

# DETERMINANTS OF THE RETURN ON EQUITY RATIO (ROE) ON THE EXAMPLE OF COMPANIES FROM METALLURGY AND MINING SECTOR IN POLAND

Received – Primljeno: 2014-12-14  
Accepted – Prihvaćeno: 2015-06-17  
Professional Paper – Strukovni rad

The purpose of this article is to present the possibilities of analyzing popular among investors ratio of ROE and identification the determinants of its growth or decline. Traditionally, according to the DuPont formula three indicators are presented as the primary determinants of ROE. The paper shows the possibility of a broader look at the issue and use of the five factors affecting the ROE. This approach reveals that, using various financial and operational strategies one can influence ROE. The analysis was conducted on the example of two Polish companies from mining and metallurgy sector.

*Key words:* metallurgy, mining, companies ROE, DuPont formula

## INTRODUCTION

A key element in managing the value of the company is the selection of adequate measures aimed at maximizing the primary objective of a business. The only value of the company is a theoretical category and hence the difficulty arises to translate it into practical ground. However, the attempt is made to its measurement.

In practice, the most common method of estimating the value is based on the concept of the main objective of the company's activities for which is traditionally considered to maximize the income of the shareholders as a result of maximizing the market value of the company.

For many years, all kinds of measures have been used for assessing changes in the value of the company. These can be broadly divided into four main groups [1]:

- Traditional accounting measures, based on economic data directly resulting from the standard financial statements;
- Measures based on residual income category (defined in different ways), also called economic profit or economic value added;
- Market measures, mainly related to total return for the owners and market value-added category;
- Cash measures, based on different forms of cash flows and associated with them economic relations.

To these groups would still join measures based on the categories of non-financial, which began to be used from the beginning of the XXI century. In recent years, more and more frequently financial measures are used to assess the company value such as *EVA (Economic Value Added)*, *MVA (Market Value Added)*, *TSR (Total*

*Shareholder Return)*, *SVA (Shareholder Value Added)*. However, for current and potential investors still one of the most important indicator is return on equity (*ROE*) and thus an important decisive factor for managers.

Return on equity ratio (*ROE*) is treated as an important measure of a company's earnings performance. The *ROE* tells common shareholders how effectively their money is being employed. With it, one can determine whether a firm is a profit-creator or a profit-burner and management's profit-earnings efficiency.

In its basis formula *ROE* can be calculated as follows:

$$ROE = \frac{\text{Net Income (NI)}}{\text{Shareholder Equity (E)}}$$

The higher a company's return on equity, the better management is at employing investors' capital to generate profits. Investors analyse the trend in *ROE* for individual firms and compare this to historical and industry benchmarks. A rising *ROE* can signal that a company is able to grow profits without adding new equity into the business, which dilutes the ownership share of existing shareholders [2].

## THREE-STEP DUPONT MODEL

Looking only at the basic formula for *ROE* it can be concluded that the increase in *ROE* requires either growth of Net Income (*NI*) or reduce the equity (i.e., increase the debt).

For many years the search were conducted for answer to the question: what factors influence the size of the *ROE*. The solution became a model created by managers from DuPont Corporation at the beginning of the twentieth century. The original model is sometimes called *Three-Step DuPont Model*, which lies in the fact

A. Kijewska, The Silesian University of Technology, Faculty of Mining and Geology, Gliwice, Poland

that the basic formula for ROE is broken into the product of three factors - the indicators. These are Net Profit Margin (*NPM*), Asset Turnover (*AT*) and Equity Multiplier (*EM*):

$$ROE = \frac{NI}{E} = \frac{NI}{Sales} \times \frac{Sales}{Assets} \times \frac{Assets}{Equity}$$

where:

*NI* – Net income (or Earnings after tax).

In other words:

$$ROE = NPM \times AT \times EM$$

The Net Profit Margin of a company reflects management's pricing strategy by showing how much earnings they can generate from a single monetary unit. Asset Turnover measures how much sales a company generates from each monetary unit of assets. It shows how effective is management in using assets to make sales. The last factor, Equity Multiplier shows to what extent a company uses debt to finance its assets. The higher this ratio, the higher the financial leverage is, which means that the company to a greater extent is financed by debt.

The *Three-Step DuPont* model integrates the three attributes – productivity, profitability and leverage, it means that the investors return on equity is influenced by these three aspects.

In financial strategy the objective is to maximize the *ROE* in the long run. To achieve this various courses of action can be taken that enable to raise one (or two) of the three ratios without too serious a decline in the others [3].

By observing changes in the value of these three indices one can determine what strategy the company performs: a "volume strategy", a "margin strategy" or a "leverage strategy". Although rarely company performs only one strategy; usually it is combination of two or three strategies.

## FIVE-STEP DUPONT MODEL

For some time, the attempts are made to look at the factors affecting the *ROE* in more detailed way or even different way. An interesting disaggregation *ROE* can be found in [4], where the starting point (level 1) is a division of *ROE* into two basic drivers: return from operating activities and return from non-operating activities. Then a further breakdown is made into the level 2 and 3. The model although interesting, is quite time-consuming and requires the availability of detailed statements.

G. Hawawini and C. Viallet [5] propose a simpler model, although more extensive than the Three-Step Model. It involves disaggregation the *ROE* into five factors, hence the term *Five-Step DuPont Model* seems suitable.

According to the authors direct impact on *ROE* have operational decisions, financial decisions and tax effect. Thus the *ROE* can be presented as:

$$ROE = \frac{Operating}{Profitability} \times \frac{Financial\ Leverage}{Multiplier} \times \frac{Tax}{Effect}$$

Operational decisions are expressed by *ROIC<sub>BT</sub>* – Return on invested capital before tax which is the ratio of pre-tax profit (*EBIT*) to invested capital (*IC*). This ratio we can present as a product of operating profit margin and capital turnover:

$$ROIC_{BT} = \frac{EBIT}{IC} = \frac{EBIT}{Sales} \times \frac{Sales}{IC}$$

in other words:

$$ROIC_{BT} = \frac{Operating\ profit}{margin\ (OPM)} \times \frac{Capital}{Turnover\ (CT)}$$

Invested capital (*IC*) is defined as:

*IC* = Equity + Non-operating Liabilities

Financial decisions result from two factors: financial cost effect that in case of high leverage reduces *ROE*, and financial structure effect that in such case increases *ROE*.

These two factors can be expressed as:

$$FC = \frac{EBT}{EBIT}, \quad FS = \frac{IC}{E}$$

Hence:

Financial leverage multiplier = *FC* x *FS*

where:

*FC* – Financial cost ratio,

*FS* – Financial structure ratio.

For a given amount of invested capital, as the amount of debt financing increases,

- shareholders' equity decreases,
  - the financial structure ratio increases, and
  - the company's *ROE* increases,
- all else the same.

The last main determinant of a company's *ROE* is the tax effect expressed by the incidence of corporate tax. It is calculated as:

$$TE = \frac{NI}{EBT} = \frac{EBT(1-ETR)}{EBT} = 1-ETR$$

where:

*TE* – Tax effect ratio

*ETR* – Effective tax rate,

*EBT* – Earnings before tax.

As the *ETR* increases, the *TE* decreases and the company keeps smaller percentage of its pre-tax earnings. Other things being equal, the company's *ROE* decreases.

Putting it all together we can obtain the *ROE* broken down into five components:

$$ROE = \frac{NI}{E} = \frac{EBIT}{S} \times \frac{S}{IC} \times \frac{EBT}{EBIT} \times \frac{IC}{E} \times \frac{NI}{EBT}$$

in other words:

$$ROE = OPM \times CT \times FC \times FS \times TE$$

The first two ratios (*OPM*, *CT*) capture the effect of the company's investing and operating decisions on its overall profitability, the third and fourth ratios (*FC*, *FS*) capture the effect of the company's financial policy on

its overall profitability, and the last ratio (*TE*) captures the effect of corporate taxation on return on equity.

### DETERMINANTS OF ROE FOR COMPANIES FROM MINING AND METALLURGY SECTOR

The analysis of the determinants of ROE was carried out on the example of two companies listed on the Warsaw Stock Exchange from the mining and metallurgical sector. These are Jastrzębska Spółka Węglowa S.A. (JSW) and KGHM Polska Miedź S.A. (KGHM). Broader characteristic of these two companies is presented in [6].

For both companies, on the basis of data presented in Tables 1, 2, the ROEs were calculated, then the ratios that make up the three-step and five-step DuPont models were calculated. The results are presented in Tables 3, 4. To better illustrate the results are also shown in Figures 1-5.

Analysis of changes in ROE shows that, although KGHM for the period 2011 - 2012 has almost double higher values than JSW, in both companies we see a downward trend. From 2011 to 2013 ROE decreased by 96 % in case of mining company (JSW) and by 71 % in case of metallurgical company (KGHM). Looking from

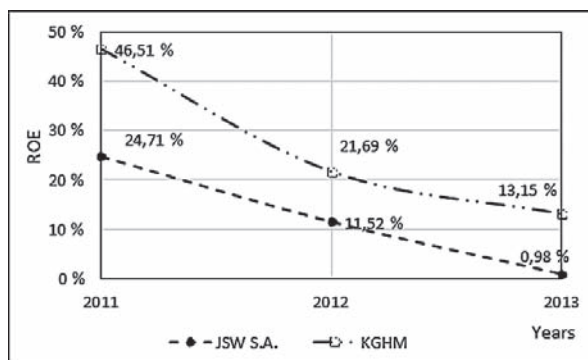


Figure 1 ROE for JSW and KGHM

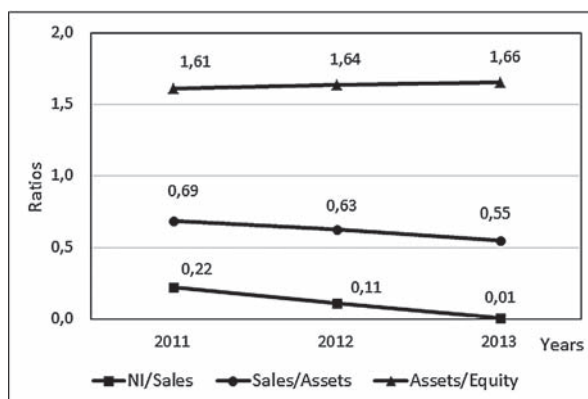


Figure 2 Three determinants of ROE for JSW

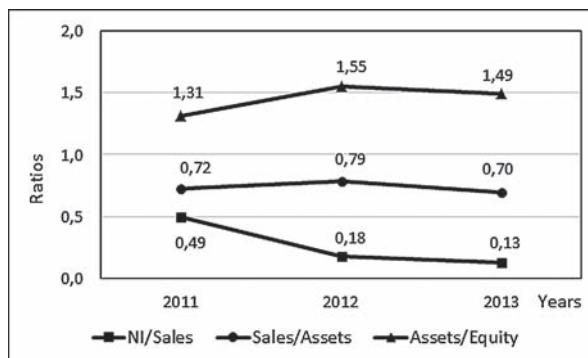


Figure 3 Three determinants of ROE for KGHM

Table 1 Some financial values of JSW

	2011	2012	2013
	/ mln EUR	/ mln EUR	/ mln EUR
Equity	1 912	2 097	2 014
IC	2 514	2 840	2 743
Assets	3 083	3 441	3 342
Sales	2 123	2 158	1 840
EBIT	613	320	49
EBT	606	312	26
NI	472	242	20

Table 2 Some financial values of KGHM

	2011	2012	2013
	/ mln EUR	/ mln EUR	/ mln EUR
Equity	5 296	5 360	5 561
IC	5 936	7 141	7 180
Assets	6 939	8 307	8 310
Sales	5 005	6 532	5 814
EBIT	2 996	1 584	1 054
EBT	2 984	1 548	1 021
NI	2 463	1 163	731

Table 3 Determinants of ROE for JSW

	2011	2012	2013
ROE / %	24,71	11,52	0,98
Three-Step DuPont Model			
NI/Sales	0,22	0,11	0,01
Sales/Assets	0,69	0,63	0,55
Assets/Equity	1,61	1,64	1,66
Five-Step DuPont Model			
EBIT/Sales	0,29	0,15	0,03
Sales/IC	0,84	0,76	0,67
EBT/EBIT	0,99	0,98	0,54
IC/Equity	1,32	1,35	1,36
NI/EBT	0,78	0,77	0,75

Table 4 Determinants of ROE for KGHM

	2011	2012	2013
ROE / %	46,51	21,69	13,15
Three-Step DuPont Model			
NI/Sales	0,49	0,18	0,13
Sales/Assets	0,72	0,79	0,70
Assets/Equity	1,31	1,55	1,49
Five-Step DuPont Model			
EBIT/Sales	0,60	0,24	0,18
Sales/IC	0,84	0,91	0,81
EBT/EBIT	1,00	0,98	0,97
IC/Equity	1,12	1,33	1,29
NI/EBT	0,83	0,75	0,72

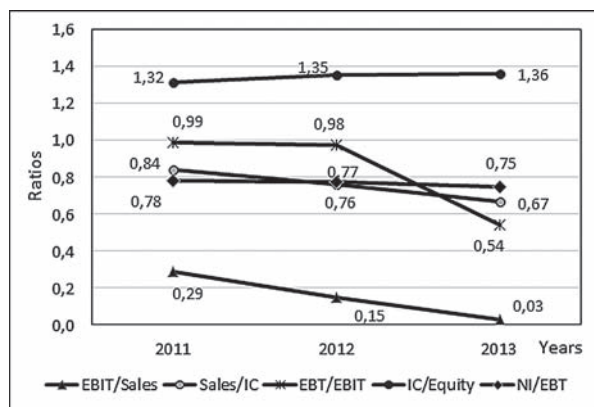


Figure 4 Five determinants of ROE for JSW

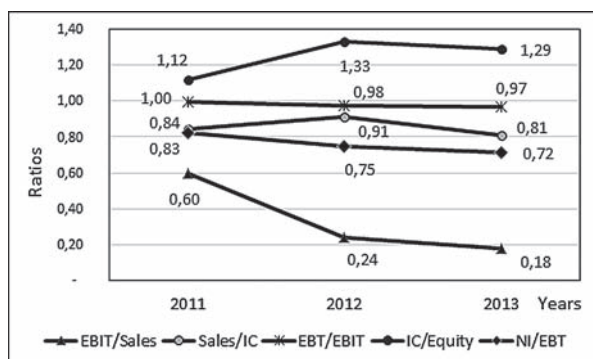


Figure 5 Five determinants of ROE for KGHM

the point of view of three determinants, in case of JSW we can see, that although equity multiplier slightly increased, the other two indicators declined, in particular net profit margin (95 %).

In case of KGHM we can see that net profit margin is also a primary factor that contributed to the decline in *ROE* (73 %).

Looking from the point of view of five determinants, in case of JSW we can see that the most significant factor influencing the decrease of *ROE* is operating profit margin. Its value was reduced by nearly 50 % in 2012 and by up to 90 % in 2013. Also, in 2013, on a decrease of *ROE* the financial cost ratio affected – it lessened by 50 %.

In the case of KGHM the main agent that caused the decline of *ROE* was operating profit margin; it decreased by 70 %. Also, but to a much lesser extent, a decline in *ROE* was affected by the decrease in tax effect ratio (14 %). In conclusion, in both sectors – mining and metallurgical, the greatest impact on the decrease in *ROE* had operational activities, and this means

that the key actions should be directed to the increase in sales revenue and, perhaps above all, to reduce costs.

## SUMMARY

*ROE* is a measure of how well a company uses shareholders' funds to generate a profit. For investors it is a worthwhile metric when analyzing a company and its stock.

Management Boards have an objective to increase *ROE*, but they realize that different factors in varying degrees influence it. Thus, almost a hundred years ago a DuPont formula was developed, which represents the *ROE* as a product of three indicators. Since that time different attempts have been made to modify this formula. In article the determinants of *ROE* are analyzed for the original version and five-factor version of the DuPont formula. With *ROE* broken up into five determinants, causes of change in that ratio can be analyzed in more detail and possible ways to improve it can be indicated. However, for the evaluation of past periods and to develop appropriate strategies for the future, such an analysis should be carried out by the management of the company, because they are the best informed on what was the reason of the decline in the indicators and what are the potential opportunities for their improvement.

## REFERENCES

- [1] Szczepankowski P., Wycena i zarządzanie wartością przedsiębiorstwa, Wydawnictwo Naukowe PWN, Warszawa 2007, p. 131.
- [2] Thorp W. A., Deconstructing ROE: DuPont Analysis. Computerized Investing First Quarter (2012), 12-15.
- [3] Priester Ch., Wang J., Financial Strategies for the Manager, Springer-Verlag, 2010, p. 33 [http://link.springer.com/chapter/10.1007/978-3-540-70966-4\\_9](http://link.springer.com/chapter/10.1007/978-3-540-70966-4_9)
- [4] Easton P. D., Wild J. J., Halsay R. F., McAnally M. L., Financial Accounting for MBAs. Cambridge Business Publisher, 4th ed. 2008, pp. 3.1-3.31.
- [5] Hawawini G., Viallet C., Finance for Executives. Managing for Value Creation. South-Western Cengage Learning, 4th ed. 2011, pp.144-157.
- [6] Bluszcz A., Kijewska A., Challenges of sustainable development in the mining and metallurgy sector in Poland. Metalurgia 54 (2015) 2, 441-444.

**Note:** The responsible translator for English language is Official Translator certified by the Ministry of Justice Agata Matuga, Katowice Poland