators of the company. As part of the system of operational financial controlling, the controller ensures the correct use of tools designed to implement the strategy. In recent years, value-oriented management has widely used such indicators as discounted cash flow (DCF), return on investment in cash flow (Clash Flow Return on Investment, CFROI), cash value added (Clash Value Added, CVA) , economic value added (Economic Value Added, EVA), etc. The above indicators, on the one hand, are most correlated with the market valuation, and on the other hand, can be used in the operational management of the company, which can significantly reduce the disadvantages of traditional methods.

The key decision in creating an effective financial controlling system is the decision to choose the main indicator of the corporation's performance (one indicator or a set of such indicators). Based on the objectives of financial controlling and its purpose, we propose to use indicators of economic value added (Economic Value Added, EVA) or monetary value added (Clash Value Added, CVA). At the same time, we assume that in the framework of financial controlling, the CVA indicator may be preferable. The CVA concept is based on the idea that a company should be able to cover both operating costs and the cost of capital from the generated cash flows. The need to focus on the cash flow indicator and draw up a cash flow statement (in addition to the income statement that calculates the "profit" indicator) is due to the following: the function of the income statement is to measure an entity's profitability for a period, but it does not show the point at which the cash flows and the impact of operations on liquidity and solvency took place. This information is given in the cash flow statement.

Cash Value Added (CVA) measures the residual cash flows generated by investment in a corporation. Cash value added is also called Residual Cash Flow (RCF) because it is the amount of cash flow that is left for shareholders after the cost of capital has been recovered. In principle, residual cash flow and monetary value added can be identified, if no distinction is made between RI and EVA. If we go into details, then there will be a certain difference between them, and it is determined by amendments to the financial statements. RCF does not require any special accounting adjustments. CVA, in accordance with its name and due to the continuity of EVA, should not be based on accounting, but on economic indicators. CVA circumvents the problem of a fictitious accounting expense, depreciation, which is rarely consistent with a long-term asset benefit scheme. The formula for calculating CVA will look like this.

$$CVA = Adjusted\ Cash\ Flow - WACC \times Adjusted\ Invested\ Capital \qquad (1)$$

Or

$$CVA = (Cash\ ROIC - WACC) \times Adjusted\ Invested\ Capital, \qquad (2)$$

Where: CVA - Cash Value Added;
WACC - weighted average cost of capital;
Cash ROIC - Cash Return on Capital Employed.

A comparative calculation of the EVA and CVA indicators is shown in the illustration (Fig. 1).
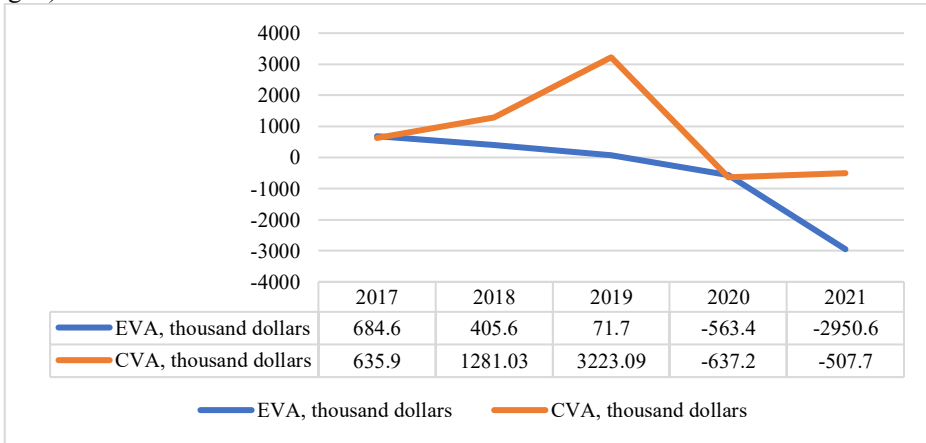

	2017	2018	2019	2020	2021
EVA, thousand dollars	684.6	405.6	71.7	-563.4	-2950.6
CVA, thousand dollars	635.9	1281.03	3223.09	-637.2	-507.7

Fig. 1. Comparative analysis of the dynamics of EVA and CVA indicators

CVA allows even out artificial fluctuations in returns over the life cycle of an investment. The main problem of EVA is that it shows a negative return at the beginning of the investment cycle, and then greatly overestimates the return in the stable phase of the investment cycle. CVA often at the beginning of the investments' life shows a low, but still positive return. This is an undoubted advantage, which, however, can turn into a significant disadvantage. CVA values should be interpreted with caution as, in particular, over the remaining investments' life; CVA tends to be slightly higher than EVA. True, this difference is determined for the most part by depreciation.

The decomposition of the CVA indicator makes it possible to determine the factors affecting the value of the company in more detail (Fig. 2). The system of indicators included in the scope of financial controlling is ranked by their value, depending on the strategic goals of the company. In the process of ranking, the most important of the controlled indicators of this type of controlling are selected into the system of priorities of the first level, then a system of priorities of the second level is formed, the indicators of which are in a factorial relationship with the indicators of priorities of the first level, the system of priorities of the third and subsequent levels is formed in a similar way.

Such a systematic approach to the formation of controlling priorities facilitates the procedures for subsequent clarification of the causes of deviations of actual values from those approved in the plans and contained in the package of ideal (desirable) configurations of the state of all processes. When forming a system of priorities, it should be taken into account that they may have a different description of indicators characteristics for individual responsibility centers; for certain financial activities of the company; for various aspects of the formation, distribution and use of financial resources. However, both the hierarchical reducibility of all controlled indicators for the corporation as a whole and their reducibility for separate financial activities should always be ensured.
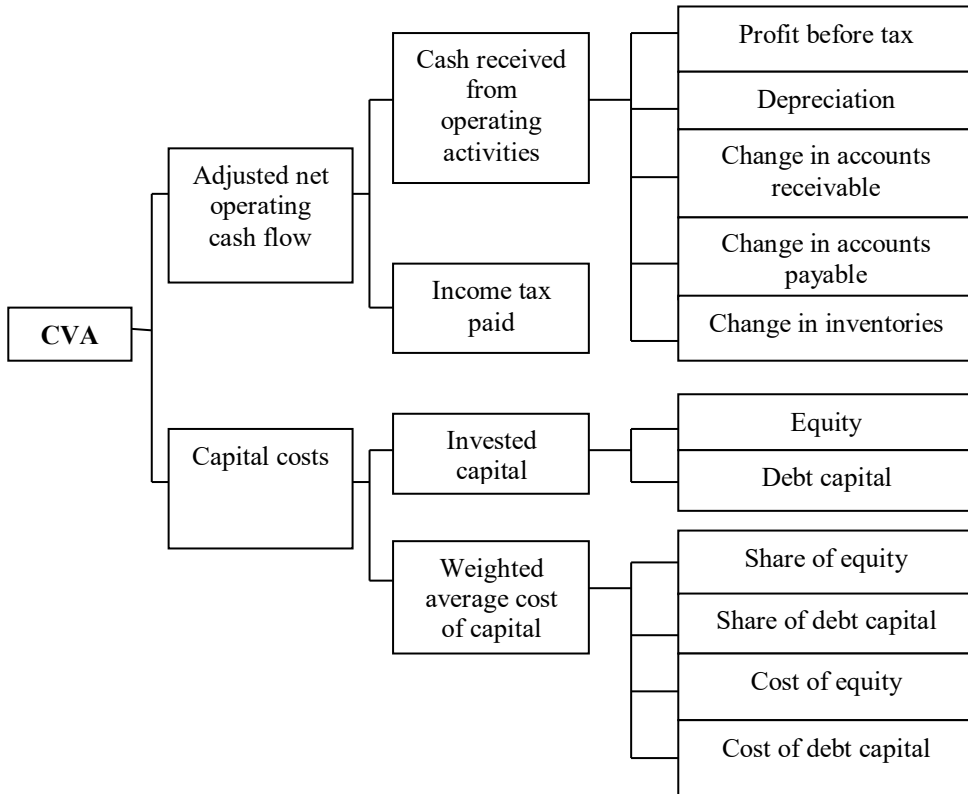
Fig. 2. Decomposition of CVA

Our study aimed to test the hypothesis that the amount of monetary value added (CVA) can be used as an indicator of the effectiveness of the financial controlling system, due to the fact that the calculated value of CVA can explain the value of the market value of company shares. At the same time, the indicator of market value added (MVA) was chosen as an indicator characterizing the company's market capitalization.

This hypothesis was tested using the methods of regression analysis in relation to Russian companies trading their shares on the MOEX, as well as on the US market in order to further compare the obtained result. The total initial sample size was 110 observations for the Russian market and 1200 observations for the US market. Additionally, for the initial sample, the Chow test was carried out, as a result of which it was revealed that, within the studied range, the relationship between the input and output variables is not monotonous for negative and positive values of monetary value added, as a result of which negative values of the input variable were excluded from the sample and further the study was conducted for positive values of EVA and CVA. Thus, the size of the final sample was 60 and 555 observations, respectively, for the Russian and American markets. The data required for the study on Russian companies are taken from public financial statements from the results of trading in ordinary shares of these companies on the stock exchange in 2017-2021. Data for American companies was obtained from the website of A. Damodaran.

3 Results

Regression results obtained when estimating model parameters for the US market for 2017-2021 are shown in Figure 3. The regression results for Russian companies are shown in

Figure 4. The low value of the coefficient of determination in the second model indicates a rather weak relationship between the studied indicators in the Russian market. Thus, the assumption about the relationship between CVA and MVA is confirmed by a study conducted on data from US companies and is not confirmed in the Russian market, which is largely due to the inefficiency of the market itself, as well as insufficient representativeness of the data. Nevertheless, the indicator of monetary value added can act as a promising indicator for Russian companies.
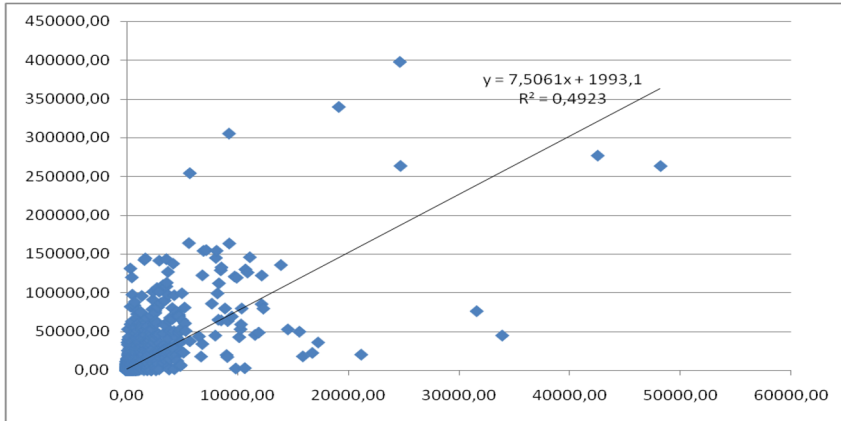

Fig. 3. Relationship between MVA (vertical axis) and CVA (horizontal axis) indicators according to US companies for 2017-2021
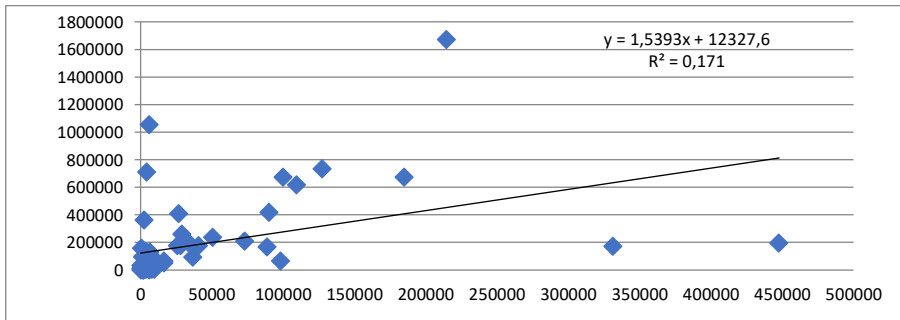

Fig. 4. Relationship between MVA (vertical axis) and CVA (horizontal axis) indicators according to Russian companies for 2017-2021

One of the main strengths highlighted by a number of studies [10,11] is that, compared to Economic Value Added (EVA), Monetary Value Added (CVA) shows a higher correlation with actual market values. Our study confirmed this assumption: the value of the correlation coefficient MVA with CVA exceeds the value of this coefficient MVA with EVA (Table 2).

Table 2. Correlation of MVA with CVA and EVA

Countries	Correlation of MVA with:	
	CVA	EVA
United States of America	0,70	0,67
Russian Federation	0,41	0,34

4 Discussion

The choice of the CVA indicator as a key benchmark in creation a financial controlling system is due to the following advantages: the cash flow indicator from operating activities allows to take into account the impact of production activities on liquidity and solvency; the indicator of cash flow from operating activities is less subject to distortion than the amount of net profit, which allows to get a more reliable assessment of the corporation performance; CVA circumvents the problem of a fictitious accounting expense - depreciation, which is rarely consistent with the pattern of benefiting from long-term assets; CVA allows to even out artificial fluctuations in returns throughout the life cycle of investments; in developed markets, compared to the economic value added (EVA), the monetary value added (CVA) shows a higher correlation with the market value added of companies.

To create an effective system of financial controlling in corporate entities, it must meet the following requirements: the target orientation of the action of each element of financial controlling, which consists in directing it to implement the developed strategy by coordinating the actions of financial responsibility centers in the process of developing and making managerial decisions; the multifunctionality of financial controlling, which is implemented in practice by mediating the function of financial planning, analysis, control and adjustment of the results of financial management; the focus of financial controlling on quantitative standards, such as indicators of profitability, liquidity, market value of the enterprise, etc.; flexibility in financial controlling system creating, that is, taking into account the possibility of adapting to new financial instruments, technologies and methods of financial transactions; the simplicity of creating links in the system is due to the fact that the excessive complexity of its construction may not be understood or not supported by the operating systems of the company; cost-effectiveness of financial controlling.

Systematizing the approaches of scientists to the definition of the objectives and essence of financial controlling, it should be noted that the analysis of conceptual approaches to determining the essence of financial controlling carried out in the framework of the study showed that many of its theoretical and applied aspects have not yet been adequately resolved. The main problems in the development of financial controlling, in our opinion, are: the implicit designation of the subject and object of financial controlling, the lack of a consensus on the positioning of financial controlling in the corporate management system, the ambiguous definition of tools and methods inherent in a certain type of controlling.

Within the framework of this work, financial controlling is considered as an integrating and coordinating subsystem of financial management, providing financial information to the decision-making process in managing the development of corporate entities with their subsequent accounting and adjustment.

5 Conclusions

The formation of the financial controlling system in corporate entities is a complex and consistent process, while it must include the following mandatory elements: objectives of financial controlling; subjects of financial controlling (financial controllers, financial directors, heads of financial departments); objects of financial controlling (financial resources); legal support, including general financial legislation, intra-company legal support (orders, instructions, etc.); methodological support, including a methodology for creating a budgeting system, a model for assessing and increasing the cost, calculating indicators of the financial performance of a corporation; management regulations that define the methods used, as well as the rules for making decisions on the main issues of financial controlling; information support, including data on the financial condition of

departments, the organization as a whole, the results of financial monitoring, new methods and tools for financial management, etc.; software in the form of modern ERP systems.

It is assumed that further research can be carried out in such main areas as: determining the principles for choosing a key indicator of the financial controlling system in corporate entities, depending on a number of factors - the size of the company, the state of the markets, the properties of manufactured products, industry affiliation, etc.; more accurate comparative analysis of the entire set of VBM indicators based on econometric studies; analysis of how an indicator accurately and reliably "signals" about the creation of new value; study of the relationship between changes in periodic indicators and the behavior of investors, fluctuations in market prices, etc. Such an analysis is especially relevant in emerging markets, and research in this direction is beginning to appear.

The development of modern controlling is facilitated by the rapid development of information, in particular, ERP systems. One of the recognized leaders of the implementation of software solutions for financial controlling is SAP, which contains solutions from the CO (Controlling) module.

However, only the introduction of programs cannot contribute to the creation of a clear picture of the functioning of a particular economic entity. An integrated approach is needed, which should include both methodological and information base. The formation of financial controlling as one of the most important areas of the overall controlling system requires a specific approach for each company. Currently, in many companies there is a need for an integrated methodological and instrumental base to support the basic management functions - planning, control, accounting and analysis, coordination of various aspects of business process management. This is confirmed by the growing interest on the part of companies in enterprise planning and accounting software and ERP systems.

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