

BARTŁOMIEJ NITA

VALUE CREATION MEASUREMENT IN RESPONSIBILITY ACCOUNTING

Introduction

Responsibility accounting supports decentralization by providing information about the performance of organizational subunits and their managers. This is a key management control tool for decentralized organizations¹. There are various types of responsibility centres including investment strategy business units. The most important goal of any company is to create value for its owners, so it is worth analyzing value creation in investment centres and examining their impact on the value of the company as a whole. It means that there is a need for detailed study of the areas in which value is created and those in which value is destroyed. Due to the fact, that the value creation process involves the investment process, the performance evaluation in respect to value creation should be done primarily for investment centres.

The major objective of the paper is to determine a general formula, describing the relationship between market value added and for value creation drivers and to derive a condition for positive market value added.

The thesis of the paper is that all the factors affecting value creation should be analyzed simultaneously, because some of them may demonstrate harmful effects on company value. The methodology adopted in the paper includes deductive reasoning based on numerical rearrangements using a case study approach.

An Overview of Market Value Added

Market value added (MVA) is an external measure used to evaluate whether a company has created or destroyed value from the point of view of the owners. In order to figure out market value added the market value of the company's total capital, both equity and debt capital should be compared with the amount of capital employed. Thus market value added is the difference between the market value of a company and book value of invested capital²:

¹ C. Raiborn, M.R. Kinney: *Cost Accounting Principles*, South-Western Cengage Learning, Andover, 2011, p. 545.

² See for further elaboration: B. Nita: *Metody wyceny i kształtowania wartości przedsiębiorstwa*, PWE, Warszawa 2007.

$$MVA = MV - IC \quad (1)$$

where:

- MVA – market value added,
- MV – market value of the company's total capital,
- IC – book value of invested capital at time 0.

It is possible to transform the formula (1) into the following equation:

$$MVA_{t-1} = \sum_{t=1}^{\infty} \frac{EVA_t}{(1+WACC)^t} \quad (2)$$

Market value reflects the market's opinion on how successful managers have been in investing the capital entrusted to them. Thus the higher the market value added the better. Negative market value added means that the value of the investments undertaken by management is less than the capital contributed to their companies by the capital markets. This means that the shareholders' wealth has been destroyed. MVA increases only when invested capital earns a rate of return on invested capital greater than the cost of capital rate. Market value added is consistent with net present value and when newly raised capital is invested in value creating projects in terms of NPV, market value added increases. On the contrary, if the capital is invested in value destroying projects, market value added is reduced³.

Market value added applied in responsibility accounting

Market value added may be applied to assess financial performance of investment centres. This is the unit, whose manager is responsible for managing revenues and costs. Additionally, the manager has the authority to acquire, use and dispose of capital invested to earn the highest rate of return on the centres' asset base⁴.

Traditional the measure of an investment centres' performance is the rate of return on investment (ROI). Thus we can make an assumption that the two critical value drivers influencing market value added are capital employed and net operating profit after taxes. These categories should be measured in relation to sales. The relationship between operating income and sales can be expressed in the following way:

$$ROS_t = \frac{NOPAT_t}{S_t} \quad (3)$$

where:

- ROS_t – rate of return on sales in period t ,
- $NOPAT_t$ – net operating profit after taxes in period t ,
- S_t – revenues from sales in period t .

³ S.D. Young, S.F. O'Byrne: *EVA and Value-Based Management. A Practical Guide to Implementation*, McGraw-Hill, New York 2001, p. 29–30.

⁴ C. Raiborn, M.R. Kinney: *op.cit.*, p. 550.

Capital requirements of an investment centre can be expressed by means of the formula:

$$CR_t = \frac{IC_t}{S_t} \quad (4)$$

where:

CR_t – capital requirements in period t ,
 IC_t – invested capital in period t .

Both measures, described by formulas (4) and (5), are very useful to describe the investment centre's performance, because the manager of this centre is responsible for its operating costs and revenues as well as invested capital. The capital invested is the sum of net operating working capital and operating long term assets. Net operating working capital is the difference between operating current assets and operating current liabilities.

As market value added represents value created over many years, it is needed to make an assumption in respect of the growth rate and cost of capital. Finally, there are four basic value drivers affecting market value added: growth rate, weighted average cost of capital, return on sales and capital requirements. To evaluate the impact of those factors on market value added, we need to quantify the relationship of MVA and all value drivers.

Taking into consideration the relationship between economic value added and market value added, it is possible to apply the formula for the present value of annual constant growth perpetuity and as a consequence to show MVA metric in the following way:

$$MVA_{t-1} = \frac{EVA_t}{WACC - g}, \quad (5)$$

where g – constant growth rate.

Economic value added (EVA) is the difference between net operating profit after taxes and total capital charge. Thus we can rewrite the equation (5):

$$MVA_{t-1} = \frac{NOPAT_t - WACC \cdot IC_{t-1}}{WACC - g} \quad (6)$$

Net operating profit after taxes in the current period is profit from the prior period increased by the constant growth rate. Thus the formula describing market value added in the current period may be rearranged to the following equation:

$$MVA_t = \frac{NOPAT_t \cdot (1 + g) - WACC \cdot IC_t}{WACC - g} \quad (7)$$

After further rearrangements and multiplying both nominators and denominators by revenues from sales we obtain the following equation for market value added:

$$\begin{aligned}
 MVA_t &= \frac{NOPAT_t \cdot (1+g)}{WACC-g} - \frac{WACC \cdot IC_t}{WACC-g} = \\
 &= \frac{S_t \cdot (1+g)}{WACC-g} \cdot \frac{NOPAT_t}{S_t} - \frac{S_t \cdot (1+g)}{WACC-g} \cdot \frac{WACC \cdot IC_t}{S_t \cdot (1+g)} = \\
 &= \frac{S_t \cdot (1+g)}{WACC-g} \cdot \left(\frac{NOPAT_t}{S_t} - \frac{WACC \cdot IC_t}{S_t \cdot (1+g)} \right).
 \end{aligned}$$

Finally, to see how the identified value drivers affect market value in the investment centre we can express market value added as a product of multiplication of the two components⁵:

$$MVA_t = \left(\frac{S_t \cdot (1+g)}{WACC-g} \right) \cdot \left(ROS_t - WACC \cdot \frac{CR_t}{(1+g)} \right) \tag{8}$$

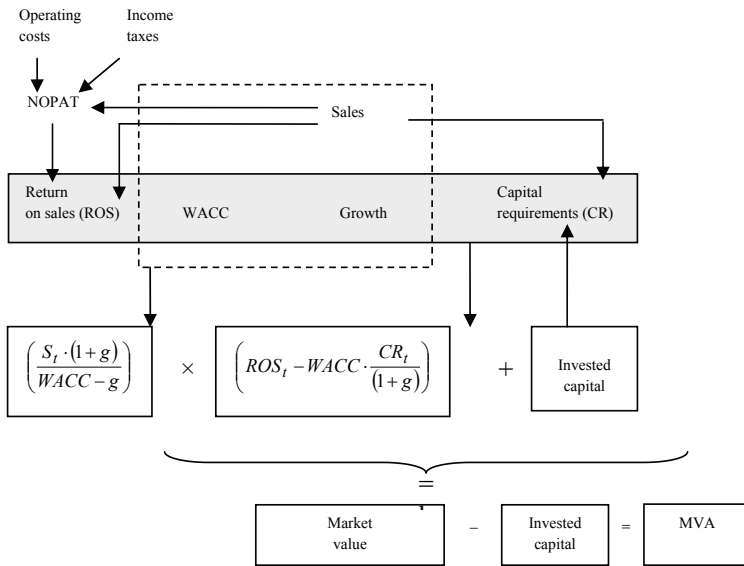


Figure 1. The impact of value creation drivers on market value added in the investment centre

Source: B. Nita, *The Use of Market Value Added in Performance Evaluation of Investment Centres*, Research Papers of Wrocław University of Economics no. 177, Wrocław 2011, p. 102.

The formula (8) can be explained by means of figure 1, which shows market value added in terms of the value drivers. It turns out, that the total market value is the sum of the

⁵ Compare in: E.F. Brigham, P.R. Daves: *Intermediate Financial Management*, South-Western Cengage Learning, Mason 2010, p. 380.

invested capital and market value added. MVA is a product of two components. The first component represents the present value of the increasing sales at the constant growth rate, discounted back to the present using weighted average cost of capital. Actually, it is the market value added of a division that never requires any capital to be invested and does not incur any operating costs. Obviously, this situation does not happen in real life and the effect of costs and additional investment is represented by the second component.

Providing the constant growth rate, market value added increases if return on sales, i.e. operating profitability, increases and on the other hand, if capital requirements and weighed average cost of capital decrease.

In order to derive the condition for positive market value added one may transform the general formula (8). Taking into account the general formula (8) and making the assumption, that weighted average cost of capital (WACC) is greater than growth rate (g) in a very easy way it is possible to draw a conclusion that market value added is greater than zero if:

$$ROS_t > WACC \cdot \frac{CR_t}{(1+g)} \quad (9)$$

As a next step we can rearrange formula (9) by replacing return on sales and capital requirements in the following way:

$$\frac{NOPAT_t}{S_t} > WACC \frac{IC_t}{S_t(1+g)} \quad (10)$$

Transformation of the formula (10) leads to the following relationship:

$$\frac{NOPAT_t(1+g)}{IC_t} > WACC \quad (11)$$

Finally, it turns out that market value added is positive if rate of return on invested capital is greater than weighted average cost of capital. On the contrary, market value added is negative or equals zero.

It is possible to draw the same conclusion by taking into consideration formula (7). The impact of this economic spread ($ROI - WACC$) on market value added can be proved by the following rearrangements:

$$\begin{aligned} MVA_t &= \frac{NOPAT_t \cdot (1+g) - WACC \cdot IC_t}{WACC - g} = \\ &= \frac{NOPAT_{t+1} - WACC \cdot IC_t}{WACC - g} = \\ &= \frac{ROI_t \cdot IC_t - WACC \cdot IC_t}{WACC - g}. \end{aligned}$$

Finally, it turns out that market value added can be also expressed in the following way:

$$MVA_t = \frac{IC_t \times (ROI_t - WACC)}{(WACC - g)} \quad (12)$$

Formula (12) indicates that market value added depends on the spread between expected return on invested capital and the weighted average cost of capital. If ROI is greater than WACC, then the rate of return on capital employed is greater than the rate of return inventors expect, and as a result a division creates value for the entire organization and its shareholders. In this situation, an increase in growth rate (g) increases value. If ROI is equal to WACC, then the division is breaking even from the point of view of value creation. If the rate of return on invested capital is less than WACC, the economic spread is negative, a division is destroying value and, as a consequence, growth is harmful. The faster the growth, the lower the division's value⁶.

The above rearrangements explain when market value added is positive and when negative as well as they explain the differences in market value added in the investment centres with positive and negative MVA.

Explanatory case study

This case study explains performance assessment by means of market value added in two investment centres. Table 1 presents the basic assumptions in respect of return on sales, capital requirements, growth rate and weighted average cost of capital as well as the final results of market value added calculation. For each division there are two alternatives under consideration that differ with regard to the growth rate. Market value added has been computed by means of the formula (8).

Table 1

Market value added in respect of return on sales and capital requirements

Specification	Division A		Division B	
Return on sales (%)	9	9	7	7
WACC (%)	14	14	14	14
Capital requirements (%)	70	70	35	35
Growth rate (%)	3	5	3	5
MVA (in thousands PLN)	-120,5	-97,2	525,0	680,6

Source: author's own.

⁶ Compare in: E.F. Brigham, P.R. Daves: *op.cit.*, p. 380–381.

It turns out that division B demonstrates strong positive market value added for the two cases and the higher growth rate causes market value added to be greater by 140,6 thousand PLN. Division A has much higher capital requirements and as a result market value added for this division becomes negative and even smaller if the growth rate increases from 3% to 5%. In order to explain the differences observed in this analysis, we should compute the rate of return on investment for each division. The rate of return on invested capital is calculated in table 2.

Both divisions have the same weighted average cost of capital of 14%. The rate of return on capital employed in division A is less than WACC, so the division should postpone growth efforts until it improves the return on investments by reducing capital requirements, by for example reducing working capital and improving profitability expressed by means of rate of return on sales ROS. The rate of return on capital in division B is greater than WACC, so the division may expand its operations and continue with its future plans.

Table 2

Market value added in respect of ROI

Specification	Division A		Division B	
Capital (in thousands PLN)	1750,00	1750,00	875,00	875,00
Growth (%)	3	5	3	5
Sales (in thousands PLN)	2575,0	2575,0	2575,0	2625,0
NOPAT _{t+1} (in thousands PLN)	231,8	236,3	180,3	183,8
ROIC (%)	13,2	13,5	20,6	21,0
MVA (in thousands PLN)	-120,5	-97,2	525,0	680,6

Source: author's own.

Thus, the difference between the rate of return on capital and weighted average cost of capital, heavily affects market value added in a similar manner as in the case of economic value added. Division A demonstrates positive incomes and cash flows, but these cash flows are just sufficient to satisfy investors, causing value to exactly equal the amount of capital that has been provided by investors.

In the case study, the return on investment was higher than the weighted average cost of capital in division B and this is the explanation why market value added in division B is positive. In division A the rate of return on investment is lower than WACC, so MVA is negative regardless of the growth rate. The differences in division with negative and positive market value added depends on the growth rate provided that the other factors remain the same. This is why MVA in division A with a growth rate of 5% is less than MVA in the same division, provided that the growth rate is just 3%.

Literature

- Brigham E.F., Daves P.R.: *Intermediate Financial Management*, South-Western Cengage Learning, Mason 2010.
- Nita B.: *Metody wyceny i kształtowania wartości przedsiębiorstwa*, PWE, Warszawa 2007.
- Nita B.: *The Use of Market Value Added in Performance Evaluation of Investment Centers*, Research Papers of Wrocław University of Economics No. 177, Wrocław 2011.
- Raiborn C., Kinney M.R.: *Cost Accounting Principles*, South-Western Cengage Learning 2011.
- Young S.D., O'Byrne S.F.: *EVA and Value-Based Management. A Practical Guide to Implementation*, McGraw-Hill, New York 2001.

prof. UE dr hab. Bartłomiej Nita
Uniwersytet Ekonomiczny we Wrocławiu
Katedra Rachunku Kosztów i Rachunkowości Zarządczej

Summary

This paper deals with the application of value creation measures, in particular market value added in responsibility accounting. In the first part of the article the term "investment centre" is explained and essence of market value added is depicted very briefly. Furthermore, the major value creation drivers affecting MVA are identified: return on sales, capital requirements in an investment centre and weighted average cost of capital and divisional growth. In the second part the relationships among these factors are examined and finally their impact on market value added generated in an investment centre is analyzed.

POMIAR KREOWANIA WARTOŚCI W RACHUNKU ODPOWIEDZIALNOŚCI**Streszczenie**

W opracowaniu zajęto się wykorzystaniem miar kreowania wartości, w szczególności rynkowej wartości dodanej, w rachunku odpowiedzialności. W pierwszej części artykułu wyjaśniono termin „rachunek odpowiedzialności” oraz przedstawiono istotę rynkowej wartości dodanej. Następnie zidentyfikowano podstawowe czynniki kreowania wartości z punktu widzenia miernika MVA, do których zaliczono rentowność sprzedaży, wymagania kapitałowe centrum inwestycji, koszt kapitału oraz stopę wzrostu. W drugiej części zbadano zależności zachodzące między tymi czynnikami oraz poddano analizie ich wpływ na rynkową wartość dodaną generowaną w centrum inwestycji.