Foundations of EVA™ for Investment Managers

Just in time, EVA!

James L. Grant

CS First Boston's landmark 1996 "Economic Value Added Conference" may permanently alter the way investment managers assess real corporate profitability. Since EVA™ emphasizes the difference between the firm's after-tax operating profit and the (total) dollar cost of capital, this financial measure may offer investment managers new insight on the joint pricing mechanism for risky bonds and stocks.

In preparation for this analytical change, this study provides investment professionals with a general framework for understanding the conceptual and empirical linkages between EVA™ and corporate valuation. Money managers can then use this financial technology to create a measure of economic value-added for their investment clientele.[1]

EVA AND CORPORATE VALUATION: BACKGROUND

EVA was hatched by Stern Stewart during the 1980s as a measure of corporate financial success. Termed EVA, for "economic value added," this financial metric looks at the firm's residual profitability over and above the debt and equity costs of the capital employed in the business.

A firm's EVA is positive when the company's after-tax operating profits exceed the dollar cost of capital. In this instance, the firm's managers add wealth to the shareholders because the post-tax rate of return on

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invested capital exceeds the weighted-average cost of capital. When EVA is negative, the firm's managers destroy market value by investing in capital projects that fall short of the returns required by both debt and equity securityholders.

To date, EVA has proven to be a valuable analytical tool for corporate managers. Large firms like AT&T, CSX, Coca-Cola, and Quaker Oats are using EVA to assess whether divisional managers are truly generating economic profits for the shareholders. Compensation schemes at these firms are based on the ability of managers to generate positive EVA within their respective operating divisions.

According to Stern Stewart, this modern approach to measuring corporate manager success contrasts sharply with the traditional way, in which incentive payments are based on a manager's ability to beat budgeted increases in sales and net profits, in the absence of a formal mechanism for determining whether such growth activities provide adequate returns to the firm's shareholders.

EVA is gaining popularity in the investment community. Securities analysts can use this profit measure to identify firms that are creating real wealth for shareholders. Companies with positive EVA momentum should see their stock prices go up over time as increasing profits net of overall capital costs lead to a rise in the firm's "market value added (MVA)." Firms with returns on invested capital that fall below the weighted-average cost of capital, by contrast, should see share price declines, as the adverse EVA outlook lowers the intrinsic (present) value of the firm. By incorporating EVA analysis into the security evaluation process, securities analysts may enhance the pricing accuracy of their research recommendations.

EVA may also offer a powerful synergy for investment firms with research departments segmented traditionally by bond and equity functions. Since it can be shown that the firm's market value-added (MVA) is equal to the present value of the anticipated future EVA, any perceived changes in this profitability measure will impact all the firm's outstanding securities.

Favorable (negative) changes in EVA will increase (decrease) stock prices as the equityholders' residual claim goes up (down), while debtholders should experience capital gains (losses) on their securities through credit upgrades (downgrades) on the firm's bonds. When they focus research efforts jointly on EVA, bond and equity analysts may see investment trends that might otherwise go unnoticed using traditional security evaluation techniques.

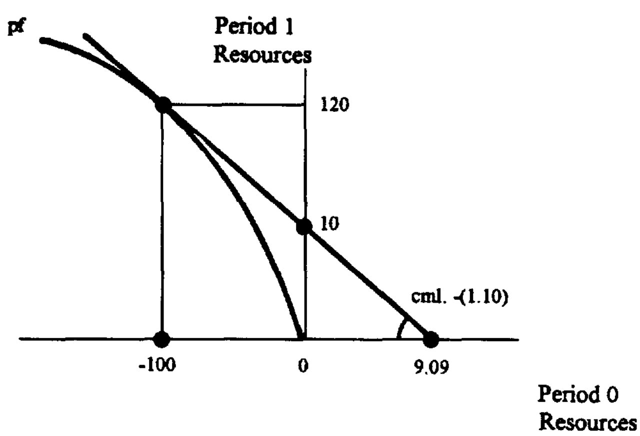
Moreover, EVA offers some valuable insights for portfolio managers. It can be used to design enhanced value- and growth-oriented investment strategies. The "value portfolio" might consist of the low-price relative, high-yield stocks of firms having positive EVA momentum (energy, financials, and industrial cyclicals, for example), while the EVA "growth style" might consist of the high-price relative stocks of companies (like technology) with abnormal EVA growth rates. These portfolio strategies could include the securities of U.S. medium- and small-capitalization firms. Portfolio managers could also use EVA concepts to build portfolios of bonds and stocks that may outperform similar risk-indexed (passive) strategies.[2]

EVA AND CORPORATE VALUATION: THE CLASSIC NET PRESENT VALUE MODEL

The corporate valuation importance of EVA for investment managers can be illustrated using a simple two-period NPV model. Suppose that NSF Corporation (new start-up firm) has the opportunity to borrow and invest $100 million in real assets at time period 0 (now). The firm's managers expect that this investment will generate a one-time cash flow of $120 million at period 1 (the future).

Exhibit 1 illustrates the expected cash flow and wealth implications of NSF's investment opportunity.[3] NSF's investment opportunity set is represented by the

EXHIBIT 1
NSF'S INVESTMENT OPPORTUNITY



curve labeled pf (for production frontier). The curve shows that by investing $100 million today the firm expects to generate $120 million in the future.

The gross present value of NSF's investment opportunity is found by dividing the expected cash flow, CF(1), by the slope of the capital market line (1 + r). With a cost of capital (r) at 10%, the gross present value of NSF's investment decision is $109.09 million ($120/1.1). This gross present value figure represents the market value of the firm at time period 0.

The net present value of NSF's investment opportunity can be determined in the conventional way. At $9.09 million, the market value-added for NSF's (initial) shareholders is obtained by subtracting the firm's total investment cost, at $100 million, from the $109.09 million in estimated gross present value:

$$\begin{aligned} NPV(0) &= GPV(0) - \text{Investment Cost} \\ &= \$CF(1)/(1 + r) - I \\ &= \$109.09 - \$100 = \$9.09 \text{ million} \end{aligned}$$

Thus, Exhibit 1 shows that, by efficiently using their productive ideas, the managers (founders) of NSF Corporation have increased the market value of the firm's (initial) shares from zero to the current maximum level of $9.09 million.

EVA AND CORPORATE VALUATION: THE TWO-PERIOD PRESENT VALUE LINKAGE

A closer look at Exhibit 1 shows that NSF's market value-added can be expressed in another informative way. Specifically, NSF's net present value can also be viewed as the present value of the firm's expected EVA. This financial result occurs because EVA is the "residual (or surplus) income" that is left after subtracting the total dollar cost of capital from the firm's expected future cash flow.

In Exhibit 1, NSF's expected EVA is $10 million. This figure results from subtracting next period's capital costs, at $110 million ($100 × 1.1), from the total expected cash flow generated by the firm's current investment opportunity. At $9.09 million, the market value-added (MVA) from NSF's $10 million of expected residual income (EVA) is obtained by dividing this future amount by the slope of the capital market line (1 + r).

$$\begin{aligned} NPV(0) &= MVA \text{ (Market Value-Added)} \\ &= \$EVA(1)/(1 + r) \\ &= \$10/(1.1) = \$9.09 \text{ million} \end{aligned}$$

It should also be apparent that NSF's expected EVA (and therefore its current MVA) is positive only if the firm's managers invest in real assets having an after-tax rate of return on capital, r^*, that exceeds the overall cost of capital, r. At 10%, this favorable "residual return on capital" $(r^* - r)$ is the underlying source of NSF's $9.09 million in market value-added:

$$\begin{aligned} NPV(0) &= \$EVA(1)/(1 + r) \\ &= \$I[r^* - r]/(1 + r) \\ &= \$100\,[0.2 - 0.1]/(1.1) \\ &= \$9.09 \end{aligned}$$

This last financial result occurs because the firm's expected EVA (in the two-period NPV model) is equal to its initial capital investment, I, times the residual (surplus) rate of return on invested capital, $(r^* - r)$.

EVA AND CORPORATE VALUATION: A SIMPLE MULTIPERIOD EXTENSION

Because of varying assumptions about the firm's investment opportunities, there are many different ways to express the formal linkage between the firm's expected EVA and its corporate valuation. A simple multiperiod approach is obtained by assuming that the firm's expected EVA is growing at some constant rate of growth (g) each year, forever.

With this simplifying convenience, the firm's market value-added can be expressed as:[4]

$$MVA = EVA(1)/(r - g)$$

where EVA(1) is the firm's current EVA outlook, r is the familiar cost of capital, and g is the assessed EVA growth rate for the (distant) future. It is, of course, understood that this constant-growth EVA model makes sense only for firms having a cost of capital, r, in excess of the long-term EVA growth rate, g.

This "Gordon-like" model indicates that if

NSF's EVA growth rate is zero, then the market value-added (MVA) from its current investment opportunity is equal to \$100 (\$10/0.1), which by coincidence happens to equal its initial capital investment. If, in contrast, the firm can engage in investment activities that increase this growth rate to, say, 2.5%, then NSF's market value-added would rise to \$133.33 million:

$$\text{MVA} = \$10/(0.1 - 0.025)$$

$$= \$133.33 \text{ million}$$

In this context, NSF's corporate managers have a clear wealth incentive to make investment decisions that enhance the firm's ability to generate EVA, both now and in the future.

EVA AND CORPORATE VALUATION: SOME EMPIRICAL EVIDENCE

The empirical connection between EVA and firm valuation can be assessed using the financial data collected by Stern Stewart & Co. to report EVA™-related information for the 1,000 largest-capitalization U.S. stocks. Some of the financial data available are:

- Economic value-added (EVA).
- Market value-added (MVA).
- Total capital (debt plus equity).
- Rate of return on capital % (r^*).
- Weighted-average cost of capital % (r).

EVA equals the firm's (yearly) after-tax operating cash flow less the dollar cost of capital, and MVA is the market value of the firm's debt and equity, less the total capital employed to support this value. Equivalently, MVA can be viewed as the firm's total economic surplus or its net present value.[5]

Exhibit 2 shows the estimated relationship between the MVA-to-capital and EVA-to-capital ratios for the Stern Stewart Performance 1000 universe at year-end 1993. The figures reveal a statistically significant relationship between the two measures of corporate financial success. With a slope coefficient at 17.14, and a t-statistic at 21.34, the EVA/capital ratio is a highly significant financial variable. The regression statistics in Exhibit 2 also reveal that 31.6% of the movement in the MVA-to-capital ratios for the U.S. large-capitalization firms at year-end 1993 is explained by the cross-sectional variations in the EVA-to-capital factor.[6]

Exhibit 3 reveals the source of the positive relationship between the EVA and MVA variables in the data base at year-end 1993. This exhibit looks at the statistical importance of variations in both the cost of capital, r , and the residual return on capital, ($r^* - r$), for corporate financial success. As expected, Exhibit 3 shows that the size of the difference between a firm's after-tax rate of return on capital, r^*, and its cost of capital, r, has a significant impact on its fundamental ability to generate economic value-added for the shareholders.

With a slope measure at 0.17, and a t-statistic at 22.09, the residual return on capital factor (r^* less r) has a highly significant impact on the MVA-to-capital ratios of the large firms followed. Taken together, the empirical findings in Exhibits 2 and 3 indicate that "good firms" do, in fact, have "good (stock) values," because their after-tax rate of return on capital (r^*) is more than sufficient to cover the total capital costs.

It is also interesting to see that the cost of capital factor (r) shown in Exhibit 3 has a significant positive impact on the firm's market value-added. With a slope measure at 0.34, and a t-statistic at 7.74, the cost of capital factor is helpful in understanding the cross-sectional variation in the MVA-to-capital ratios for the U.S. large-capitalization firms. This finding may be due, in part, to an underlying positive relationship between the firm's cost of capital, r, and its after-tax return on capital, r^*. That is, high-returning, but also

EXHIBIT 2
Regression Statistics for Performance Universe at Year-End 1993

$$\text{MVA/Capital} = \underset{(16.30)}{1.80} + \underset{(21.34)}{17.14}\ \text{EVA/Capital} \quad \text{(t-value)}$$

Adjusted R^2 = 31.6%
N = 983 Firms

EXHIBIT 3
Multiple Regression Statistics for Performance Universe at Year-End 1993

$$\text{MVA/Capital} = \underset{(-3.85)}{-1.86} + \underset{(7.74)}{0.338}\ r + \underset{(22.09)}{0.172}\ [r^* - r] \quad \text{(t-value)}$$

Adjusted R^2 = 37.4%
N = 983 Firms

more volatile, firms and industries (technology, for example) have a relatively high required rate of return.

EVA AND CORPORATE VALUATION: FIFTY LARGEST U.S. "WEALTH CREATORS" AT YEAR-END 1993

Given these average cross-sectional findings, it is interesting to assess the strength of the MVA and EVA relationship for major wealth creators. Exhibit 4 shows the relationship between the MVA-to-capital and EVA-to-capital ratios for the fifty largest U.S. "wealth creators" at year-end 1993.

The graph indicates a strong linear relationship between the twin measures of economic value-added for the top-performing U.S. large-capitalization firms. When the EVA-to-capital ratio is large and positive, the corresponding MVA-to-capital ratio is also high and positive in value. Likewise, when the EVA-to-capital ratio is low and negative for these firms, the corresponding MVA-to-capital ratio is also low.[7]

A closer look at Exhibit 4 shows that thirty of the fifty largest U.S. wealth creators have both positive EVA- and MVA-to-capital ratios. This finding indicates that the firm's most recently announced EVA makes a positive contribution to the firm's overall corporate valuation, as measured empirically by its MVA-to-capital ratio.

This positive EVA momentum is clearly "good news," as it conveys windfall capital gains to the firm's shareholders. Additionally, that twenty out of fifty U.S. wealth creators have positive MVA-to-capital ratios in the presence of currently negative EVA/capital ratios shows that future growth opportunities play a doubly meaningful role in the valuation of these firms.

The visual observations are reinforced in the regression results shown in Exhibit 5. With a slope coefficient at 36.14, and a t-statistic at 15.59, the EVA-to-capital ratio for the fifty largest wealth creators is a highly significant financial variable. Moreover, cross-sectional regression statistics now reveal that 83% of the movement in the MVA-to-capital ratio for top-performing large firms is explained by variations in the EVA-to-capital factor.

Exhibit 6 reveals the source of the positive relationship between the MVA and EVA measures shown in Exhibit 5. The exhibit shows a comparison of the after-tax return on capital (r^*) and the cost of capital (r)

EXHIBIT 5
Regression Statistics for Fifty Largest U.S. Wealth Creators at Year-End 1993

MVA/Capital = 0.71 + 36.14 EVA/Capital
(t-value) (1.85) (15.59)

Adjusted R^2 = 83.2%
N = 50 Firms

EXHIBIT 4
MVA VERSUS EVA: FIFTY LARGEST U.S. WEALTH CREATORS AT YEAR-END 1993

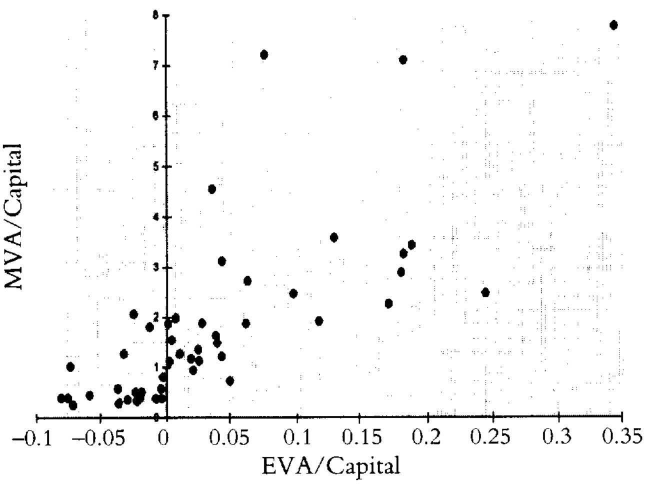
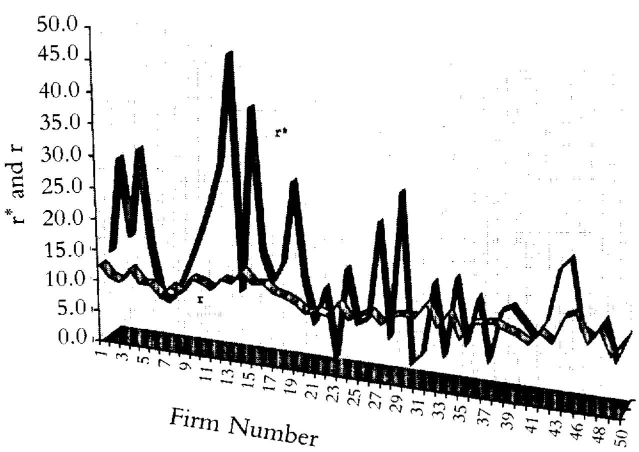


EXHIBIT 6
RETURN ON CAPITAL VERSUS COST OF CAPITAL: FIFTY LARGEST U.S. WEALTH CREATORS AT YEAR-END 1993



for the same firms at year-end 1993. As expected, Exhibit 6 reveals that wealth-creating firms have positive economic value-added because their rate of return on invested capital, r^*, exceeds the weighted-average cost of capital, r.

The large positive differences in these financial rates (r^* and r), like those observed for Microsoft and Intel (firm numbers 13 and 15), lead to large positive EVA-to-capital ratios. In turn, the large EVA-to-capital ratios, like those observed more generally in Exhibit 4, generate sizable improvements in the firm's overall corporate valuation. These empirical findings are consistent with the predictions of the NPV model, and are largely due to the fact that EVA is positive when the firm's "residual return on capital" (r^* minus r) is greater than zero.[8]

EVA AND CORPORATE VALUATION: FIFTY LARGEST U.S. WEALTH DESTROYERS AT YEAR-END 1993

It is also interesting to assess the MVA and EVA characteristics of firms that have (in retrospect) wasted economic wealth. Exhibit 7 graphs the MVA-to-capital and EVA-to-capital ratios for the fifty largest U.S. "wealth destroyers" at year-end 1993. This exhibit reports consistently negative MVA-to-capital ratios in the presence of currently adverse EVA performance. That is, forty-seven out of the fifty paired MVA- and EVA-to-capital ratios occur at negative points in this exhibit.

This finding for large U.S. wealth destroyers is important because it suggests that a currently adverse EVA outlook may have negative information content about the firm's future growth opportunities. If this conclusion is correct, then the source of this adverse impact on corporate valuation must in some sense be due to shareholders' assessment of a negative residual return on capital. That is, the after-tax rate of return on capital (r^*) falls short of the weighted-average cost of capital (r) for wealth-destroying firms.

Exhibit 8 sheds some light on this financial issue by showing the relationship between the after-tax return on capital and the cost of capital for the same fifty firms at year-end 1993. As expected, the negative EVA-to-capital ratios in Exhibit 7 are caused by negative residual returns on capital (that is, r^* minus r is less than zero). In turn, these abnormal return announcements have negative wealth consequences for investors because they reduce the present value assessment of the firm's future growth opportunities.[9]

INVESTMENT IMPLICATIONS OF THE EVA FINDINGS

This study provides a foundation for understanding the conceptual and empirical linkages between EVA and corporate valuation. The classic net present value model shows that the firm's market

EXHIBIT 7
MVA VERSUS EVA: FIFTY LARGEST U.S. WEALTH DESTROYERS AT YEAR-END 1993

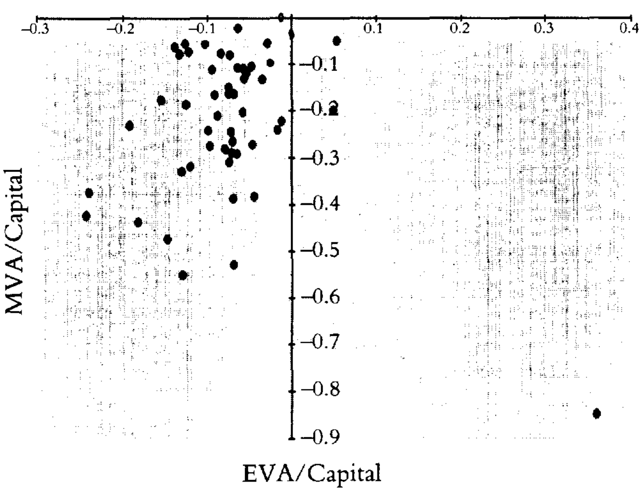
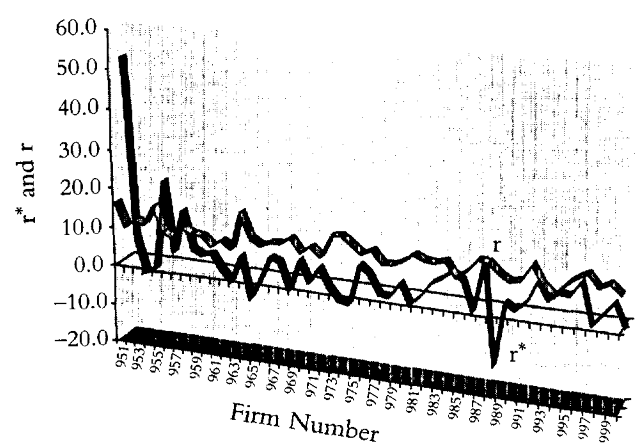


EXHIBIT 8
RETURN ON CAPITAL VERSUS COST OF CAPITAL: FIFTY LARGEST U.S. WEALTH DESTROYERS AT YEAR-END 1993



value-added (MVA) is equal to the present value of its expected future EVA, when discounted back to the current period using the weighted-average cost of capital. The investment model also demonstrates that firm values change in response to variations in both the firm's near-term EVA outlook and movements in the long-term EVA growth rate. Moreover, the NPV model suggests that fluctuations in EVA have a direct impact on the intrinsic value of the firm's outstanding debt and equity securities.

The empirical research indicates that EVA has a significant impact on the firm's market value-added (MVA). Variations in the EVA-to-capital ratios for firms listed in the Stern Stewart Performance 1000 Universe at year-end 1993 account for about 32% of the movement in the MVA-to-capital ratios for the U.S. large-capitalization firms. The percentage of MVA variation explained (R^2) is 83% for the fifty largest U.S. wealth creators at year-end 1993.

The research indicates that the source of this EVA-induced wealth effect is that firms have a positive residual return on capital. Their after-tax return on invested capital exceeds the weighted-average cost of capital.

It would be interesting to assess the explanatory power of EVA on corporate valuation from both a time series perspective and over a larger universe of firms. Expanded EVA research could include the stocks of medium- and small-capitalization firms as well as international securities. It would also be interesting to assess proportionate valuation impacts on the stocks and bonds of firms having positive (and negative) EVA momentum.

ENDNOTES

The author has benefited from helpful discussions with John Stahr at Fidelity Investments and Al Ehrbar at Stern Stewart Management Services in New York. He is also grateful to Stern Stewart for supplying the Performance 1000 diskette used in the empirical analysis.

[1]EVA™ is a registered trademark of Stern Stewart Management Services. This financial metric is the practitioner's tool for estimating the firm's "economic value added." Stern Stewart refers to the present value equivalent of this profit measure as the firm's "market value added (MVA)."

[2]An EVA "value style" of investing may prove to be an active way of generating positive risk-adjusted rewards. This inference is drawn from the long-term empirical findings of Fama and French [1992] and the more recent findings of Grant [1995], which jointly suggest that "value wins."

[3]Brealey and Myers [1991, pp. 16-23] provide additional basic insights on the two-period NPV model. A more advanced treatment of the financial implications of this classic investment model is in Fama and Miller [1972, pp. 69-98].

[4]Jackson, Mauboussin, and Wolf [1996] present an informative two-stage EVA growth example (near-term growth, followed by zero growth) to show that the free cash flow and EVA approaches to corporate valuation are equivalent.

For a theoretical framework on EVA and corporate valuation, see Fama and Miller [1972, pp. 89-92]. Since the term, $I(t)[r^*(t) - r]$, is also the firm's expected EVA at period $(t + 1)$, it is apparent that EVA is directly related to the present value of the firm's anticipated future growth opportunities. Accordingly, the firm's expected future EVA is positive when the internal rate of return on invested capital, $r^*(t)$, at t, exceeds the overall cost of capital, r.

[5]The Stern Stewart EVA and MVA figures at year-end 1993 are used directly in the empirical investigation. In view of the model described by Fama and Miller [1972, pp. 89-92], this implies that any *contemporaneous* association between these financial measures will be a reflection of 1) the unanticipated change at year-end 1993 in the firm's operating cash flow generated by the firm's existing assets, 2) any surprise changes in the market's assessment of the firm's future after-tax return on capital, $r^*(t)$, and 3) any unanticipated changes in the firm's weighted-average cost of capital, r.

This view that changes in the firm's cost of capital may impact its overall corporate valuation should not be interpreted to mean that debt policy matters. Indeed, as Bernstein [1991, p. 1] points out, "the cost of capital depends far more on the quality of corporate earning power than on the structure of paper [debt and equity] claims."

[6]Instead of 1,000 firms, 983 are used in estimation of the regression statistics reported in Exhibits 2 and 3, because 17 firms did not have any listed EVA figures at year-end 1993 in the Stern Stewart Performance 1000 universe. In an attempt to adjust for firm size, the MVA- and EVA-to-capital ratios are used in the empirical analysis. With a slope measure at 2.52, and a t-statistic at 8.65, the dollar level of EVA at year-end 1993 has a significant impact on the firm's unadjusted MVA (although R^2 is only 7%).

[7]Cisco Systems, Inc., with paired EVA- (x-variable) and MVA-to-capital (y-variable) ratios at year-end 1993 of 0.9595 and 44.017, respectively, is eliminated as a large positive outlier in Exhibit 4. The financial impact of Cisco Systems is, however, included in the reported regression results for the fifty largest U.S. wealth creators at year-end 1993.

[8]With a slope coefficient at 0.35, and a t-statistic at 12.22, the residual return on capital factor, $(r^* - r)$, has a highly significant positive impact on the MVA/capital ratios for large U.S. wealth creators. This significant finding also seems robust in years other than 1993. (The slight) variability in the cost of capital factor among large U.S. wealth creators shown in Exhibit 6 offers no real independent help in assessing why these firms generate market value-added for the shareholders.

[9]At 2.7%, the adjusted R^2 value is close to zero in the MVA-to-capital and EVA-to-capital regression for the fifty largest U.S. wealth destroyers at year-end 1993. This finding suggests that investors largely value firms that create economic value-added, rather than those firms that destroy it. This low R^2 value may also suggest that troubled firms are plagued by an abundance of managerial "noise."

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