EVA AND ITS CRITICS

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The basic objective of EVA is to create an operating measure of periodic performance that is consistent with discounted cash flow (DCF) valuation and highly correlated with current market value. Accounting earnings cannot be used to calculate the DCF value of a company because accounting earnings don't recognize the cost of equity capital. EVA differs from accounting earnings because it recognizes the cost of both debt and equity capital; hence, it can be used to calculate the DCF value of a company. Free cash flow (FCF) can also be used to calculate the DCF value of a company, but FCF is poorly correlated with current market value because it fails to match investment outlays with the future periods they benefit. EVA differs from free cash flow because EVA permits the recognition of expenditures to be deferred to the future periods they benefit and, hence, is more highly correlated with current market value.

EVA differs from FCF by substituting for the actual investment in the year a capital charge based on book capital:

$$\text{FCF} = \text{NOPAT} - \Delta\text{capital}$$
$$\text{EVA} = \text{NOPAT} - c * \text{capital}$$

NOPAT is Net Operating Profit After Tax, or operating profit minus the taxes that would be payable without any deduction for interest expense. NOPAT, unlike net income, has no charge for interest expense or any other financing cost because it is designed to separate operating performance from the method of financing. FCF can be expressed in terms of NOPAT without adding back depreciation because investment, Δcapital, is net of depreciation. EVA can be used for DCF valuation because the total expense recognized under EVA—depreciation and capital charge—is always equal, in present value, to the initial cash outlay regardless of the depreciation schedule.[1] Since EVA recognizes the same investment cost as FCF, but also charges for beginning book capital (which has no impact on FCF), the DCF value of the company can be expressed in terms of EVA and beginning book capital:

$$\begin{aligned}\text{Enterprise value} &= \text{PV of future FCF} \\ &= \text{Capital}_0 + \text{PV of future EVA}\end{aligned}$$

EVA defers the recognition of expenditures through the capitalization process. A capitalized expenditure is not charged against EVA in the year in which it is made, only in the years in which depreciation and/or a capital charge is recognized.

THE FINDINGS OF BIDDLE, BOWEN, AND WALLACE

In a recent study published in the *Journal of Accounting and Economics* (and as reported in their article in this issue), Gary Biddle, Robert Bowen, and James Wallace find that earnings explain more of the variation in shareholder returns and in market value levels than EVA.[2] They also find that the EVA capital charge has only a small impact on shareholder return, much smaller than the theory might lead us to expect. In the case of one-year returns, the capital charge is statistically significant at the 5% confidence level, but not at the 1% level; and $3.77 of capital charge could replace $1 of cash operating expense without reducing one-year shareholder return (whereas the EVA model would lead us to expect each $1 of capital charge to have the same effect as $1 of operating expense). For five-year returns, the capital charge is not significant at the 5% level, and $24.18 of capital charge could replace $1 of cash operating expense without reducing five-year shareholder return. But, in interpreting these findings, Biddle, Bowen, and Wallace (henceforth "BBW") don't conclude from their analysis that investors don't care about capital costs. Indeed, they profess their continued belief that "equity valuation is ultimately the discounted present value of future equity cash flows (or dividends or RI or

1. See my working paper, "Does Value Based Management Discourage Investment in Intangibles?," presented at the 2nd Intangibles Conference, New York University (1999).

2. Gary C. Biddle, Robert M. Bowen and James S. Wallace, "Does EVA Beat Earnings? Evidence on Asssociations with Stock Returns and Firm Values," *Journal of Accounting and Economics*, Vol. 24 (1998).

EVA)." How do they reconcile this apparent contradiction? By concluding that "earnings are a better predictor of future EVA than EVA itself."

In their article in this issue, BBW also present the findings of a study by Wallace of companies adopting EVA and other residual income incentive plans. That study shows that such companies reduced their new investment by 21% relative to a control group of companies while also increasing residual income by $190 million a year.[3] BBW conclude from Wallace's study that "the adoption of residual income incentives alters management decisions in ways that should contribute to shareholder wealth." At the same time, however, they caution that it is difficult to know whether a "reduction in net investment is a value-increasing action since it is possible that managers are reducing positive-NPV projects." Moreover, they also conclude that "it is possible for a metric to be quite useful for internal incentive purposes even though it conveys little if any news to market participants regarding the firm's future prospects."

The conclusions of BBW thus present something of a puzzle. On one hand, they find that capital costs are insignificant in explaining returns and that earnings is better than EVA in explaining returns and market value levels. On the other hand, they say that adoption of EVA incentives changes management's behavior in ways that lead to reduced investment and increased residual income. While BBW acknowledge that capital costs ultimately matter, their research shows that capital costs don't matter within a five-year time frame.

But, in my experience, very few incentive plans run more than five years before being scrapped or "recalibrated." If earnings over the life of the incentive plan are a better predictor of future EVA than EVA itself, why shouldn't managers focus on earnings? If capital costs over the life of the incentive plan don't matter, why should managers be provided incentives to reduce investment and increase EVA instead of earnings?

SOME PROBLEMS WITH BBW's ANALYSIS

Biddle, Bowen, and Wallace conclude from their findings that current capital costs don't matter. But, a closer look at their analysis shows that current capital costs *do* matter. Their case against EVA is not persuasive for three reasons:

- BBW's regression analysis shows that investors put great weight on the cost of *debt*, while apparently ignoring the cost of equity. Their earnings variable is not a pure earnings measure that excludes all financing costs, but rather a hybrid earnings measure that includes interest costs, but not equity capital costs.
- In their analysis of market value levels, the explanatory power they attribute to NOPAT is really attributable to NOPAT *and* capital—and thus their earnings model is really an EVA model in disguise.
- The ability of EVA to explain shareholder returns depends upon the accuracy of their model of *expected* EVA performance, and they make no attempt to derive a model of expected EVA improvement from the EVA valuation equation.

THE COST OF DEBT MATTERS

BBW find that earnings (before extraordinary items) explain 13% of the variation in annual shareholder return vs. 6% for EVA (when separate variables are used for positive and negative values). To explain why EVA has less explanatory power, they break EVA down into the following pieces:

EVA = CFO + Accrual + ATInt – CapChg + AcctAdj

"CFO" is cash flow from operations, based on FASB 95 (after 1987) as reported by Compustat. "CFO" starts with net income and then (1) adds back non-cash operating expenses (such as depreciation and amortization and deferred taxes) and subtracts non-cash operating revenue; (2) adds back non-operating losses (such as equity in subsidiary losses and losses on the sale of property and investments) and subtracts non-operating gains; and (3) subtracts the increase in current net operating assets (that is, accounts receivable and inventory less payables and accrued liabilities). "Accrual" represents all the accruals that are needed to reverse the CFO adjustments and get back to net income before extraordinary items. "ATInt" is after-tax interest expense. "CapChg" is a charge for debt and equity capital based on GAAP book capital and Stern Stewart's weighted average cost of capital estimate. "AcctAdj"

3. James S. Wallace, "Adopting Residual-Income-Based Compensation Plans: Do You Get What You Pay For?," *Journal of Accounting & Economics*, Vol. 24, No. 3 (December 1997).

is the net effect of Stern Stewart accounting adjustments to GAAP. For R&D, for example, AcctAdj includes the effect of capitalizing R&D on NOPAT as well as its effect on the capital charge.

The independent variables in their regressions on returns are the current and prior-period values of each of the five EVA components. The prior-period values are used as a proxy for investor expectations so that the combination of the current and prior-period values gives a measure of the unexpected value of the EVA component. The table below shows the coefficients for the regression on five-year returns, where the variables are five-year sums:

Variable	Coefficient	Predicted Sign
Constant	-.373	
CFO—Current	2.128	+
CFO—Prior	–.731	–
Accrual—Current	1.659	+
Accrual—Prior	–.072	–
AT Interest—Current	–.509	–
AT Interest—Prior	.089	+
Capital Charge—Current	–.088	–
Capital Charge—Prior	.275	+
Acct Adj—Current	.549	+
Acct Adj—Prior	.487	–

The coefficients tell us that an additional dollar of cash flow from operations adds $2.128 to the five-year return, while an additional dollar of capital charge subtracts only $.088 from the five-year return. This implies that $24 of capital charge (or $2.128/$.088) is needed to offset the economic benefit of $1 of cash flow from operations. This suggests that investors are virtually indifferent to capital costs and is a very far cry from EVA, which says that $1 of capital charge offsets the economic benefit of $1 of earnings.

Is it possible that investors care so little about capital costs when DCF valuation principles tell us that they must matter? A more careful look at the regression coefficients shows that capital costs matter a good deal more than the capital charge coefficient suggests. The regression obscures the impact of capital costs because it does not fully separate financing and operating performance. Cash flow from operations includes after-tax interest expense. This means that current period after-tax interest expense appears in the regression three times: as a negative component of cash flow from operations; as a positive component of the capital charge; and as a separate independent variable. This implies that the aggregate coefficent on current period after-tax interest expense is –2.735 (= -2.128 + –.509 + –.088). This, in turn, has two very puzzling implications. First, it implies that $1.29 (= $2.735/2.128) of positive cash flow from operations is needed to offset the economic cost of $1 of after-tax interest expense. Since after-tax interest expense is computed using the statutory corporate tax rate, one explanation for this odd differential is that the effective tax saving is less than the statutory rate. Second, and much more puzzling, it implies that $1 of after-tax interest expense has the same economic cost as $31 (= 2.735/.088) of equity capital cost.

This is a very odd result—one that suggests that equity capital is basically free. BBW may have overlooked the issues raised by after-tax interest expense because they expected the "AT Int" variable to have a negative sign. It should have a positive sign in the regression, just as it does in the EVA components equation, since after-tax interest expense is adding back the expense buried in cash flow from operations.

MARKET VALUES DEPEND ON NOPAT *AND* CAPITAL

Cash flow from operations is an operating performance measure that is "contaminated" by financing costs. For this reason, its use in the regression does not help us understand how investors recognize the capital costs of operating earnings. A similar contamination occurs in BBW's discussion of market value level models, which is a response to my finding (in a 1996 article in this journal) that EVA explains more of the variation of the market value levels than NOPAT.[4]

In my 1996 study, I analyzed the relationship between operating performance and market value for the years 1985-1993 for companies in the 1993 Stern Stewart Performance 1000 database. More specifically, the study compared the explanatory power of three measures of operating performance: free cash flow (FCF), net operating profit after tax (NOPAT), and EVA. My results, which were based on

4. Stephen F. O'Byrne, "EVA and Market Value," *Journal of Applied Corporate Finance*, Vol. 9, No. 1 (Spring 1996).

The attempt by BBW to "level the playing field" effectively makes the NOPAT model into a *NOPAT and capital* model. Thus, it is really an EVA model in disguise, and so provides no insight into the explanatory power of information of NOPAT alone.

a sample of 6,551 company/years and expressed in terms of the variance explained in the market/capital ratio, are summarized in the following table.

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

My study showed that a simple EVA regression model explains less variance than a standard NOPAT regression with a non-zero constant term (31% vs. 33%), but that EVA explains more variance than NOPAT when the NOPAT model is truly a "NOPAT only" model—that is, *when the model has a zero intercept.* I also show that the explanatory power of the EVA model can be improved by using separate variables for positive and negative EVA and by adding a ln(capital) term to the regression that reflects declining valuations as companies get bigger. BBW argue that such adjustments effectively tilt the playing field toward EVA; and that when they run the NOPAT regression with (1) a non-zero intercept, (2) separate variables for positive and negative NOPAT and (3) a ln(capital) term, then NOPAT has more explanatory power than a similar EVA regression. On this "level playing field," they conclude, NOPAT is better than EVA.

The problem with this argument, however, is that it misses a very fundamental point: This attempt by BBW to "level the playing field" effectively makes the NOPAT model into a *NOPAT and capital* model. Thus, it is really an EVA model in disguise, and so provides no insight into the explanatory power of information of NOPAT alone.

To show why this is really an EVA model requires just a bit of very basic algebra. Begin by noting that, in my 1996 study, the regression equation for the NOPAT model with a non-zero intercept was:

Market Value/Capital = 0.808 + 9.878 * NOPAT/Capital

When we multiply both sides of this equation by Capital, the predicted market value is equal to:

Market Value = 0.808 * Capital + 9.878 * NOPAT

This expression shows that the predicted market value depends on NOPAT *and* capital, not just on NOPAT. We can also show that the NOPAT and capital model can be re-written as an EVA model. If we add and subtract (1 – 0.808) * Capital = 0.192 * Capital on the right side of the equation, the equation becomes:

Market Value=1.0*Capital + 9.878*NOPAT – 0.192*Capital
Market Value = 1.0*Capital + 9.878*(NOPAT – 0.0194*Capital)

The second of these two equations is an EVA model with a 1.94% capital charge on ending capital.

BBW standardize market value and NOPAT by capital to eliminate "heteroscedasticity"—that is, a size trend in the error term. But when their standardized model has a significant constant term, their NOPAT model is converted into an EVA model. To test the explanatory power of a pure NOPAT model, while controlling for heteroscedasticity, BBW need to standardize by a *different* size variable, perhaps sales, that results in an insignificant constant term.

We can create a "pure" NOPAT model that uses no information about capital by forcing the regression equation through the origin (although this equation does not control for heteroscedasticity). When we do this, the regression equation is:

Market Value/Capital = 15.557 * NOPAT/Capital, or
Market Value = 0 * Capital + 15.557 * NOPAT

This pure NOPAT model, as I reported in my 1996 study, explains only 17% of the variation in market to capital ratios vs. 33% for the NOPAT and capital model and 31% for the EVA model. This analysis thus suggests that capital adds a lot of information to NOPAT. But it also suggests that investors' implicit charge for capital is much lower than the cost of capital calculated using standard approaches, such as the Capital Asset Pricing Model with a 6% market risk premium. Another possibility, however, is that the amount of capital employed by companies is systematically understated by standard EVA accounting.[5]

5. For example, my own recent work (cited in footnote 1) suggests that acquisitions and R&D frequently involve "negative economic depreciation" that, if recognized, would result in substantially higher book capital values.

THE MODEL OF EXPECTED PERFORMANCE IS TOO SIMPLE

BBW's analyses of shareholder returns are based on excess, or market-adjusted, returns. They assume that excess returns are related to unexpected operating performance, where unexpected operating performance is the difference between the actual and the expected value of the operating performance variable. They assume that the expected value is a linear function of prior-period values of the variable and limit the prior-period values to the first prior period since there is "possible structural change across time." They claim that "little is known about suitable proxies for market expectations for performance measures other than earnings," but they make no effort to derive expected EVA performance from the EVA valuation equation cited earlier:

$$\text{Enterprise value} = \text{Capital}_0 + \text{PV of future EVA}$$

We can use this EVA valuation equation to show that a cost-of-capital return on market value requires EVA improvement that satisfies the equation:

$$\Delta EVA_1 + \Delta EVA_1/c + \Delta FGV_1 = c * FGV_0$$

where FGV is "future growth value."[6] Future growth value is the present value of expected EVA improvement. Future growth value is derived from the EVA valuation equation as follows:

$$\begin{aligned}
\text{Market value} &= \text{Capital} + \text{PV of future EVA} \\
\text{Market value} &= \text{Capital} + EVA_0/c + (1 + c)/c * PV(\Delta EVA_i) \\
\text{Market value} &= \text{Current Operations Value} + (1 + c)/c * PV(\Delta EVA_i) \\
\text{Market value} &= \text{Current Operations Value} + \text{Future Growth Value}
\end{aligned}$$

While current operations value can be expressed in terms of NOPAT (i.e., $NOPAT_0/c + \Delta Capital_0$), neither the future growth value nor the conditions of a cost-of-capital return on market value can be expressed in terms of NOPAT. They can be expressed only in terms of EVA.

A model of ΔFGV tells us expected EVA performance. If investors simply project ΔEVA_0 in perpetuity, expected ΔFGV_1 is zero and expected EVA improvement is equal to $(c^2/(1 + c)) * FGV_0$. The excess in year one depends on $\Delta EVA_1 - \Delta EVA_0$ (which is equal to $EVA_1 - 2 * EVA_0 + EVA_{-1}$). But even this simple model, which depends on two lagged terms of EVA, is more complex than the one-lag model used by BBW.

A good model of expected performance is vital to understanding the market's valuation of operating performance—and BBW's best model explains only 13% of the variation in one-year returns. My own empirical research shows that ΔFGV, and hence expected EVA improvement, depends significantly on revenue growth and R&D investment, among other factors. Developing accurate models of future growth value and expected EVA improvement is not an easy task, but it is an essential one if we are to fairly evaluate the explanatory power of EVA.

UNANSWERED QUESTIONS?

Although Biddle, Bowen, and Wallace fail to make a persuasive case that investors are indifferent to current capital costs, their work does raise several very important issues for future research: How do investors recognize the cost of equity capital? Why is it so difficult to demonstrate the significance of the equity capital charge? Is the market risk premium used in estimating the cost of equity too high? Are income and capital understated by not recognizing negative economic depreciation in R&D and acquisitions? What is an appropriate model of future growth value?

6. For a detailed presentation of this future growth model, see Mark Sirower and Stephen O'Byrne, "The Measurement of Post-Acquisition Performance," *Journal of Applied Corporate Finance*, Vol. 11 No. 2 (Summer 1998).

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