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B.S. Kishibayeva*, G.N. Jaxybekova

Almaty Management University, Kazakhstan, Almaty
*e-mail: bkishibayeva@gmail.com

ASSESSMENT OF THE RETURN ON EQUITY OF AN ENTERPRISE USING THE DUPONT METHOD

The article discusses the principle of asset profitability analysis based on the DuPont model. The profitability of equity was described on the basis of three basic formulas for calculating the model and used in the analysis.

The subject of the study is the development of the enterprise of JSC "Caspian Oil" for 2019-2021. The purpose of the study is to evaluate the effectiveness and factor analysis of the company. To achieve this goal and objectives, formulas for calculating indicators and the Dupont method were used.

The analysis of return on equity on the example of JSC "Caspian Oil" using the DuPont three-factor model and the analysis based on the indicator of the open annual report 2019-2021. The change in net return on assets was revealed due to three factors, namely an increase in net profit, a slowdown in asset turnover and a deterioration in the capital structure.

As a result of the work, it turned out that one of the most important and meaningful coefficients is ROE (return on equity). It shows the effectiveness of the use of shareholders' funds and the company in question is a joint-stock company. Using a factor analysis of the profitability of an oil and gas company, the authors showed that the growth of net profit, equity and profitability are more sensitive to changes in net profit by the same percentage.

Key words: profitability, efficiency of company, Dupont model, factor analysis of ROE, net profit, equity, financial analysis.

Б.С Кишибаева*, Г.Н. Джаксыбекова

Алматы Менеджмент Университеті, Қазақстан, Алматы қ.
*e-mail: bkishibayeva@gmail.com

Дюпон әдісі бойынша кәсіпорынның меншікті капиталының кірістілігін бағалау

Мақалада Дюпон моделіне негізделген активтердің кірістілігін талдау принципі қарастырылады. Меншікті капиталдың кірістілігі модельді есептеудің үш негізгі формуласы негізінде сипатталған және талдауда қолданылған.

Зерттеу нысаны "Каспий мұнай" АҚ кәсіпорнының 2019-2021 жылдары дамуы болып табылады. Зерттеудің мақсаты-тиімділікті бағалау және кәсіпорынның факторлық талдауы. Осы мақсат пен міндеттерге қол жеткізу үшін көрсеткіштерді есептеу формулалары мен Дюпон әдісі қолданылды.

Меншікті капиталдың рентабельділігін талдау "Каспий мұнай" АҚ мысалында DuPont үш факторлы моделін пайдалана отырып және 2019-2021 жж. ашық жылдық есеп көрсеткіші негізінде талдау жүргізілді. Активтердің таза кірістілігінің өзгеруі үш фактордың арқасында анықталды, атап айтқанда таза кірістің артуы, активтер айналымының баяулауы және капитал құрылымының нашарлауы.

Жүргізілген жұмыстың нәтижесінде ең маңызды және нақты коэффициенттердің бірі ROE (меншікті капиталдың кірістілігі) екендігі анықталды. Бұл акционерлердің қаражатын пайдаланудың тиімділігін көрсетеді, ал қарастырылып отырған кәсіпорын акционерлік қоғам болып табылады. Мұнай-газ кәсіпорынның рентабельділігінің факторлық талдауын қолдана отырып, авторлар таза кірістің, меншікті капиталдың және рентабельділіктің өсуі таза кірістің сол пайызға өзгеруіне сезімтал екенін көрсетті.

Түйін сөздер: рентабельділік, кәсіпорын тиімділігі, Дюпон моделі, ROE факторлық талдауы, таза пайда, меншікті капитал, қаржылық талдау.

Б.С. Кишибаева*, Г.Н. Джаксыбекова
Алматы Менеджмент университет, Казахстан, г. Алматы
*e-mail: bkishibayeva@gmail.com

Оценка рентабельности собственного капитала предприятия по методу Дюпон

В статье рассматривается принцип анализа прибыльности активов на основе модели Дюпона. Доходность собственного капитала была описана на основе трех основных формул для расчета модели и использована в анализе.

Предметом исследования является развитие предприятия АО «Каспий нефть» за 2019-2021 годах. Целью исследования является оценка эффективности и факторный анализ компании. Для достижения этой цели и задач были использованы формулы расчета показателей и метод Дюпона.

Анализ рентабельности собственного капитала на примере АО «Каспий нефть» с использованием трехфакторной модели DuPont и проведен анализ на основе показателя открытого годового отчета за 2019-2021 гг. Изменение чистой доходности активов было выявлено благодаря трем факторам, а именно увеличению чистой прибыли, замедлению оборачиваемости активов и ухудшению структуры капитала.

В результате проведенной работы выяснилось, что одним из наиболее важных и значимых коэффициентов является ROE (рентабельность собственного капитала). Оно показывает эффективность использования средств акционеров, а компания, о которой идет речь, является акционерным обществом. Используя факторный анализ прибыльности нефтегазовой компании, авторы показали, что рост чистой прибыли, собственного капитала и рентабельности более чувствительны к изменению чистой прибыли на тот же процент.

Ключевые слова: прибыльность, эффективность компании, модель Дюпона, факторный анализ рентабельности инвестиций, чистая прибыль, собственный капитал, финансовый анализ.

Introduction

One of the most important sectors of the country's economy is the oil and gas industry. There is continuous innovative development in this industry. A lot of money is invested in it. In this regard, it is important to monitor the situation of companies operating in the oil and gas sector (Awan, 2014). Improving profitability and return on investment is the main goal of internal financial analysis of companies. Owners and shareholders of capital are interested in its increase, income growth and an increase in the share of profit due to each shareholder.

Return on equity shows how much of the profit is brought by the equity of companies (Bondar, 2016).

To understand the structure and methodology for calculating indicators used in each organization, it is necessary to compare the values of the coefficients of any companies. In most cases, the same coefficient includes different elements. In this case, you need to get accurate data for analysis and comparison. To conduct a factor analysis, it is necessary to understand what and to what extent affects the indicator. Factor analysis is carried out using the DuPont model. For analysis, it is important to work in depth and in detail (Awan, 2014).

Factor analysis is currently being used very much in research. Its relevance is associated with the widespread introduction of computers. They make it possible to perform complex calculations of factor analysis with the processing of large data matrices. The range of factor analysis methods is currently very wide. It also includes dozens of different procedures and data processing methods. The DuPont model is one of the methods of factor analysis (Sudiani, 2018).

In his work, Harman G. formulated the main goal of factor analysis as follows: "Factor analysis does not try to find the truth in infinite time, infinite space, or infinite sampling. On the contrary, he tries to give a simple description of a finite group of objects functioning in a finite number of ways, in terms of some space with a small number of dimensions. Those who want to find more obscure goals and truths in factor analysis will be disappointed" (Harman, 1972).

The relationship between the change of one variable and another is established by Factor Analysis and the size of this ratio is also determined. In the early stages of scientific research, factor analysis is effective. In cases where it is necessary to identify preliminary patterns, the following experiment can be improved (Benfratello, 2006).

"The DuPont model is a factor analysis that can be used to understand the factors that influence the change in profitability. This model is based on return on equity (ROE) — the factors affecting ROE are separated in order to understand which factors and to what extent affect this profitability" (Zhdanov, 2022).

An important financial indicator for investors and business owners is the return on equity (ROE), which reflects the profitability and growth in the value of the business. Since the high value of return on equity determines the investment attractiveness of the company, and hence the competitive advantage in the market, in this case the main task is to maximize the return on invested capital, which allows you to optimize relations with stakeholders and take a stable position in the market. Return on capital management is becoming a key task of strategic, tactical and operational management.

Identification of specific factors that primarily affect the return on equity is possible using the DuPont model, which is one of the most widely used models in practice for calculating the return on equity. Depending on the direction of activity, the specifics of accounting, etc. for many companies, the growth of return on equity in dynamics is possible by several factors (Likhutin P.N., 2017). In this regard, the question arises: is it possible to build a typology of companies based on the relationship between the growth rate of ROE and the growth rate of factors affecting it.

Literature Review

The theoretical and methodological basis of the study was the work of economists and financiers: Saleem & Rehman, Delen D., Kuzey C., Uyar A., Li, Nissim, Padake, Soni and et al.

Saleem & Rahman in their study investigated the relationship between liquidity and profitability of oil and gas companies in Pakistan. The results show that the current and rapid liquidity ratios did not have a significant impact on the return on equity, while the return on invested capital strongly depends on these ratios (Saleem, 2011).

Delen D., Kuzey C., Uyar A. (Delen, 2013) using factor analysis to determine the value of financial coefficients, followed by the use of predictive modeling methods to study the relationship between financial coefficients and the company's efficiency, we came to the conclusion that the return on equity is primarily determined by profit before tax, operating profit, financial leverage and increased return on sales.

The authors analyzed the impact of profit and asset turnover on the change in future net operating profit. Li and Nissim (Li, 2014) came to the conclusion that both elements of the DuPont model, return on sales and asset turnover provide information for forecasting the volatility of operating profit.

Padake, Soni (Padake, 2015) analyze the activities of the twelve largest banks in India using the DuPont model. The authors claim that the model provides a deeper understanding of the effectiveness of the organization, they come to the conclusion that the assessment of the bank's activities solely from the point of view of profit is not accurate, since profit is a reflection of capital, and not the efficiency of the use of assets.

U.A. Prosvirina (Prosvirina, 2015) takes into account the average industry return on capital and the method of return on assets for calculating the discount rate on investment projects.

A.V. Lazarev, A.V. Postrelova (Lazarev, 2013) uses a model for comparative assessment of investment risk, supplementing it with implementation indicators.

Therefore, most studies consider the use of the Dupont model to analyze the factors affecting the value of ROE at a given time, without taking into account their variability.

The following assumption is made about the possibility of modifying the Dupont three-factor model in terms of assessing the impact of the growth rates of individual factors on the growth rate of ROE, which will create a typology of companies, on this basis to create an indicator that determines individual factors. This can be used by interested parties for financial and economic analysis of companies' activities.

Methods and materials

The object of the study is JSC "Caspian Oil". The main activity of the company is the extraction and sale of hydrocarbon raw materials.

The sources of the information base on the financial results of JSC "Caspian Oil" were financial statements according to accounting standards: balance sheet as of December 31, 2019-2021; annual report on financial results for 2021.

The purpose of the article is to apply DuPont's three–factor profitability model in practice. Within the framework of the research, a number of the

following tasks can be solved to achieve the goal: analysis of the concept of profitability and factor analysis; to investigate Dupont models; to identify factors affecting profitability; to consider the structure of the analysis of factors affecting the return on equity of the company. The solution of the problems is carried out according to the calculation method of Dupont models and the method of chain statements.

The method of factor analysis of profitability indicators provides for signs of intensification of production and increase in efficiency. In the economic literature, several models of factor analysis of profitability from two-factor to multi-factor are recommended.

Results and Discussion

DuPont was the first to use this method in the early twentieth century. It divides it into factors that affect the performance of the company, offering a simple way to manage profitability. The purpose of the analysis was to find ways to maximize the return on invested capital for the owners and shareholders of the enterprise. The profitability of the company and the growth of its value are reflected in the profitability index. Profitability management: is the main task for all levels of strategic, tactical and operational management (Diaz-Diaz, 2008).

The DuPont model is based mainly on three- and five-factor formulas. It allows the organization to quickly assess the degree of influence of various factors on the formation of return on equity (Olsen, 2006).

A systematic approach that uses financial coefficients when analyzing the results obtained using the DuPont model allows you to take into account all the relationships between the company's activities. Each of them is characterized by certain model indicators (Douma, 2006).

The first model is easy to understand. We can find the value of the return on equity. Formula:

$$ROE = NP / EQ \quad (1)$$

where:

NP – net profit;

EQ – equity capital.

There are errors in the formula. This makes it impossible to determine the factors affecting the return on equity.

The second method is more significant and looks like this:

$$ROE = ROE * DFL \quad (2)$$

where:

ROA — the return on assets ratio;

DFL – leverage ratio.

If we expand the formula by integrating it with the implementation indicator, we get a three-factor DuPont model that looks like this:

$$ROE = {}^{NP}/_{S_g} \times {}^{S_g}/_{\mathrm{A}} \times {}^{\mathrm{A}}/_{E_q} \quad (3)$$

where:

S_g – sale of goods, works and services exempt from excise taxes and VAT;

A – total assets of the company.

The DuPont five-factor model is considered more fully. Accounting for factors affecting the return on equity. Two indicators are also presented: EBT – profit before tax; EBIT – profit before interest and taxes. The five – factor model:

$$OE = \frac{NP}{EBT} \times \frac{EBT}{EBIT} \times \frac{EBIT}{S_g} \times \frac{S_g}{\mathrm{A}} \times \frac{\mathrm{A}}{E_c} \quad (4)$$

Using leverage, you can transform the equation. Then it will look like this:

$$ROE = \frac{NP}{EBT} \times \frac{EBT}{EBIT} \times \times \frac{EBIT}{S_g} \times \frac{S_g}{\mathrm{A}} \times \frac{\mathrm{A}}{E_c} \times DFL \quad (5)$$

where:

NP/EBT – tax burden ratio;

EBT/EBIT – percentage load factor;

EBIT/S_g – profitability of sales of the enterprise (ROS);

S_g/A – asset turnover ratio;

DFL – capitalization ratio (financial leverage ratio).

Using this model, on the example of JSC "Caspian Oil" we will conduct a factor analysis of the profitability of own funds (JSC, Annual reporting, 2019-2021)

Analysis of the profitability of own funds on the example of "Caspian oil" according to the DuPont three-factor model (Table 1).

Table 1 – Analysis of the return on equity of Caspian oil JSC

№	Indicators	2019	2020	2021
1	Net profit	42010973	28560025	49554447
2	Revenue	126723915	99689383	163261264
3	Assets	31780452	60359819	108115147
4	Equity capital	31970973	31970973	109135447
Note: Compiled by the author based on (JSC «Caspian Oil», 2019-2021)				

The authors analyzed the return on equity using three-factor DuPont on the example of JSC «Caspian Oil».

The method of chain substitutions was used for the calculation:

$$NP_{eq2019} = 0{,}33 * 3{,}96 * 0{,}99 * 100 = 129{,}37$$
$$NP_{eq2020} = 0{,}29 * 1{,}65 * 1{,}89 * 100 = 90{,}44$$
$$NP_{eq2021} = 0{,}30 * 1{,}51 * 0{,}99 * 100 = 44{,}85$$

After the increase in net profit, there was a deterioration in net profitability by – (15,68%) (113,69-129,37)

– (45,59%) (44,85-90,44)
2020 = 0,29*3,96*0,99*100 = 113,69
2021 = 0,30*1,51*0,99*100 = 44,85

After asset turnover slowed down, net return on equity was reduced by – (26,46%) (102,91-129,37)

– (47,09%) (43,35- 90,44)
2020 = 0,33*1,65*1,89*100 = 102,91
2021 = 0,29*1,51*0,99*100 = 43,35

After the deterioration of the capital structure, net return on equity increased by 117,68% (246,98-129,37)

43,07% (47,37-90,44)
2020 = 0,33*3,96*1,89*100 = 246,98
2021 = 0,29*1,65*0,99*100 = 47,37

The combined effect of three factors is equal to:
2020г. = 117,68-15,68-26,46 = 75,54%
2021г. = 43,07-45,59-47,09 = -49,61%

To solve the problem of an increase in the assets of an enterprise in the future, the analysis of net income is used when choosing a rational capital structure and making decisions on capital investments.

As a result of the analysis carried out on the example of Caspian oil JSC using the DuPont three-factor model, a change in net return on equity was revealed. An increase in net income, a slowdown in asset turnover and a deterioration in the capital structure. To identify these production barriers, the DuPont model is important. Thanks to the DuPont model, it is possible to purposefully and accurately eliminate negative consequences, as well as correctly allocate the company's resources.

The paper also calculates such indicators of the activity of JSC "Caspian Oil" as EBIT and EBITDA (Table. 2), ROE, ROA, ROCE (Table 3).

In conclusion, it was found that today there are many indicators that reflect the effectiveness of the company's activities.

After analyzing the EBIT, EBITDA indicators (Table 2), we can conclude that the oil and gas company «Caspian oil» JSC has the opportunity to receive loans and provide services. This is an important factor for investors. JSC «Caspian Oil» can repay loans to a greater extent, as it has a high value of EBIT and EBITDA.

Table 2 – Efficiency of JSC "Caspian Oil" based on EBIT and EBITDA indicators

(billion tg.)

Company	EBIT			EBITDA		
JSC «Caspian Oil»	2019	2020	2021	2019	2020	2021
	64 688	42 428	82 568	66 262	48 443	85 591
Note: Compiled by the author based on (JSC «Caspian Oil», 2019-2021)						

Table 3 – Efficiency of the oil and gas sector of JSC «Caspian Oil» based on ROA, ROE, ROCE indicators (%)

Company	ROA			ROE			ROCE		
JSC «Caspian Oil»	2019	2020	2021	2019	2020	2021	2019	2020	2021
	0.31	0.20	0.29	1.31	0.89	0.45	0.65	0.40	0.70
Note: Compiled by the author based on (JSC «Caspian Oil», 2019-2021) (JSC, Audit reports, 2019-2021)									

The analysis of the relative indicators of ROA, ROE and ROCE showed that JSC «Caspian Oil» is an effective company. It has a normal value of profitability indicators (Table 3).

Factor analysis can be used to predict the economic condition of the company. One of the areas of future research may be forecasting the efficiency of oil and gas companies.

Conclusion

The key factor in the competitiveness of an enterprise element can be the implementation of the Dupont model. The purpose of the model is to identify factors that determine the effectiveness of the enterprise. In addition, it is an assessment of the degree of influence of the model and the trends and significance of changes. This model is also used to compare the risk of investing or lending a particular company.

Having studied and analyzed the indicators presented in the work, the activity of JSC “Caspian Oil” is effective.

Factor analysis of return on equity confirmed that revenue will have a big impact on the change in the ratio due to its volume and growth rates.

In the future of research, it is important to carefully analyze the ROE. A detailed understanding of the specifics of the work of companies, as well as a similar analysis of other indicators for a more accurate forecast of their development.

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