CONTRIBUTION OF EVA LEVERAGE TO THE TOTAL LEVERAGE EFFECT ON THE COMPANY

Kristina Jančovičová BOGNÁROVÁ*

Abstract

The concept of Economic Value Added (EVA) and Market Value Added (MVA) has opened up new insights into the leverage effect of fixed costs (operational leverage) and interest (financial leverage), and for determining what effects the changes in sales would have through leverage, not only on profits, but also on EVA and MVA. The paper also introduces the leverage effect of the cost of equity as a new concept and illustrates how it reacts in conjunction with operating leverage and financial leverage to determine the total overall leverage of the company. A spreadsheet model was developed using a given level of operating leverage and financial leverage. The relationship between profits (after interest and tax) and EVA was determined by using the cost of own capital (equity), and this fixed amount can therefore be described as a leverage factor for EVA. Furthermore, the EVA leverage factor was combined with the operating and financial leverage in order to illustrate how the expected percentage change in EVA and MVA can be predicted, given a certain percentage change in sales (or profits). The results of the model were than analysed to reach conclusions.

Keywords: *Total degree of leverage (TDL), Degree of financial leverage (DFL), Degree of operating leverage (DOL), Market Value Added (MVA), Economic Value Added (EVA), EVA leverage, Weighted average cost of capital (WACC)*

1. Introduction

1.1. Introduction

In this article the theoretical concept of economic value added (EVA), market value added (MVA) and leverage will be discussed briefly. Thereafter we develop a spreadsheet model to extend the leverage analysis of profits to EVA and MVA. The leverage effect of the equity cost is also investigated.

The cost of equity will also have a leverage effect on the profits (and EVA and MVA) of the company, just like fixed costs and interest. We attempt to quantify this leverage effect and to use it, together with operating leverage and financial leverage factors, to determine the total leverage for the company. Then it would be possible to predict what effect any change in input will have on profits, EVA and MVA.

The objectives of this paper could be summed up in this way:

- To link leverage analysis and value analysis;
- To determine how changes in inputs will affect the shareholder value;
- To introduce the leverage effect of the equity cost;
- To determine its connection with operating leverage and financial leverage in the context of determining the total leverage.

The findings of this paper could be useful for managers at all levels in a company, but especially for financial managers. Existing shareholders and potential investors would also benefit from the findings, but the company data needed as inputs for the model would not be available to them.

2. The theoretical background

2.1. EVA and MVA

EVA is a performance measure that attempts to measure the true economic profit produced by a company. Such a metric is useful for investors who wish to determine how well a company has produced value for its investors, and it can be compared against the company's peers for a quick analysis of how well the company is operating in its industry. MVA is not a performance metric like EVA, but instead is a wealth metric, measuring the level of value a company has accumulated over time. In order to maximise the value for shareholders, companies should strive towards maximising MVA and not necessarily their total market value.

EVA is determined by calculating the difference between the cost of a company's capital and the return earned on capital invested, and multiplying it with the amount of capital invested in the company.

$$EVA_t = (r - WACC) * IC_{t-1}$$

where:

r = the return on the capital invested

WACC = the company's after-tax cost of capital

IC_{t-1} = the invested capital at the beginning of period *t*

This mesure quantifies the surplus return earned by the company. In those cases where a company is able to earn a return that is higher than its cost of capital a positive value for EVA is calculated. A negative EVA value is calculated when the cost of capital exceeds the return on the invested capital.

* Faculty of National Economy, University of Economics in Bratislava (e-mail: kristina.jancovicova-bognarova@euba.sk);

Alternatively, the measure can be calculated by comparing the net operating profit after tax with the total cost of capital invested.

$$EVA_t = NOPAT_t - Total\ cost\ of\ IC = = NOPAT_t - (WACC * IC_{t-1})$$

where:

$NOPAT_t$ = Net operating profit after taxes

If a company is able to earn NOPAT values in excess of its total cost of capital invested it generates a positive EVA figure. However, should NOPAT be insufficient to cover the company's total cost of capital, a negative value for EVA is calculated.

A company's total market value (MV) is equal to the sum of the market value of its equity and the market value of its debt. In theory, this amount is what can be taken out of the company when all shares are sold and debt is repaid at any given time. The MVA is the difference between the total market value of the company and the invested capital. The invested capital (IC) is the amount that is put into the company and is basically the fixed assets plus the net working capital.

$$MVA = MV\ of\ company - IC$$

From an investor's point of view, MVA is the best final measure of a company's performance.

The link between MVA and EVA is that theoretically, MVA is equal to the present value of all future EVA to be generated by the company.

$$MVA = present\ value\ of\ all\ future\ EVA$$

If the company is not operating at optimal levels of financial gearing, changing the proportion of debt relative to equity can lower the WACC, so that the capital structure is closer to optimal. This will also unlock value for the company as a whole, including the shareholders.

2.2. Leverage

Operating leverage (OL) is a measure of the degree to which a company incurs a combination of fixed and variable costs. The higher the degree of OL, the greater the potential danger from forecasting risk, where a relatively small error in forecasting sales can be magnified into large errors in cash flow projections.

Most of a company's costs are fixed costs that occur regardless of sales volume. As long as a company earns a substantial profit on each sale and sustains adequate sales volume, fixed costs are covered and profits are earned. Other company costs are variable costs incurred when sales occur. The company earns less profit on each sale, but needs a lower sales volume for covering fixed costs.

The percentage change in the earnings before interest and taxes (EBIT) relative to a given percentage change in sales is defined as operating leverage.

Degree of operating leverage (DOL) = % change in EBIT/% change in sales.

The equation can also be written as follows:

$$DOL = Contribution / EBIT$$

Financial leverage (FL) is the degree to which a company uses fixed-income securities such as debt and preferred equity. The more debt financing a company uses, the higher its financial leverage. A high degree of financial leverage means high interest payments, which negatively affect the company's bottom-line earnings per share.

The percentage change in earnings per share (EPS) due to a given percentage change in EBIT is known as financial leverage. Degree of financial everage (DFL) = % change in EPS / % change in EBIT. The following equation can also be used to calculate DFL:

$$DFL = EBIT / EBT$$

where

EBT = Earnings before tax

The total leverage is the outcome of the multiplication of operating leverage and financial leverage.

$$Degree\ of\ total\ leverage\ (DTL) = DOL\ x\ DFL$$

or

$$DTL = \%\ change\ in\ EPS / \%\ change\ in\ sales$$

If a company has a high amount of operating leverage and financial leverage, a small change in sales will lead to a large variability in EPS.

If the cost of equity is subtracted from profits (after interest and tax), the result is EVA. This amount (subtracted as cost of equity) is a fixed amount in the case when the capital structure and the cost of equity percentage remain unchanged. This fixed amount of the cost of equity also has a leverage effect that causes EVA to change more dramatically than profits when there are changes in the sales volume.

This EVA leverage effect is is calculated as follows:

$$Degree\ of\ EVA\ leverage = Earnings\ after\ interest\ and\ tax / EVA$$

3. Research method and model inputs

A spreadsheet model was developed in which we use a given level of operating leverage and financial leverage. The relationship between earnings (after interest and tax) and EVA was determined.

Furthermore, the EVA leverage factor was calculated and combined with the operating and financial leverage to illustrate how the expected percentage change in EVA and MVA can be predicted, given a certain percentage change in sales.

The results of the model were than analysed to reach conclusions and to allow some recommendations to be made.

The model inputs are as follows. It was assumed that a company has operational assets consisting of fixed assets and net current assets of 4 million. These are financed by 50 % equity capital and 50 % long-term debt. This is in our model an optimal (or average) capital structure with the lowest WACC of 15 %. The cost of equity at this level is 20 % and the after-tax cost of debt is 10 %.

A tax rate of 20 % and a return on assets before tax of 45 % (36 % after tax) are assumed. Furthermore, an asset turnover of 1 is assumed; meaning that the total assets of 4 million will yield sales of 4 million. The cost structure of variable costs of 40 % of sales and fixed costs of 600 000 per year is considered average.

The model inputs for the basic scenario (average level of fixed costs, optimal capital structure) are contained in Table 1.

Table 1 Model inputs

Items	Amount or %
Total assets	4 000 000
Equity (50% of total capital)	2 000 000
Debt (50% of total capital)	2 000 000
Cost of equity	20 %
Cost of debt	10%
Weighted cost of equity	10 %
Weighted cost of debt	5%
WACC	15 %
Tax rate	20%
Interest rate before tax	12,5%
Interest rate after tax	10%
ROA (before interest and tax)	50%
ROA (after tax)	40%
Asset turnover (total sales / total assets)	1
Variable costs = 40% of sales	1 600 000
Fixed cost per year	600 000

The model was based on the assumption that the asset turnover remains the same and that there is no inflation. Fixed costs therefore remain the same in total amount and variable costs remain the same percentage of sales.

4. Results and conclusions

In this section the earnings, EVA and MVA are calculated according to tha model inputs stated in Table 1. We proceed as follows:

Contribution = sales – variable costs =
4 000 000 – 1 600 000 = 2 400 000

When the fixed costs are subtracted from the contribution, the result is Earnings Before Interest and Tax (EBIT):

EBIT = 2 400 000 – 600 000 = 1 800 000

Next the interest is subtracted to give Earnings Before Tax (EBT):

EBT = 1 800 000 – 250 000 = 1 550 000

After subtracting the tax, the Earnings After Tax (EAT) remain:

EAT = 1 550 000 – 310 000 = 1 240 000

In order to calculate the EVA, the cost of equity capital is subtracted from EAT. The cost of equity is calculated as 20% × 2 000 000 = 400 000.

EVA = 1 240 000 – 400 000 = 840 000

An alternative calculation, using the WACC, is used to confirm the EVA.

EVA = return spread x invested capital = (ROA – WACC) x invested capital =
(0,36 – 0,15) x 4 000 000 = 840 000

The MVA is calculated in three ways, according to three different assumptions about future growth in EVA. MVA_1 is calculated as if there will be no future growth in EVA.

$MVA_1 = EVA / WACC =$
$840\,000 / 0.15 = 5\,600\,000$

MVA_2 assumes a constant future growth rate of 5% in EVA:

$MVA_2 = EVA \times (1 + g) / (WACC - g) =$
$(840\,000 \times 1{,}05) / (0{,}15\text{-}0{,}05) =$
$8\,820\,000$

MVA_3 assumes an abnormal growth rate in EVA of 15% for the first five years and a constant growth rate of 5% after that.

$$MVA_3 = 840\,000 \times (1{,}15) / 1{,}15 + 840\,000 \times (1{,}15)^2 / 1{,}15^2 + 840\,000 \times (1{,}15)^3 / 1{,}15^3 + 840\,000 \times (1{,}15)^4 / 1{,}15^4 + 840\,000 \times (1{,}15)^5 / 1{,}15^5 + [840\,000 \times (1{,}15)^5 \times (1{,}05) / (0{,}15 - 0{,}05)] / 1{,}15^5 =$$
$$8\,820\,000$$

As a check for the reasonableness of this calculation, the Market to Book ratio was calculated.

M / B ratio = market value of equity / book value of equity.

Calculation for MVA_1:

Total market value = total assets + MVA_1 =
4 000 000 + 5 600 000 = 9 600 000

Market value of equity = total market value – debt
= 9 600 000 – 2 000 000 = 7 600 000

M/B ratio = 7 600 000 / 2 000 000 = 3,8

Calculation for MVA_2 and MVA_3:

Total market value = total assets + MVA_2 =
4 000 000 + 8 820 000= 12 820 000

Market value of equity = total market value – debt
= 12 820 000 – 2 000 000 = 10 820 000

M/B ratio = 10 820 000 / 2 000 000 = 5,41

The ratios calculated for all three versions of MVA range from 3,8 to 5,41 and are considered reasonable. Another test for reasonableness is the MVA/EVA multiple. It ranges from 6,7 for MVA_1 to 10,5 for $MVA_{2,3}$. This is in line with the research findings of Stern Stewart, namely that "each $1 increase in EVA brings, on average, a $9,50 increase in MVA."

Table 2 Earnings, EVA and MVA

Items	Amount
EBIT	1 800 000
EBT	1 550 000
EAT	1 240 000
EVA	840 000
MVA_1 (in case EVA remains same, that means no growth)	5 600 000
MVA_2 (constant EVA growth)	8 820 000
MVA_3 (abnormal growth of EVA)	8 820 000
Market to Book ratio for MVA_1	3,8
Market to Book ratio for MVA_2 and MVA_3	5,41
MVA_1 / EVA	6,7
$MVA_{2,3}$ / EVA	10,5

Table 3 shows the calculation of the leverage factors for the basic scenario, where average levels of operating leverage and financial leverage are maintained.

Table 3 Calculation of leverage

DOL = contribution / EBIT	2 400 000 / 1 800 000 = 1,33
DFL = EBIT / EBT	1 800 000 / 1 550 000 = 1,16
TDL = DOL x DFL	1,33 x 1,16 = 1,54
EVA leverage = EAT / EVA	1 240 000 / 840 000 = 1,48
Total leverage including EVA = TDL x EVA leverage	1,54 x 1,48 = 2,28

This means that for every 1% change in sales, the EBIT changes by 1,33%, the EAT changes by 1,16%. For every 1% change in EAT, EVA will change by 1,48%. If this is combined with the TDL, than for every 1% change in sales, EVA (and MVA) changes by 2,28%.

In table 4 the effect of changes of -10% and +10% on sales was calculated to verify the correctness of the leverage factors for the basic scenario.

Table 4 The effect of changing amount of sales (in mil.)

Items	Sales -10%	Current sales	Sales +10%
Sales	3,6	4	4,4
VC	1,44	1,6	1,76
Contribution	2,16	2,4	2,64
FC	0,6	0,6	0,6
EBIT	1,56	1,8	2,04
Interest	0,25	0,25	0,25
EBT	1,31	1,55	1,79
Tax	0,262	0,31	0,358
EAT	1,048	1,24	1,432
Cost of E	0,4	0,4	0,4
EVA	0,648	0,84	1,032

Table 5 shows the relative changes of EBIT, EAT, EVA and MVA for every 10% change in sales.

Table 5 Changes in EBIT, EAT, EVA and MVA in case of a 10%-change in sales

Item	Change by %
EBIT	13,33
EAT	15,48
EVA and MVA	22,86

As we can see, results of Table 3 are in line with the results of Table 5.

In this paper the spreadsheet model was used to investigate the leverage effect of three items, namely fixed costs (DOL), interest on debt capitaI (DFL) and the cost of equity (EVA leverage).

It is recommended that companies make use of the suggested spreadsheet model in order to investigate and analyse the effects of changes in sales and other input items (such as selling prices, costs and the cost of capital) on the crucial performance measures of EVA and MVA. As illustrated, these changes in EVA and MVA represent a direct quantification of shareholder value creation. The techniques discussed can be applied in performance measurement, valuations, cost/volume/profit analysis, sensitivity analysis, value management and scenario planning. The techniques can even be used to develop a performance-based reward system for all employees of a company that creates value for its shareholders.

Further research could focus on the effect that other factors, such as changes in the financial structure and costs, would have on EVA and MVA.

Acknowledgement

The paper is a result of the research work within the project VEGA No. 1/0946/17 (ŠPP prvok V-17-101-00) „Úverový cyklus, kreditné riziko a jeho determinanty v krajinách strednej a východnej Európy".

References

- ADENUGBA, A. A., IGE, A. A., KESINRO, O. R. 2016. Financial Leverage And Firms' value: A Study of selected firms in Nigeria. In European Journal of Research and Reflection in Management Sciences, Vol. 4, No. 1.

- BREALY, R.A., MYERS, S.C. 2000. Principles of Corporate Finance. Illinois: Irwin, Burr Ridge.
- COPELAND, T. 2002. Want to create value? In Strategic Finance, Vol. 83, No. 9, p. 48–54.
- COPELAND, T., KOLLER, T., MURRIN, J. 1996. Measuring and Managing the Value of Companies, Wiley, New York, 2. Auflage.
- CHEN, S., DODD, J. L. 1997. Economic Value Added: An Empirical Examination of a New Corporate Performance Measure. In Journal of Managerial Issues, Vol. 9, No. 3, p. 318-333.
- DE WET, J. 2005. EVA versus traditional accounting measures of performance as drivers of shareholder value: a comparative analysis. In Meditari Accountancy Research, Vol. 13, No. 2, p. 1–16.
- FERNANDEZ, P. 2003. EVA, economic profit and cash value added do not measure shareholder value creation. In Journal of Applied Finance, Vol. 9, No. 3, p. 74–94.
- GATES, S. 2000. Strategic performance measurement systems: translating strategies into results. In Journal of Applied Corporate Finance, Vol. 13, No. 3, p. 44–59.
- GITMAN, L. J. 2000. Principles of Managerial Finance (9th edition). Boston: Addison Wesley Longman.
- GRANT, J.L. 1997. Foundations of Economic Value Added. Frank Fabozzi, New Hope.
- HALL. J.H. 1998. Variables determining shareholder value of industrial companies listed on the Johannesburg Stock Exchange, Doctoral thesis, University of Pretoria, Pretoria.
- HATFIELD, G.R. 2002. R&D in an EVA world. In Research Technology Management, Vol. 45, No. 1, p. 41–47.
- JANČOVIČOVÁ BOGNÁROVÁ, K. 2017. Analysis of the relationship between economic value added and market value added. In conference proceedings Challenges of the Knowledge Society CKS 2017, Bucharest, 12th - 13th May 2017, 11th edition.
- JANČOVIČOVÁ BOGNÁROVÁ, K. 2018. The effect of leverage and economic value added on market value added. In conference proceedings Challenges of the Knowledge Society CKS 2018, Bucharest, 13th - 14th May 2018, 12th edition.
- KRAMER, J.K., PETERS, J.R. 2001. An inter-industry analysis of Economic Value Added as a proxy for Market Value Added. In Journal of Applied Finance, p.41–49.
- MAJUMDAR, S.K., CHHIBBER, P. 1999. Capital structure and performance: Evidence from a transition economy on an aspect of corporate governance. In Public Choice 98 (3-4). p. 287-305.
- ODIT, M.P., GOBARDHUN, Y.D. 2011. The Determinants of Financial Leverage of SME's In Mauritius. In International Business & Economics Research Journa, March 2011, Vol. 10, No. 3, p. 113-126.
- PACHORI, S., NAVINDRA, K.T. 2012. Influence of Financial Leverage on Shareholders Return and Market Capitalization: A Study of Automotive Cluster Companies of Pithampur, (M.P.), India. 2nd International Conference on Humanities, Geography and Economics (ICHGE'2012) Singapore.
- ROSS, S.A., WESTERFIELD, R.W., JORDAN, B.D., FIRER, C. 1999. Fundamentals of Corporate Finance. Roseville: McGraw-Hill.