EVA® AND MARKET VALUE

by Stephen F. O'Byrne,
Stern Stewart & Co.

Valuation theory is focused on the present value of future cash flows, but investment practice focuses largely on *multiples* of cash flow, earnings, and even book values. Statements like "This company is overpriced at 12 times cash flow" or "This company is a bargain at 90% of book value" are commonplace among investors and analysts. Sometimes these statements are shorthand for the results of discounted cash flow analysis, but often they are just statements about the multiples of cash flows or net assets paid in comparable transactions.

It is hard to make multiples go away. Since we rarely know the forecasts that led to a sale, much less how the buyer and seller developed their forecasts, discounted cash flow analysis is not very useful in predicting what the buyer might be willing to pay, or the seller accept, in another transaction. Even when we have our own forecast of future company performance, we need a valuation multiple to determine the value of the company at the end of our forecast horizon. To develop accurate valuations that make sense in terms of corporate finance theory, we need an operating performance measure that is consistent with DCF *and* valuation multiples that are highly predictive of public market values.

My objective in this paper is to show that Economic Value Added, or EVA, which is net operating profit after-tax (NOPAT) minus a charge for all capital invested in the business, provides the operating performance measure and the valuation multiples we need to link theory and practice. The findings of my recent research challenge the suggestion of other researchers that earnings, without regard to the amount of capital employed to generate those earnings, are sufficient to explain differences in investor returns. For example, in one widely-cited study entitled "Aggregate Accounting Earnings Can Explain Most of Security Returns," Peter Easton, Trevor Harris, and James Ohlson report that a company's total earnings over a given period explain an increasing proportion of the variation in shareholder return as the measurement period is extended to longer and longer periods. They show, for example, that although the current year's earnings explain only 5% of the variation in that year's stock returns, five years of corporate earnings explain 33% of the variation in stock returns over the same five-year period and ten years of corporate earnings explain 63% of the variation in ten year returns. Based on these findings, moreover, Easton et al. hypothesize that the long-run correlation between aggregate earnings and shareholder return will asymptotically approach one.[1]

My own research, however, shows that changes in EVA explain more of the variation in ten-year stock returns than do changes in earnings, and dramatically more of the variation in five-year returns. More specifically, my study finds that five-year changes in EVA explain 55% of five-year changes in market value, whereas five-year earnings changes explain only 24%. And ten-year changes in EVA accounted for 74% of variation in market value, as compared to the 64% explained by ten-year changes in earnings. My research also shows that the *level* of EVA explains more of the variation in market values than the level of earnings.

1. Peter Easton, Trevor Harris, and James Ohlson, "Aggregate Accounting Earnings Can Explain Most of Security Returns: The Case of Long Return Intervals," *Journal of Accounting and Economics* 15 (1992).

As I attempt to show in this paper, the failure of other researchers to date to substantiate the greater explanatory power of EVA relative to earnings is due, in large part, to their failure to recognize two important characteristics of the market's valuation of companies:

- Multiples of positive EVA are significantly higher than multiples of negative EVA, which implies that companies with negative EVAs have values that are higher than what would be expected if the market valued all EVA at the same multiple.
- Multiples of capital tend to decline with company size, which suggests that the market assigns higher multiples to a given level of EVA for smaller companies.

As I also argue, the existing research has unintentionally exaggerated the explanatory power of earnings by not explaining stock returns (or market value) *solely* as a multiple of earnings. Research on returns has typically instead used regression equations that imply that predicted stock returns are a function of beginning market value as well as changes in earnings over the measurement period. Similarly, prior research on market value *levels* has typically used regression equations that imply that the predicted market value is a multiple of capital and a multiple of earnings. As I demonstrate later in this paper, such "earnings-*and*-capital" models are really EVA models in disguise. When the earnings models are really earnings-*and*-capital models, and when the EVA models don't distinguish between positive and negative EVA or recognize declining capital multiples, it *appears* as if earnings explain as much of (if not more than) the variation in market values as EVA. But, when these adjustments are made, EVA proves to have significantly more power to predict market values.

A PRIMER ON MULTIPLES AND VALUATION THEORY

Before describing the results of my own tests, let's begin with a brief discussion of earnings and cash flow multiples and how they might fit within the modern theory of corporate finance. For our purposes, modern valuation theory can be seen as beginning with Miller and Modigliani's pathbreaking 1961 article, "Dividend Policy, Growth and The Valuation of Shares."[2] In that article, M & M presented an equation or model that relates the value of the firm (the market value of its debt plus equity) to its current and expected future operating cash flows. If we use the term NOPAT (net operating profit after tax) to refer to a company's annual operating (pre-interest, but after-tax) earnings, we can transpose the M & M valuation model into the following terms:

$$\mathbf{V = NOPAT/c + \Sigma[I(r - c)/c]/(1 + c)^{t}},$$[3]

where c is the company's weighted average cost of capital and I is the amount of new investment (net of depreciation) in the current and each future year.

Note that the M & M formula breaks down the current value of the firm into two components. The first, "NOPAT/c," represents the discounted present value of the firm's current earnings stream assuming it remains constant forever. This perpetuity value can be thought of as the firm's *current operations value*. To illustrate, assume that Company XYZ is currently earning \$100 on a capital base of \$1,000, its cost of capital is 10%, and it is expected to earn \$100 in all future years and to pay out all earnings as a dividend each year (rather like a perpetual bond). In that case, the value of XYZ is equal to its perpetuity value of \$100/10%, or \$1,000, and its shares will trade at a multiple of 10 times operating earnings. Moreover, its EVA is zero (since it is earning precisely its cost of capital), and its market-to-capital ratio is 1.0.

Now let's turn to the second component of the M&M model, $\Sigma[I(r - c)/c]/(1 + c)^{t}$, which represents the firm's *future growth value*. Note that, in accordance with modern finance theory, it is only when new investment (I) is expected to earn more than its cost of capital (that is, r must be greater than c, or EVA must be positive) that a company's growth value is

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2. *Journal of Business* 34 (October 1961).

3. The original equation (Equation 12) in the M&M article is as follows:

$$X(0)/p + \Sigma_{t=0} (I(t) (p^{*}(t) - p)/p)/(1 + p)^{t+1},$$

where X(0) is the (uniform perpetual) earnings on the current asset base, I(t) is the investment at the end of year t, p*(t) is the constant rate of return on I(t) and p is the cost of capital. In the language of EVA (and using our normal notation where market value_t is the market value at the *end* of year t), X(0) is $NOPAT_0$, I(t) (p*(t) – p) is the EVA improvement in year t+1 (ΔEVA_{t+1}), and p is the cost of capital c, so the M&M equation can be expressed as:

$$\text{Market value}_{-1} = NOPAT_0/c + \Sigma_{t=1} (\Delta EVA_t/c)/(1 + c)^t.$$

If we add and subtract $NOPAT_{-1}/c$ and ($\text{Capital}_{-1} - \text{Capital}_{-2}$) to the right side of this equation, we can show that this is equivalent to:

$$\text{Market value}_{-1} = \text{Capital}_{-1} + EVA_{-1}/c + \Delta EVA_0 /c + \Sigma_{t=1} (\Delta EVA_t/c)/(1 + c)^t,$$

which becomes:

$$\text{Market value}_{-1} = \text{Capital}_{-1} + EVA_{-1}/c + (1+c)/c * \Sigma_{t=0} (\Delta EVA_t)/(1 + c)^{t+1}.$$

positive. Returning to our example, let's now assume that Company XYZ invests $100 each year, and that it expects to earn 20% on that new investment in all future years. In this case, XYZ's *future growth value* would be $1,000. Adding the *future growth value* of XYZ of $1,000 to its *current operations value* gives a total value of $2,000, and the company thus trades at 20 times earnings or 2.0 times its capital.

One purpose of this simple example is to demonstrate that part of a company's current market value—and hence its multiple of earnings and capital—reflects its prospects for profitable growth in the future. By profitable growth, moreover, we mean not increases in operating earnings or NOPAT, but increases in earnings over and above the cost of capital—that is, increases in EVA.

The M&M formula assumes that the company's future rate of return (r) on each new investment is constant. And this in turn implies that the increase in EVA (hereafter referred to as the *EVA improvement*) in the following year is equal to I × (r – c). Thus, the M&M equation expresses the value of the firm as the sum of the perpetuity value of current year NOPAT plus the present value of the perpetuity values of the future annual EVA improvements beginning in the second year.

Before moving to the empirical results, let's introduce one additional complication. Earlier, we assumed that Company XYZ was earning just its cost of capital (on its current capital base). But, now let's assume that XYZ was earning 15% on total capital instead of 10%, or $150 on a capital base of $1,000, thus representing a current EVA of $50. In this case, XYZ's current operations value would be $1,500 ($150/.10). And this $1,500 current operating value can itself be broken down into two components: (1) $1,000 of capital (representing XYZ's ability to return its cost of capital) and (2) $500 representing the discounted present value of the *current* level of EVA.

In sum, the value of the firm (debt plus equity) can be thought of consisting of three parts: (1) book value of capital (debt plus equity); (2) the perpetuity value of current EVA; and (3) the capitalized present value of expected annual EVA improvements (see footnote 3). We will return to the concept of expected EVA improvements later.

THE EVA REGRESSION MODELS

To test the predictive power of EVA relative to earnings (or NOPAT) and free cash flow (FCF), we devised a number of regression models designed to capture the relationship between a company's market value and these measures of current operating performance. The simplest EVA model, based on the framework just described, would express a company's market value as a linear function of capital and capitalized current EVA:

$$\text{Market Value} = a \times \text{Capital} + b \times (\text{EVA}/c)^{4}$$

To make this model more useful for regression analysis, I then divided both sides of the equation by capital. (In so doing, our aim was to give equal weighting to equal *percentage* errors rather than equal *dollar* errors.)[5] This made the form of the market value regression model:

$$\text{Market Value/Capital} = a + b \times (\text{EVA}/c)/\text{Capital}$$

In testing the predictive power of the other variables, operating earnings (NOPAT) and free cash flow (FCF), I used the following models:

$$\text{Market Value/Capital} = a + b \times (\text{NOPAT/Capital})$$
$$\text{Market Value/Capital} = a + b \times (\text{FCF/Capital}).$$

NOPAT, as noted earlier, is pre-interest but after-tax corporate earnings. FCF is equal to NOPAT minus net new corporate investment (including retained earnings).

For each of these three variables—EVA, NOPAT, and FCF—my regressions attempted to discover the strength of the correlations with the market value/capital ratios. I also examined the correlations between changes in EVA, NOPAT, and capital and changes in market value.

The Data Used To Test The Models

To test the usefulness of these models and compare the explanatory power of the EVA models with NOPAT, FCF and capital models, we used nine years of data (covering the period 1985-1993) for

4. And, to the extent a company's current value consists of future growth value as well as current operations value, this model implies:
Future Growth Value = (a – 1) × Capital + (b – 1) × (EVA/c).

5. Technically speaking, the prediction errors as a percent of capital are much closer to a normal distribution than the prediction errors in absolute dollars.

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the companies in the 1993 Stern Stewart Performance 1000. The Stern Stewart Performance 1000 is a ranking, based on MVA, or Market Value Added (the dollar difference between market value and capital) of the 1000 largest publicly traded companies in the U.S. excluding financial institutions and public utilities.

The total sample for the market value models consisted of only 7,546 company valuation years (as opposed to 9,000) because some of the 1,000 companies were not publicly traded in all nine years. From this sample, we excluded all cases (i.e., company valuation years) in the top and bottom 2% for each of the following four variables. Below are listed the cutoff points (that is, the 2nd and 98th percentiles) for each of the four variables:

Variable	2nd %-tile	98th %-tile
Market Value/Capital	0.640	8.331
(EVA/c)/Capital	–1.972	1.730
NOPAT/Capital	–0.105	0.338
FCF/Capital	–0.533	0.393

The purpose of these exclusions is to prevent extreme cases (known as "outliers") from creating statistical relationships that don't hold throughout the sample. Our 2% cut-off is arbitrary, but provides an objective standard for all variables to avoid selection bias in eliminating extreme cases.

After these exclusions, we were left with a total sample of 6,551 company valuation years. The means and standard deviations of the four variables for this sample are:

Variable	Mean	Std Dev
Market Value/Capital	1.792	1.120
(EVA/c)/Capital	–0.077	0.558
NOPAT/Capital	0.100	0.065
FCF/Capital	–0.014	0.143

As shown in the above table, the average company trades at about 1.8 times the book value of capital and earns a 10% rate of return on total capital. What may not be apparent from the above table, however, is that the average company produces an EVA that is indistinguishable from zero. That is, the average company in our sample succeeds in earning a rate of return slightly (less than 1%) below its cost of capital—a result that one might expect in competitive markets where above-normal returns are difficult to sustain.

In measuring five-year changes in market value, I used all five-year periods (with beginning years in 1983 through 1988) for the companies in the 1993 Stern Stewart Performance 1000. In measuring ten-year market value changes, I had only one measurement period for each company—the change from 1983-93. In both cases, we excluded the top and bottom 2% of cases for each of the key variables, i.e., the dependent variable, ΔNOPAT/Market Value$_0$, ΔCapital/Market Value$_0$, ΔEVA/c/Market Value$_0$.

THE FINDINGS: FIRST IMPRESSIONS

At first glance, the results of our regression analysis suggest that earnings (NOPAT) and EVA have about the same level of success in explaining market value. The following table summarizes the explanatory power of the alternative market value models:

Variable/Model	Variance Explained	Standard Error
Free cash flow	0%	1.12
NOPAT	33%	0.92
EVA	31%	0.93

FCF is actually *negatively* correlated with the market/capital ratio and, as shown in the top line of the table, FCF explains less than 1% of the variation in market/capital among the 6,551 cases. This is not surprising since both poorly performing companies and successful, but rapidly growing, companies are likely to have negative FCF. For example, in 1992, Wal-Mart's free cash flow was –13% of capital even though its EVA return was 8% and its market/capital ratio was 4.8. The same year K-Mart's free cash flow was –7% of capital, but its EVA return was –3% and its market/capital ratio was 1.1.

As suggested by the second and third lines of the table above, NOPAT and EVA appear to have almost identical explanatory power. That is, both NOPAT/capital and EVA/c/capital appear to explain about one third of the variation in market/capital ratios, and with almost identical standard errors. But, as we argue below, there is a good reason for this similarity in the results—one that should cause us to re-examine these findings.

Why The Earnings Model is Really an EVA Model

To assess the explanatory power of a NOPAT model, one needs to be careful about the mathematical form of the regression model. If our model is the standard single regression trendline,

$$\text{Market Value/Capital} = a + b \times (\text{NOPAT/Capital}),$$

and the constant term a is not zero, then we really have what might be called a "Capital-and-NOPAT" model:

$$\text{Market Value} = a \times \text{Capital} + b \times \text{NOPAT}$$

And a "Capital-and-NOPAT" model is effectively an EVA model with a cost of capital equal to (1–a)/b.

Consider, for example, the actual regression equation produced by our sample:

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

Multiplying both sides by capital transforms this equation into the following:

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

If we add and subtract (1 – 0.808) * capital = 0.192 * capital from the right side of the equation, the equation becomes:

$$\text{Market Value} = 1.0\ \text{Capital} + 9.878\ \text{NOPAT} - 0.192\ \text{Capital}$$

This expression can be re-written as:

$$\text{Market Value} = 1.0\ \text{Capital} + 9.878\ (\text{NOPAT} - 0.0194\ \text{Capital}),$$

which is an EVA model with a 1.94% capital charge on ending capital.

To have a "pure" NOPAT model, we need to force the regression equation through the origin. When we do this, the regression equation is:

$$\text{Market Value/Capital} = 0 + 15.557\ \text{NOPAT/Capital, or}$$
$$\text{Market Value} = 15.557\ \text{NOPAT}$$

This regression has a standard error of 1.02 (expressed in terms of Market Value/Capital) and explains only 17% of the variation in market/capital.[6]

TWO ADJUSTMENTS TO THE EVA MODEL

At the same time the predictive power of earnings is overstated by conventional regression analysis, the ability of EVA is significantly underestimated by the simple regression model presented above. For the superiority of EVA over NOPAT as a predictor of market values increases when the EVA model is expanded to include two additional variables: one that reflects whether the company is earning positive or negative EVA, and one designed to capture any differences in the way the market values companies of different size.

Different EVA Multiples for Positive and Negative EVA. The simple EVA model used above implies that positive EVA is valued at the same multiple of its perpetuity value as negative EVA. This assumption would be appropriate if, for example, investors expected current EVA to be maintained indefinitely (and, in this case, the multiple would be 1.0). However, this is rarely an appropriate assumption for both positive and negative EVA. Positive EVA implies that a company is able to earn more than its cost of capital and, hence, that it will be able to increase its EVA if it increases its capital base and merely maintains its current rate of return. Since many growing companies are successful in maintaining their rate of return, investors typically capitalize positive EVA *at more than its perpetuity value.*

But, in the case of companies earning less than their cost of capital, capitalizing negative EVA at more than its perpetuity value implies that the company will not only fail (forever!) to improve its return on its existing capital base, but will make new investments that also earn less than its cost of capital. Investors, however, rarely assume that a poor performing company will go forever without a turnaround that stops unprofitable new investment and boosts returns on its existing capital base. The expectation of a turnaround implies that negative EVA should be valued at less than its perpetuity value.

6. The variance explained (which is not computed for regression through the origin by statistical packages such as SPSS) is equal to the explained variance divided by the total variance. The explained variance is equal to the total variance minus the unexplained variance. The total variance is the mean squared deviation, i.e., the mean value of (market/capital – mean market/capital)^2. The unexplained variance is mean squared prediction error, i.e., the mean value of (market/capital – predicted market/capital)^2.

When the earnings models are really earnings-*and*-capital models, and when the EVA models don't distinguish between positive and negative EVA or recognize declining capital multiples, it *appears* as if earnings explain as much of the variation in market values as EVA. But, when these adjustments are made, EVA proves to have significantly more power to predict market values.

Different Capital Multiples for Different Sizes. The simple EVA model also implies that all companies will have the same *capital* multiple regardless of size. This would be a reasonable assumption if the capital multiple were 1.0, since this multiple would imply that $1 of capital (on which the firm earns zero EVA) creates $1 of market value. In fact, regression analysis often shows that capital multiples are greater than 1.0. A multiple greater than 1.0 could occur, for example, because investors are anticipating an improvement in profitability as experience causes productivity to improve or greater economies of scale are realized.

Such improvements in profitability become increasingly less likely, however, as companies increase in size. As firms get larger, cumulative experience and scale increase at slower rates and may also have diminishing effects (per unit change). Thus, there is less and less reason for capital multiples greater than 1.0 as companies get bigger.

To take account of both of these possibilities—that positive EVA multiples differ systematically from negative EVA multiples, and that capital multiples tend to decline with company size—the EVA regression model becomes:

$$\text{Market Value/Capital} = a + b\,(\ln(\text{Capital})) + d\,((EVA^{+}/c)/\text{Capital}) + e\,((EVA^{-}/c)/\text{Capital}),$$

where EVA^{+} equals EVA if EVA is positive (and zero otherwise) and EVA^{-} equals EVA if EVA is negative (and zero otherwise).

Using our sample of 6,551 company years, the regression equation for the market value model turns out to be as follows:

$$\text{Market Value/Capital} = 2.645 - 0.160\,(\ln(\text{Capital})) + 1.852\,(EVA^{+}/c)/\text{Capital} + 0.349\,((EVA^{-}/c)/\text{Capital})$$

Multiplying both sides of the equation by Capital produces the following:

$$\text{Market Value} = (2.645 - 0.160 * \ln(\text{Capital})) \times \text{Capital} + 1.852\,(EVA^{+}/c) + 0.349\,(EVA^{-}/c)$$

This model has a standard error of 0.856 and explains 42% of the variation in market/capital ratios. Both of our refinements to the simple market value model increase its explanatory power. Recognizing positive and negative EVA multiples increases the variance explained from 31% to 38%. Recognizing the size effect in capital multiples increases the variance explained from 38% to 42%.

We also estimated the coefficients for each of the 57 industry groups in the Performance 1000. When the industry coefficients are used to calculate predicted market/capital ratios, the EVA model explains 56% of the variation in actual market/capital ratios.

In sum, after making a number of adjustments, we find that levels of EVA are significantly better predictors of current market values than levels of NOPAT or FCF. The following table summarizes the findings reported thus far.

Variable/Model	Variance Explained	Standard Error
Free cash flow	0%	1.12
NOPAT	17%	1.02
NOPAT (non-zero intercept)	33%	0.92
EVA	31%	0.93
with positive and negative EVA coefficients	38%	0.88
with ln (capital) term	42%	0.86
with industry coefficients	56%	0.74

CHANGES IN EVA AND MARKET VALUES

Up until this point, we have been discussing the results of regressions relating the *level* of market value to the *levels* of various measures of operating performance. Besides measuring correlations among levels of NOPAT, EVA, and market value, I also ran a series of regressions testing the correlations among *changes* in these variables over both five-year and ten-year periods.[7]

Five-year changes in EVA explain 55% of the variation in five-year changes in market value, and ten-year changes in EVA explain 74% of the variation in ten-year changes. By contrast, the NOPAT model

7. Our EVA model of market value changes is derived from our EVA model of market value levels:

$$[\text{Market Value}_n - \text{Market Value}_0]/\text{Market Value}_0 = a_1 * [\text{Capital}_n - \text{Capital}_0]/\text{Market Value}_0 + a_2 * [\ln(\text{Capital}_n)*\text{Capital}_n - \ln(\text{Capital}_0)*\text{Capital}_0]/\text{Market Value}_0 + a_3 * [(EVA_n^{+}/c_n) - (EVA_0^{+}/c_0)]/\text{Market Value}_0 + a_4 * [(EVA_n^{-}/c_n) - (EVA_0^{-}/c_0)]/\text{Market Value}_0$$

We standardize market value changes by beginning market value instead of capital in order to make the dependent variable the market value return. We also force our regressions through the origin to ensure that beginning market value does not affect the predicted market value change.

explains only 24% of the five-year changes, and 64% of the ten-year changes, in market value. I also found that the five- and ten-year changes in capital explain 36% and 58%, respectively, of market value changes. Our findings on both NOPAT and capital are similar to those reported by the Easton, Harris, and Ohlson study cited earlier—namely, that cumulative five-year and ten-year earnings explain 33% and 63% of five- and ten-year returns.

The following table shows that these time-series estimates of the EVA model coefficients are very similar to the cross-sectional estimates presented earlier:

	Cross-Sectional	5 Year Change	10 Year Change
Capital	2.645	2.899	3.164
Ln (capital)	–0.160	–0.182	–0.174
EVA^+/c	1.852	1.602	1.696
EVA^-/c	0.349	0.197	0.510

The time series estimates strongly confirm the key insights from the cross sectional model—namely, that (1) the market puts a much higher multiple on positive EVA than it does on negative EVA, and (2) capital multiples decline with company size.

FUTURE GROWTH VALUE AND EXPECTED EVA IMPROVEMENT

Thus far, we have focused on using operating performance to predict market value and changes in market value. However, in many situations involving security analysis as well as management performance evaluation and incentive compensation, we will want to use market value to establish investor expectations of future operating performance. That is, we will want to know what level of EVA improvement management needs to provide for investors to earn a "normal" (or cost-of-capital) return on the current market value of their investment.

The starting point in analyzing investor expectations is future growth value. Future growth value, as we saw earlier in the context of the M&M valuation model, is the capitalized present value of expected annual EVA improvements.

If all of a company's current market value can be accounted for by its *current operations value*—that is, the book value of its capital plus the present value of its current EVA—then its future growth value is zero. And, if a company's future growth value is zero, then no EVA improvement is needed for investors to earn a normal return on the market value of their investment. But, if future growth value is positive, then the company must earn a cost-of-capital return on *both* its current operations value *and* its future growth value in order to provide investors with a normal return on the *market value* of their investment. Maintaining current EVA ensures a cost of capital return on current operations value, but does not provide any return on the future growth value. To give investors a cost-of-capital return on the future growth value, there must be EVA improvement.

To determine how much annual EVA improvement is needed to provide investors with a normal return, we need to make two sets of assumptions. We need an assumption about, or model of, future growth value at the end of our forecast horizon; and we need to make an assumption about the progression of EVA improvement over the forecast horizon. The most convenient assumptions, for ease of computation, are that (1) future growth value is zero at the end of the forecast horizon (say, ten years) and (2) EVA improvement is either a constant dollar amount, or a constant percentage of capital, over the forecast horizon.

The assumption that future growth value is zero at the end of the forecast horizon implies that capital investments after the forecast horizon will earn only the cost of capital. This is an appropriate assumption if the forecast horizon is chosen to be the "competitive advantage period" (or "CAP")—the period over which the company can be expected to earn excess returns on incremental capital.

The "CAP approach" is convenient, but there is little research to support the choice of any particular period of competitive advantage. In practice, choosing the duration of the CAP is fraught with problems. Using a short CAP to establish investor expectations often leads to the conclusion that current levels of expected EVA improvement far exceed historical levels of EVA improvement. Using a long CAP, on the other hand, implies an ability to forecast operating performance over far longer periods than are normally used in valuation or strategic planning. Finally, the CAP assumption, whether short or long, often implies that a company with substantial positive EVA (at the end of the forecast horizon) will have zero growth value, a combination that is rarely observed in practice.

An alternative approach (which I will call the "regression model" approach) is to use the EVA

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regression model to estimate expected EVA improvement. This involves the following steps:

- Select a forecast horizon and make an assumption about the progression of annual EVA improvement over the forecast horizon (for example, EVA will increase in each year by a constant percentage of capital),
- Develop an appropriate EVA regression model (for example, by using an appropriate industry group or a specific set of peer companies), and
- Solve for the schedule of annual EVA improvement that provides the present value reflected in the current stock price through a combination of the EVA improvements over the forecast horizon *plus* the present value of expected EVA improvement reflected in the market value at the end of the forecast horizon.

Estimating Wal-Mart's Expected EVA Improvement

Let's illustrate these two approaches to estimating expected EVA improvement using Wal-Mart's valuation at the end of 1992, when it held 1st place in the Stern Stewart Performance 1000 ranking (in our most recent ranking, as of the end of 1994, it had fallen to 3rd place). At the end of 1992, Wal-Mart's total market capitalization (debt plus equity) was $81 billion, the book value of its total (debt and equity) capital was $16.9 billion, and its current EVA was $957 million. The perpetuity value of this current EVA, when discounted at Wal-Mart's cost of capital of 11.1%, was $8.6 billion, thus giving the company a *current operations value* of $25.6 billion. And, thus, as shown in the calculations below, fully $55.5 billion of Wal-Mart's $81 billion market capitalization was *future growth value*—that is, the present value of the company's future expected EVA improvements.

Market Value ($bil)	$81.0		$81.0
Capital	$16.9	Current Operations Value	$25.5
Capitalized Current EVA (=$957/.111)	$8.6		
PV of Expected EVA Improvement	$55.5	Future Growth Value	55.5

Given a future growth value of $55.5 billion, we can infer that Wal-Mart's investors were expecting future *annual* EVA improvements with a present value of $5.5 billion (= c/(1+c) * $55.5).

To illustrate the CAP approach, let's assume a 20-year period of competitive advantage, a 10.7% rate of growth in capital (which is only one-third of Wal-Mart's capital growth rate for the prior five years) and constant EVA improvement as a percentage of capital. Because 20 years is a generous assumption about the duration of competitive advantage, this means our assumptions about the rate of EVA improvement and the level of future EVA are likely to be conservative. Making conservative assumptions about EVA improvement is useful because it makes our conclusion more general—that is, if zero future growth value is unrealistic for lower levels of EVA, it is even less realistic for higher levels of EVA.

The CAP approach just described implies Wal-Mart's management needs to produce an annual EVA improvement of 1.9% of beginning capital to generate a 20-year present value of $5.5 billion. Annual capital growth of 10.7% and annual EVA improvement equal to 1.9% of capital imply that Wal-Mart at the end of year 20 will have $129 billion in capital and $20.7 billion in EVA. This gives Wal-Mart, in year 20, a current operations value of $315 billion (= $129 + ($20.7/.111)) and a rate of return more than 15% above its cost of capital.

How often are companies with such a 15% EVA return, or even a 5% EVA return, valued with no future growth value? If we look at the 1985-93 valuations of these companies in the 1993 Stern Stewart Performance 1000 database, we find that they were valued at or below current operations value less than 20% of the time (using either the 15% or the 5% cutoff). The median company with an EVA return of 5% or more had a future growth value that was more than 70% of its current operations value. Consider that 70% of Wal-Mart's current operations value in year 20 is $221 billion—and that this represents $27 billion in present value terms, or fully one-third of Wal-Mart's market value at the end of 1992. The CAP approach can hardly lead to accurate valuation or meaningful strategic planning when, for the sake of computational convenience, it wipes out a third of the company's value.

Now let's turn to the second approach outlined above. The regression model approach provides a more realistic estimate of Wal-Mart's expected EVA improvement because it recognizes that Wal-Mart's valuation at the end of our forecast horizon will reflect a growth value. Our estimate of the growth value at the end of the forecast horizon is the difference between Wal-Mart's predicted market value, using the EVA regression model, and its current operating value.

To illustrate how this method works, let's begin with the following EVA regression model based on data from the "Discount and Fashion Retailing" industry group in the Stern Stewart Performance 1000:

$$\text{Market Value} = (1.654 - 0.029 \times \ln(\text{Capital})) \times \text{Capital} + 2.855\ \text{EVA}^{+}/c + 0.354\ \text{EVA}^{-}/c$$

This industry model has a significantly higher positive EVA multiple than the general industry model. The small negative coefficient on the natural log of capital also implies that *dis*economies of scale in retailing are much smaller than the general industry average (see the discussion of "irrational" capital multiples below).

If we assume, as we did with the CAP approach, that Wal-Mart's EVA improvement will be a constant percentage of capital, we need to solve for the percentage of capital that provides $5.5 billion of present value through the *combination* of (1) the annual EVA improvements over the 20-year forecast period and (2) the present value of future annual EVA improvement reflected in the estimated market value at the end of the forecast period. Using the industry EVA regression model, the annual EVA improvement required to provide a present value of $5.5 billion is 0.96% of capital. The 20 annual EVA improvements, which increase from $162 million in year 1 to $1.11 billion in year 20, provide $2.81 billion in present value, while the future growth value at the end of the forecast horizon provides the remaining $2.73 billion of present value.

The following table summarizes the two approaches:

	CAP ($mil)	Regression Model ($mil)
Year 1 EVA Improvement	$319	$162
Year 20 EVA Improvement	$2,192	$1,114
Year 20 EVA	$20,693	$10,985
Year 20 Current Operations Value	$315,283	$227,819
Year 20 Future Growth Value	$0	$223,874

As things turned out, Wal-Mart's actual EVA improvements in 1993 and 1994 were significantly less than our estimates of its expected EVA improvements. The result of Wal-Mart's failure to achieve expected EVA improvement was a roughly 33% decline in its stock price. Although the company still produced positive EVA in those years, the increase in its EVA in 1993 was far less than expected, and EVA actually declined significantly in 1994. In terms of the above discussion, Wal-Mart gave up over half of its future growth value in the next two years:

Year	Expected EVA Improvement	Actual EVA Improvement	Future Growth Value
1992			$55,500
1993	$162	$99	$35,100
1994	$179	($139)	$25,500

THE "IRRATIONAL" MULTIPLE OF CAPITAL

The negative coefficient of ln (Capital) in the market value model implies that the capital multiple decreases with increases in company size. It also implies that the derivative of market value with respect to capital (which is equal to a + b x (1 + ln(capital)) is decreasing. The following table shows, for capital values ranging from $500 million to $32 billion, both the capital multiple and the market value derivative with respect to capital for the general industry model:

Capital ($mil)	Capital Multiple	Market Value Derivative
$500	1.651	1.491
$1,000	1.540	1.380
$2,000	1.429	1.269
$4,000	1.318	1.158
$8,000	1.207	1.047
$10,735	1.160	1.000
$16,000	1.096	0.936
$29,180	1.000	0.840
$32,000	0.985	0.825

One implication of this model is that $1 of incremental capital that just earns the cost of capital (that is, leaves EVA unchanged), creates more than $1 of market value for companies with less than $10.7 billion in capital. This is inconsistent, of course, with discounted cash flow valuation if we assume that EVA remains unchanged in the future. A more consistent interpretation is that investors believe capital growth is positively correlated with future EVA improvement up to the point where the derivative falls to $1.00 (for example, $10.7 billion in the all-industry model), but negatively correlated

In many situations involving management performance evaluation and incentive compensation, we will want to use market value to establish investor expectations of future operating performance. We will want to know what level of EVA improvement management needs to provide investors with a "normal" return on the current market value of their investment.

with future EVA improvement above that point. The cross-over point represents investors' perceptions of where diseconomies of scale begin to take hold, and varies dramatically across industries. For example, the cross-over point for discount and fashion retailing is more than $200 billion, while the cross-over point for apparel manufacture is less than $4 billion.

CONCLUSION

EVA, unlike NOPAT or other earnings measures like net income or earnings per share, is systematically linked to market value. It should provide a better predictor of market value than other measures of operating performance. And, as we have shown, it does provide a better predictor once we understand and adjust for two critical relationships between EVA and market value.

First, investors capitalize positive EVA at much higher multiples than negative EVA. Positive EVA is a sign of future EVA improvement because a growing company can create EVA improvement simply by maintaining its current rate of return. Negative EVA reduces market value, but by significantly less than if such substandard performance were expected to continue forever. Lower multiples on negative EVA imply that the market expects a turnaround, whether engineered internally or through some external corrective force.

Second, capital multiples decline with size. The implicit message from the market here is that size eventually brings with it diseconomies of scale. Big companies that don't generate positive EVA now are less and less likely (as they get bigger) to generate any EVA improvement in the future.

EVA improvement provides a powerful tool for understanding the investor expectations that are built into a company's current stock price. Expected EVA improvement—that is, the increase in future EVA that is necessary to provide investors with a normal return on the company's shares—is important not only for securities analysts in evaluating stocks, but also for corporate compensation committees in setting performance standards for management incentive compensation plans.

■ STEPHEN O'BYRNE

is Senior Vice President and head of Stern Stewart & Co.'s executive compensation advisory practice.