EVA® and Shareholder Return

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This article identifies important conceptual and methodological weaknesses in several studies that find little relationship between EVA and market value or EVA and shareholder return. The biggest conceptual weakness in these studies is their failure to recognize that shareholder return depends on the difference between actual and expected performance. The article summarizes the author's previous empirical research on EVA and market value and derives, from basic principles of DCF valuation, the exact relationship between the excess investor return and the capitalized future value of the differences between actual and expected EVA improvement.

■ A number of recent studies report poor statistical relationships between EVA and shareholder return or EVA and market value. One study shows that the percentage change in EVA explains less than 2% of the variation in one-year shareholder returns (Olsen, 1996). A second study shows that absolute EVA and the EVA return on capital are poorly correlated with one-year shareholder return (Peterson and Peterson, 1996). Another study shows that five-year changes in EVA explain less of the variation in market adjusted shareholder returns than five-year changes in earnings (Biddle, Bowen and Wallace, 1996). This study concludes that "there is little evidence to support the Stern Stewart claim that EVA is superior to earnings in its association with stock price." The study reported in this issue shows that the EVA return on capital explains less than 5% of the variation in "standardized MVA," and concludes that "the market seems more focused on 'profit' than EVA."

My own studies give a very different picture; I have found that 1) EVA explains significantly more of the variation in market value among companies than earnings, and 2) changes in EVA and changes in capital explain significantly more of the variation in five- and ten-year changes in market value than changes in earnings.

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I. The Results of My Studies

In a study published last year (O'Byrne, 1996), I analyzed the relationship between operating performance and market value for the years 1985-93 for the companies in the 1993 Stern Stewart Performance 1000 database and compared the explanatory power of free cash flow (FCF), net operating profit after tax (NOPAT), and EVA. My results, which are based on a sample of 6,551 company/years and expressed in terms of the variance explained in the market/capital ratio, are:

Variable/Model	Variance Explained
FCF	0%
NOPAT	17%
NOPAT (with non-zero intercept)	33%
EVA	31%
EVA with positive and negative coefficients	38%
and with ln (capital) term	42%

My study shows that a simple EVA-regression model explains less variance than a standard NOPAT-regression model with a non-zero constant term (31% vs. 33%), but that EVA explains more than twice as much of the variation in market/capital ratios as NOPAT (42% vs. 17%) when the EVA model has positive and negative EVA coefficients and an ln (capital) term and the NOPAT model is truly a "NOPAT only" model with a zero intercept. These vital differences in methodology between my studies and the other studies are explained in Section III below.

My study also showed that, with similar refinements in methodology, EVA changes explain significantly more of the variation in market value changes (expressed as a fraction of beginning market value) than NOPAT changes:

Variable/Time Period	Variance Explained
NOPAT/five years	24%
EVA/five years	55%
NOPAT/ten years	64%
EVA/ten years	74%

II. The Conceptual Weakness of The Anti-EVA Studies

The shortcomings of the other studies are not limited to regression methodology. A much more fundamental weakness is their failure to consider, and adjust for, the role of investor expectations in shareholder returns. The basic concepts of discounted cash flow (DCF) valuation imply that shareholder returns depend on the difference between actual and expected performance, but the other studies have attempted to explain shareholder returns without any DCF model for estimating 1) investor expectations of future performance or 2) the impact on the stock price of differences between actual and expected performance. My studies have focused on market value levels. A model of market-value level is the logical starting point in any analysis of returns because it provides the basis for estimating investor expectations of future performance. A model of investor expectations is especially critical for studies of short-term, e.g., one year, shareholder returns since, in the short-term, changes in expectations are large relative to changes in performance. My own studies of returns have been limited to five- and ten-year changes in market value where the impact of EVA improvement is substantial even without adjustment for investor expectations. Later in this article, I will explain the mathematical relationship, derived from valuation theory, between excess return (i.e., the dollar return in excess of a cost of capital return), EVA improvement, and changes in investor expectations of future EVA improvement. I will also explain the empirical analysis required to test the relationship between excess return and historical EVA improvement which is really a test of how well historical EVA and EVA improvement explain investor expectations of future EVA improvement.

III. Differences in Methodology

A. Positive and Negative EVA Coefficients and an Ln(Capital) Term

The first important difference in methodology is that my EVA models use separate variables for positive and negative EVA and an ln (capital) term. Separate variables for positive and negative EVA recognize that the market puts a much higher multiple on positive EVA than it does on negative EVA. The ln (capital) term recognizes that market multiples of capital tend to decline with company size. My model is:

$$\text{Market Value} = [a_1 + a_2 \ln(\text{Capital})]\,\text{Capital} + a_3(\text{EVA}^+/c) + a_4(\text{EVA}^-/c)$$

where EVA^+ is equal to EVA when EVA is positive (and 0 otherwise) and EVA^- is equal to EVA when it is negative (and 0 otherwise). In the regression analysis to estimate the coefficients in this market value model, both sides of the equation are divided by capital to give equal weighting to equal percentage errors rather than equal dollar errors (technically speaking, the prediction errors as a percent of capital are much closer to a normal distribution than the prediction errors in absolute dollars). This makes the form of the market value regression model:

$$\text{Market Value/Capital} = a_1 + a_2 \ln(\text{Capital}) + a_3(\text{EVA}^+/c)/\text{Capital} + a_4(\text{EVA}^-/c)/\text{Capital}$$

B. Eliminating the Capital Term from the NOPAT Model

The second important difference in methodology is that my NOPAT models, where I regress the market/capital ratio on NOPAT/capital, suppress the constant term to ensure that the predicted market value is a multiple of NOPAT only, rather than a multiple of NOPAT and a multiple of capital (which is the result when the model has a non-zero constant term). In my study of 1985-93 market value levels, the standard NOPAT regression equation is:

$$\text{Market Value/Capital} = 0.808 + 9.878\,\text{NOPAT/Capital}$$

but this implies that market value is a function of both capital and NOPAT:

$$\text{Market Value} = (0.808)\,\text{Capital} + (9.878)\,\text{NOPAT}$$

A NOPAT and capital model is really an EVA model in disguise (see O'Byrne, 1996, for further explanation of this point). To make market value solely a function of NOPAT, I make the constant term zero. When this is done, the NOPAT coefficient jumps to 15.557:

Market Value = (15.557)NOPAT

These two differences in methodology have a dramatic impact on the results of models of market value and market value changes. When these differences are ignored, NOPAT explains more of the variation in market value levels than EVA (33% vs. 31% in my study of 1985-93 market value levels). But when these differences are taken into account, EVA explains more than twice as much of the variation in market value levels as NOPAT (42% vs. 17% in my study of 1985-93 market value levels). These differences also have a big impact on models of market value changes. When taken into account, five-year changes in EVA and capital explain 55% of five-year changes in market value, while five-year changes in NOPAT only explain 24% of the five-year changes in market value.

C. Eliminating Extreme Values

A third difference in methodology, which appears to be important for the study reported in this issue, is the exclusion of companies with extreme market/capital ratios or extreme values for the independent variables. When variables are standardized by capital, a small number of very extreme values are usually created because some companies have very small capital levels (primarily because prior losses have reduced capital to very low levels). For example, market/capital for the companies in the 1994 Stern Stewart Performance 1000 database (a total of 9,000 company/years) ranges from +1134 to -404. When the top and bottom 2% of the sample are excluded, the standard deviation of market/capital drops from 15.8 to 1.2. Excluding the top and bottom 2% of the sample for dependent and independent variables has a dramatic effect on the results of regression analyses. Including all company/years, EVA/prior year capital explains only 0.2% of the variation in MVA/capital and each additional dollar of EVA increases MVA by only $1.66. (EVA/prior year capital and MVA/capital are the variables used in the study reported in this issue.) When the top and bottom 2% of cases for each variable are excluded, EVA/prior year capital explains 33.5% of the variation in MVA/capital and each additional dollar of EVA increases MVA by $7.95. (When EVA and MVA are both standardized by current capital—which prevents capital growth from distorting the EVA coefficient—each additional dollar of EVA increases MVA by $9.45.)

IV. The EVA Equation for Market Value

The most disappointing aspect of all of these studies is their failure to use valuation theory to guide their empirical research. DCF valuation implies that the value of a bond is the present value of the future interest and principal payments discounted at the cost of debt, and the value of a stock is the present value of the future dividends discounted at the cost of equity. These concepts imply, as Modigliani and Miller proved years ago (Modigliani and Miller, 1961), that the total market value of the firm is the present value of future free cash flow (FCF) discounted at the weighted average cost of capital. The relationship between FCF and market value implies the fundamental EVA equation:

$$MV_0 = cap_0 + EVA_0/c + ((1+c)/c)\ \sum_{i=1}^{\infty} x_0\Delta EVA_i/(1+c)^i$$

where MV_0 is market value at the end of year 0, cap_0 is book capital at the end of year 0, EVA_0 is EVA for year 0, c is the weighted average cost of capital (so $EVA_0 = NOPAT_0 - c(capital_{-1})$) and $x_0\Delta EVA_i$ is investors' expectation, at the end of year 0, of EVA improvement in year i. The sum of capital and capitalized current EVA is called "current operations value," i.e., the value of the capital and EVA the company has now. The third term, the capitalized present value of the expected annual EVA improvements, is called "future growth value," or FGV_0. The distinction between current operations value and future growth value is critical in understanding the relationship between EVA and market value. We can show, although we won't prove it here, that no EVA improvement is required for investors to earn a cost of capital return on market value if market value is equal to current operations value. But if market value exceeds current operations value, i.e., future growth value is positive, then the company must achieve EVA improvement for its investors to earn a cost of capital return on market value.

V. The EVA Equation for Excess Return

We can use the fundamental EVA equation to derive the relationship between EVA and the excess investor return (which will equal excess shareholder return as long as the bond holders realize their expected return). Actual investor wealth at the end of year 1 is the sum of ending market value and free cash flow for the year, or $MV_1 + FCF_1$. Expected investor wealth at the end of year 1 is $(1+c)MV_0$. The excess investor return in year 1 is the difference between actual investor wealth and expected investor wealth, or:

$$\text{Excess investor return} = MV_1 + FCF_1 - (1+c)(MV_0)$$

Since $FCF_1 = NOPAT_1 - \Delta cap_1$ and $EVA_1 = NOPAT_1 - c(cap_0)$, we can express FCF_1 in terms of EVA as $EVA_1 + (c)cap_0 - \Delta cap_1$. Using the fundamental EVA equation for beginning and ending market value, we have:

$$MV_1 = cap_1 + EVA_1/c + ((1+c)/c) \sum_{i=2}^{\infty} x_1 \Delta EVA_i / (1+c)^{i-1}$$

$$FCF_1 = EVA_1 + (c)\, cap_0 - \Delta cap_1$$

$$MV_0 = cap_0 + EVA_0/c + ((1+c)/c) \sum_{i=1}^{\infty} x_0 \Delta EVA_i/(1+c)^i$$

Collecting terms for capital, EVA and expected EVA improvement, the excess investor return $[MV_1 + FCF_1 - (1+c)MV_0]$ is equal to:

$$cap_1 + c(cap_0) - (cap_1 - cap_0) - (1+c)cap_0$$

$$+ EVA_1/c + EVA_1 - (1+c)EVA_0/c - ((1+c)/c)x_0\Delta EVA_1$$

$$+ ((1+c)/c) \sum_{i=2}^{\infty} x_1 \Delta EVA_i/(1+c)^{i-1} - ((1+c)/c) \sum_{i=2}^{\infty} x_0 \Delta EVA_i / (1+c)^{i-1}$$

which simplifies to:

$$((1+c)/c)((EVA_1 - EVA_0) - x_0 \Delta EVA_1)$$

$$+ ((1+c)/c) \sum_{i=2}^{\infty} (x_1 \Delta EVA_i - x_0 \Delta EVA_i)/(1+c)^{i-1}$$

or:

$$((1+c)/c)(Ex\Delta EVA_1)$$

$$+ ((1+c)/c) \sum_{i=2}^{\infty} (x_1 \Delta EVA_i - x_0 \Delta EVA_i)/(1+c)^{i-1}$$

where $Ex\Delta EVA_1$ is the excess EVA improvement in year 1. The more general expression for the n year excess return is:

$$((1+c)/c) \sum_{i=1}^{n} (Ex\Delta EVA_i)(1+c)^{n-i}$$

$$+ ((1+c)/c) \sum_{i=n+1}^{\infty} (x_n \Delta EVA_i - x_0 \Delta EVA_i)/(1+c)^{i-n}$$

This says that the n year excess return is the sum of the capitalized future value of the excess EVA improvements for years 1 through n plus the "excess future growth value" at the end of year n. The excess FGV is the difference between the actual FGV at the end of year n and the year 0 expected year n FGV.

VI. The Regression Variables Suggested by Valuation Theory

The n year excess return can also be expressed (by rearranging the terms in the expression above) in terms of actual EVA improvement as the capitalized future value of the actual EVA improvements for years 1 through n *minus* the year n future value of the year 0 future growth value *plus* the year n future growth value:

$$((1+c)/c) \sum_{i=1}^{n} (\Delta EVA_i)(1+c)^{n-i}$$

$$-((1+c)/c) \sum_{i=1}^{\infty} x_0 \Delta EVA_i (1+c)^{n-i}$$

$$+ ((1+c)/c) \sum_{i=n+1}^{\infty} x_n \Delta EVA_i /(1+c)^{i-n}$$

From these three components of the excess return, we can see that a regression analysis that tries to explain the excess return in terms of EVA improvement needs three explanatory variables: 1) the capitalized future value of the annual EVA improvements over the return period, 2) the future value, at the end of the return period, of the future growth value in the stock price at the start of return period, and 3) an operating performance proxy for the future growth value in the stock price at the end of the return period. We use EVA^+/c, EVA^-/c and capital to predict future growth value in the market value regression models discussed above:

$$\begin{aligned}\text{Predicted Future Growth Value} = &[a_1 + a_2 \ln(\text{Capital}) - 1]\text{Capital} \\ &+ [a_3 - 1](EVA^+/c) \\ &+ [a_4 - 1](EVA^-/c)\end{aligned}$$

A market value model like this, or a more refined model that incorporates capital growth rates or even non-financial measures of company and industry performance, is an essential component of any effort to explain excess returns.

VII. Future Research

An important area for future research is the future growth value associated with capital. When the capital coefficient (or, technically, when the derivative of the capital coefficient) is greater than 1, the model implies a result that makes no sense in terms of DCF valuation: an incremental dollar of capital, with no EVA, adds more than \$1 of market value. The future growth value associated with capital is especially problematic for a security analyst trying to estimate the excess return that would be realized from a forecast of future company performance. Should the analyst assume that incremental capital will increase future growth value? Or is the future growth value associated with capital a "financial illusion" that will disappear over time?

VIII. Conclusion

DCF valuation theory demonstrates that EVA, not earnings, is the basis of market value and excess EVA improvement is the source of excess shareholder return. My own studies have shown that EVA explains differences in market value much better than NOPAT or FCF and EVA changes explain market value changes much better than changes in NOPAT. The recent studies that challenge the usefulness of EVA in explaining market value and shareholder return have significant shortcomings in methodology: they focus on shareholder return not excess shareholder return; they don't use expected EVA improvement as a variable in explaining shareholder return; they don't recognize that investors put a much higher multiple on positive EVA than they do on negative EVA; and they fail to realize their earnings models are really earnings and capital (that is, EVA) models. ■

References

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