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Incentives and Investor Expectations

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In their new book entitled *Outperform with Expectations-Based Management* (John Wiley, 2005), Tom Copeland and Aaron Dolgoff argue that conventional approaches to value-based management are flawed because they fail to take account of investor expectations about future performance. Copeland and Dolgoff (henceforth C&D) propose an annual measure of performance called "EBM" that is equal to "the difference between actual and expected economic profit (EP) or EVA®." They argue that EBM is a superior measure of performance because changes in earnings expectations explain far more of the variation in shareholder returns than any other measure, including EVA and EPS. They propose a corporate incentive plan based on total shareholder return versus peers, but offer no specific design for an incentive plan based on EBM.

In this article, we argue that EBM is not a new measure, but essentially the same measure that many EVA companies have used for years as the basis for internal performance evaluation and incentive compensation.[1] We describe a widely used EVA bonus plan design that gives managers a fixed percentage interest in "excess ΔEVA"—that is, the change in EVA in excess of the expected improvement in EVA that is reflected in the company's current share price. We close by discussing our approach for dealing with a problem that confronts all single-period economic profit performance measurement systems—how to provide an incentive to make major long-term investments, such as acquisitions, that have positive net present value but reduce economic profit in the short run.

Building Market Expectations into an Incentive Compensation Plan

The bonus plan performance measure commonly used by EVA companies is "excess EVA improvement," which is the actual increase in EVA minus the expected increase. The expected increase in EVA, or what we refer to as the Expected EVA Improvement (or "EI"), is calibrated from the stock price and represents an estimate of the increase in EVA necessary for shareholders to earn a cost-of-capital return on the market value of the stock.[2]

The bonus plan design used by EVA companies typically makes the bonus earned equal to the sum of a target bonus plus a fixed percentage of excess ΔEVA (which can be negative):

$$\text{Bonus earned} = \text{target bonus} + \% \times (\Delta EVA - EI)$$

The bonus formula includes a target bonus to ensure that the bonus earned for meeting investor expectations—that is, for achieving ΔEVA equal to EI—provides competitive compensation in the labor market. But instead of being paid out immediately, the bonus earned is then credited to a bonus "bank," and the bonus bank balance determines the bonus paid.[3] The bonus bank is a system for deferring bonus payouts that effectively serves as a clawback mechanism in the event of unsustainable performance.

Calibrating the Expected Improvement

The first major challenge in designing such an incentive system, then, is to calculate the expected improvement in EVA, or EI, that is reflected in the company's current market value. We approach this problem by recognizing that the current value of any earnings-producing company can be divided into two parts: (1) its current operations value, which can be calculated by capitalizing its current after-tax operating earnings (or what we call "NOPAT") at the inverse of the firm's weighted average cost of capital (or "WACC"); and (2) its future growth value, or "FGV," which is the spread between the expected return on new capital investment and the cost of capital multiplied by the present value of future capital investment. A company's current operations value, or "COV," can also be thought of as the value of the business "as is," without any expectation of improvement in operating margins or new capital investment. It can be expressed as follows: COV = Total Capital

1. We use the term "EVA companies" to refer to companies using EVA for performance measurement and incentive compensation. It includes, but is not limited to, present and former clients of Stern Stewart & Co.

2. This measure is the same as C&D's EBM measure, which they define as follows: $EBM_1 = EVA_1 - \text{expected } EVA_1 = EVA_1 - (EVA_0 + EI) = EVA_1 - EVA_0 - EI = \Delta EVA_1 - EI$.

3. A common payout rule is that the bonus paid is equal to the bonus bank balance, up to the amount of the target bonus, plus one-third of the bank balance in excess of the target bonus. As long as the sharing percentage and the EI schedule are fixed, the cumulative bonus earned will be equal to the cumulative target bonus plus the fixed percentage of cumulative excess ΔEVA.

+ EVA/WACC = NOPAT/WACC + ΔTotal Capital. Future growth value, or FGV, can be calculated simply by subtracting a company's COV from its current market "enterprise" value—the sum of the market values of its debt and equity.

And if we assume that a company's market enterprise value is equal to the present value of expected future free cash flow discounted at the weighted average cost of capital, then FGV can be shown to equal the capitalized present value of future annual EVA improvements:

$$FGV = (1+WACC)/WACC \times \Sigma\, PV(\Delta EVA_i)$$

FGV is the key to understanding investors' expectations. Investors want a cost-of-capital return on the market value of their investment, which in turn means that they expect a cost-of-capital return on COV and a cost-of-capital return on FGV. Since the company's NOPAT, with no EVA improvement, will provide only a cost-of-capital return on its COV, the company's return on its FGV must come from an increase in either current EVA or expected future EVA—that is, an increase in FGV. Expressed as a formula, investors will achieve a cost-of-capital return on their FGV, and thus on the market value of their investment, only if:

$$\Delta EVA/WACC + \Delta EVA + \Delta FGV = WACC \times FGV$$[4]

To solve for EI, we first need a formula that shows how changes in EVA are expected to be related to changes in FGV. For that purpose, we need to specify a coefficient α, such that $\Delta FGV = \alpha \times \Delta EVA/WACC$. We can calculate α by formula if we assume that the capital growth rate, return on capital and the cost of capital are all constant, or we can, more realistically, estimate α from a regression analysis of ΔFGV as a function of ΔEVA. Using our estimate of α, we then arrive at the following formula for EI:

$$EI = WACC \times FGV_0/[(1 + WACC + \alpha)/WACC]$$

We refer to the divisor in this formula, $(1 + WACC + \alpha)/WACC$, as the "ΔEVA multiple." The assumption of $\alpha = 0$ gives a quick "back of the envelope" calculation of EI.[5] But $\alpha = 0$ is rarely an accurate assumption since changes in EVA normally change FGV. If a company is growing at a steady rate and maintaining a constant return on capital, α will be positive. For example, α will be 1.08 for a company with a 15% return on capital (vs. an 8% cost of capital) and a 4% annual capital growth rate.[6] If a company is facing a declining capital growth rate, α will usually be negative. To provide an empirically grounded approach to determining EI, we develop a multiple regression model of historical changes in FGV and use the model to estimate both α and the expected change in FGV that is not directly related to ΔEVA.

Calibrating Management's Share of Excess ΔEVA

Having calculated a schedule of expected EVA improvements, the next step is to determine management's percentage share of the excess EVA created over and above the expected improvements. Our approach to calculating the sharing percentage starts with the basic concepts of incentive strength and retention risk. Assume, for simplicity, that the manager's compensation is limited to salary and bonus. In that case, we can express the manager's compensation as:

$$\text{Compensation} = \text{salary} + \text{target bonus} + \% \times (\Delta EVA - EI)$$
$$= \text{expected compensation} + \text{excess compensation}$$[7]

We can express salary and target bonus, the expected component of the manager's compensation, as a percentage of investors' expected return as follows:

$$\%_{expected} = (\text{salary} + \text{target bonus})/(WACC \times \text{enterprise value}).$$

And since investors' unexpected or excess return is in theory the capitalized value of the excess ΔEVA,[8] the manager's share of excess ΔEVA, which is the excess or unexpected component of compensation, can be viewed as a percentage of investors' excess return:

$$\%_{\Delta EVA} \times WACC/(1+WACC) = \%_{excess}$$

For example, if the cost of capital is 10% and the manager has a 5% share of excess ΔEVA, the manager can be viewed as having a 0.455% share of investors' excess return.

Putting together the two components of compensation, expected and excess, we get the following:

$$\text{Compensation} = \%_{expected} \times \text{expected return} + \%_{excess} \times \text{excess return}.$$

The ratio of $\%_{excess}$ to $\%_{expected}$ provides a measure of the manager's incentive to increase investor wealth.[9] If the ratio

4. For multi-year returns, the corresponding equation is:
$(1 + WACC)/WACC \times FV \text{ of } \Delta EVA + \Delta FGV = ((1 + WACC)^n - 1) \times FGV$
where $FV \text{ of } \Delta EVA = \Delta EVA_1 \times (1 + WACC)^{n-1} + \ldots + \Delta EVA_{n-1} \times (1 + WACC) + \Delta EVA_n$

5. The assumption of $\alpha = 0$ implies that every dollar of increased EVA translates into (1 + WACC)/WACC of additional COV without causing any change in FGV.

6. The formula for α, assuming that the return on capital, the cost of capital, and the capital growth rate are all constant, is $\alpha = [(1+WACC)\times g/(WACC-g)] -1$.

7. Copeland and Dolgoff use a similar decomposition of pay and show, using the *Forbes* compensation database, that the average absolute excess bonus is only 17% of expected compensation, but they don't tie the decomposition to a bonus plan design and calibration.

8. Stephen F. O'Byrne, "EVA and Shareholder Return" in *Financial Practice and Education* (Spring/Summer 1997).

9. This measure is similar, but not exactly equal, to the wealth leverage measure used in our other work.

Table 1

Variable	Capital Goods Coefficient
Constant	0.002
Beginning FGV	-0.491
Industry Average Total Shareholder Return	0.360
FV of ΔEVA/WACC	-0.414
[FV of ΔEVA/WACC] × Sales Growth Rate	0.021
R-squared	0.229
Cases	1,351

Table 2

	1992	1998
Market Enterprise Value ($mil)	13,574	29,609
Capital	5,674	11,549
EVA	233	760
WACC	12.15%	9.99%
FGV	5,983	10,445
Three Year Sales Growth Rate	2.9%	10.3%
Required Six Year Return on FGV	5,922	8,046
Baseline FGV	3,637	4,665
Required Return from FV of ΔEVA	2,285	3,380
Divided by FV of ΔEVA Multiple	6.32	9.04
= Required FV of ΔEVA ($mil)	361	374
ΔEVA Growth Assumption	2.9%	10.3%
FV Factor	8.7	9.7
First Year EI	41.6	38.4
Back of the Envelope EI	78.0	73.0

is greater than 1.0, the manager has a stronger incentive than an owner since an owner has a constant percentage interest in the total return and, hence, equal percentage interests in the expected and excess returns. If the ratio is close to zero—for example, 0.05—the manager will have a weak incentive because a doubling in investors' total return from expected to 2 × expected will increase the manager's compensation by only 5%.

If we calibrate the share of excess ΔEVA to make the ratio 1.0, the manager will have the same incentive as an owner (who holds equity and debt in proportion to the company's capital structure), but this high ratio of $\%_{excess}$ to $\%_{expected}$ will also increase the probability that the bonus earned will be negative and the manager's compensation will not exceed his or her salary. To determine the retention risk associated with a negative bonus, we need to determine the percentile performance that results in a negative bonus and the total compensation percentile provided by the manager's salary. The difference between the performance percentile and the compensation percentile provides a measure of retention risk. If 45th percentile performance results in a negative bonus, but the manager's salary provides only 20th percentile total compensation, a negative bonus will create substantial retention risk. To reduce retention risk to a tolerable level, the company has two choices: reduce $\%_{\Delta EVA}$, the manager's share of excess ΔEVA, to reduce the probability of a negative bonus; or increase salary to raise the manager's total compensation percentile when the bonus earned is negative.

The first alternative reduces the manager's incentive while the second increases the shareholders' expected compensation cost. The optimal solution depends on the expected effect of incentives on company performance.[10] If the expected shareholder wealth gain from the stronger incentive exceeds the cost of the additional salary needed to maintain tolerable retention risk, the shareholders are better off increasing salaries than reducing incentives.

An EVA Bonus Plan Calibration for Emerson Electric

We now use data for Emerson Electric in 1992 and 1998 to calibrate two hypothetical EVA bonus plans with targets tied to investor expectations. Calibrating the plan parameters at these two points in time will allow us to see the dynamics of the EVA bonus in both good times and bad. We will first calibrate EI and then the CEO's share of excess improvement. For simplicity, both calibrations rely on a regression model of ΔFGV based on peer company data for 1992-2004. In practice, of course, each calibration would rely on a model of ΔFGV based only on the peer data available at the time of calibration. Also for simplicity, we divide our data history period into two equal halves and calibrate a bonus plan for each six-year period. To illustrate the dynamics of a strong incentive, we assume no re-calibration within either of the two six-year periods.

The first step in calibrating EI for Emerson Electric is to develop an empirical model of changes in Future Growth Value. The dependent variable in our model is the change in FGV expressed as a percentage of beginning market enterprise value. The independent variables are the future value of ΔEVA/WACC, the future value of ΔEVA/WACC × the three-year sales growth rate, beginning FGV, and the total shareholder return for the company's entire industry group. All of the independent variables, except the industry group return, are standardized by beginning market enterprise value.[11] The data used in constructing the model consist of all six-year changes in FGV for the capital goods companies

10. See Stephen F. O'Byrne and S. David Young, "Top Management Incentives and Company Performance," *Journal of Applied Corporate Finance*, Winter 2005).

11. The cross product variable, FV of ΔEVA/WACC × three-year sales growth rate, is set to zero when ΔEVA is negative since our expectation is that higher growth rates will increase the value of positive EVA companies, but not have a discernible effect on the value of negative EVA companies.

in the current S&P 1500 ending in the years 1992-2004. We use six-year changes for the model because we are calibrating parameters for six-year periods.

As shown in Table 1, the coefficients of the first three variables in our model are all significantly different from zero. The coefficients tell us that FGV normally changes—and thus can be expected to change in the future—even if ΔEVA is zero. The baseline ΔFGV is expected to increase with the industry average shareholder return—that is, prosperous times in the industry lead investors to assign larger growth premiums—and decline with beginning future growth value—companies with high levels of FGV relative to enterprise value tend to move toward the average over time.

To estimate EI for Emerson Electric in 1992 and 1998, we start by calculating the expected baseline ΔFGV and the ΔEVA multiple. The expected baseline ΔFGV, as a percent of beginning market enterprise value, was 26.8% at the end of 1992 and 15.8% at the end of 1998.[12] The ΔEVA multiple was 6.32 in 1992 and 9.04 in 1998, based on Emerson's cost of capital and historical sales growth rates.[13]

Table 2 shows the calculation of Emerson's EI. We start with the required six-year return on FGV, which is equal to $5.92 billion. Next we subtract the expected baseline ΔFGV from $5.92 billion to determine the required six-year return from ΔEVA, which gives us $2.285 billion. Then we divide the required six-year return from ΔEVA by the ΔEVA multiple to get the required six-year FV of ΔEVA, which equals $361 million. And, finally, we convert the six-year FV of ΔEVA to annual EIs. To determine annual EIs, we assume that ΔEVA will grow proportionally with sales.[14] Using Emerson's historical sales growth rate at the end of 1992, we get an initial EI of $41.6 million, increasing at 2.9% a year. This EI is considerably less than a back of the envelope EI based on the assumptions that baseline ΔFGV = 0 and α = 0, which is $78 million.

Calculating the CEO's Share. The first step in calibrating the CEO's share of excess ΔEVA is to determine the CEO's expected compensation and the share it represents of investors' expected return. In 1992, Emerson CEO Chuck Knight received a base salary of $800,000 and a bonus of $1,000,000. We assume, based on the disclosure in Emerson's 1994 proxy that "annual incentive opportunity represents from 30% to 50% of total cash compensation," that Knight's target bonus was 100% of salary and that his expected compensation at the end of 1992 was thus $1.6 million. Based on Emerson's 1992 market enterprise value of $13.574 billion and WACC of 12.15%, Knight's expected compensation represented 0.097% of investors' expected return (.097% = 1.6/[13,574 × 12.15%]).

To illustrate a bonus plan with a strong incentive, we will calibrate Knight's share of excess ΔEVA to make his share of investors' excess return equal to his share of their expected return. This means that his share of excess ΔEVA is 0.895% (= 0.097% × (1+WACC)/WACC).

In setting up an EVA bonus plan for an entire management *team*, it is useful to express the bonus earned as a product of the target bonus and a bonus multiple. To do this, we introduce the concept of the "EVA interval," which is the ΔEVA that makes the bonus earned equal to two times target. The cash compensation formula then becomes:

$$\text{compensation} = \text{salary} + [\text{target bonus} \times (1 + (\Delta\text{EVA} - \text{EI})/\text{EVA interval})]$$

Since the individual manager's share of excess ΔEVA is equal to [target bonus/EVA interval], Knight's share of excess ΔEVA implies that the EVA interval is initially $89.4 million ($0.8 million/0.895%). To maintain a constant management share of excess ΔEVA, we need to adjust the EVA interval each year to offset the change in the aggregate target bonus pool.

Table 3 shows our simulation of the EVA bonus plan for 1993-1998. The EVA bonus multiple ranged from 0.87 in 1997 to 1.75 in 1993, with an average of 1.37. (Emerson's actual bonus multiples had a lower average, 1.22, but a similar standard deviation due to the large bonus in 1998.)

Table 4 shows our simulation of the EVA bonus plan for 1999-2004, a period when Emerson's EVA performance fell off sharply and then made a modest recovery. The EVA bonus multiple ranged from -0.82 in 2002 to 1.15 in 2003, with an average of 0.64. Emerson's actual bonus multiples had a higher average, 1.12, and a significantly lower standard deviation (0.48 vs. 0.77 for the EVA bonus plan).

Since we calibrated the Emerson EVA bonus plan to make the CEO's share of the excess return equal to his share of the expected return, the average excess bonus multiple (that is, the average bonus multiple minus 1, which is also the ratio of the excess bonus to the target bonus) should be proportional to the ratio of the excess return to the expected return. Table 5 shows that this is roughly the case. The average excess bonus multiple was 0.37 for the years 1992-1998, when the excess return was 47% of the expected return. Similarly, the average excess bonus multiple was -0.36 for the years 1998-2004 when the excess return was -45% of the expected return. Emerson's average actual bonus multiple was similar in both periods even though the first period had a substantial positive excess return, with the stock price increasing 114% from $27.25 in 1992 to $58.19

12. 0.268 = 0.002 + (0.441 × -0.491) + (.152 × .360). 0.002 is the regression constant, 0.441 is Emerson's 1992 FGV as a percent of market enterprise value, and 15.2% is the expected shareholder return for the Capital Goods industry, based on an average beta of 1.48, a market risk premium of 5% and a risk-free rate of 7.8%.

13. α = -0.353 = -0.414 + .021 × 2.9%, 6.32 = (1 + .1215 - .353)/.1215.

14. An alternative approach is to assume that ΔEVA will grow proportionally with the ΔEVA anticipated by the company's strategic plan.

Table 3

	1992	1993	1994	1995	1996	1997	1998	1993-1998 Average
Base Salary ($000)	800	800	875	900	900	900	900	
Target Bonus ($000)	800	800	875	900	1,350	1,350	1,350	
Expected Compensation	1,600	1,600	1,750	1,800	2,250	2,250	2,250	
Expected Comp % of Expected Return	0.097%							
Excess Comp % of Excess Return	0.097%	0.097%	0.097%	0.097%	0.097%	0.097%	0.097%	
Excess Comp % of Excess ΔEVA	0.895%	0.895%	0.895%	0.895%	0.895%	0.895%	0.895%	
EVA Interval ($000)	89,356	89,356	97,733	100,526	150,789	150,789	150,789	
EVA ($mil)	233	342	452	491	630	657	760	
ΔEVA		109	110	39	139	28	103	
EI		42	43	44	45	47	48	
Excess ΔEVA		67	67	-5	94	-19	55	
Bonus Multiple		1.75	1.69	0.95	1.62	0.87	1.36	1.37
Actual Emerson Bonus		1,100	1,100	1,100	1,100	1,100	2,500	
Actual Emerson Bonus Multiple		1.38	1.26	1.22	0.81	0.81	1.85	1.22

Table 4

	1998	1999	2000	2001	2002	2003	2004	1999-2004 Average
Base Salary ($000)	900	1,200	1,400	1,400	1,400	1,400	1,400	
Target Bonus ($000)	1,350	2,800	3,267	3,267	3,267	2,100	2,100	
Expected Compensation	2,250	4,000	4,667	4,667	4,667	3,500	3,500	
Market Enterprise Value ($mil)	29,609							
WACC	9.99%							
Expected Investor Return ($000)	2,956,905							
Expected Comp % of Expected Return	0.076%							
Excess Comp % of Excess Return	0.076%	0.076%	0.076%	0.076%	0.076%	0.076%	0.076%	
Excess Comp % of Excess ΔEVA	0.838%	0.838%	0.838%	0.838%	0.838%	0.838%	0.838%	
EVA Interval ($000)	161,089	334,111	389,796	389,796	389,796	250,583	250,583	
EVA ($mil)	760	834	853	644	-13	81	170	
ΔEVA		74	19	-209	-657	93	89	
EI		38	42	47	52	57	63	
Excess ΔEVA		35	-23	-256	-708	36	27	
Bonus Multiple		1.11	0.94	0.34	-0.82	1.15	1.11	0.64
Actual Emerson Bonus		3,000	6,000	2,520	1,766	2,100	3,150	
Actual Emerson Bonus Multiple		1.07	1.84	0.77	0.54	1.00	1.50	1.12

Note: David Farr replaced Chuck Knight as CEO in 2001. To provide a more consistent bonus illustration, we assume that Farr had Knight's 2000 salary in the years 2001-2004. The actual bonus multiples for 2001-2004 are based on Farr's actual bonus as a multiple of his true target bonus.

in 1998, while the second period had a substantial negative excess return, with the stock price increasing only 16% from $58.19 in 1998 to $67.24 in 2004. The example suggests that Emerson's cash compensation did not provide a particularly strong incentive. Our wealth leverage research (cited above) supports the same conclusion. On average over the

Table 5

		1992-1998	1998-2004
	Actual FV of EVA	701	-705
	Expected FV of EVA	361	374
	Excess FV of EVA	339	-1,079
A	Capitalized Excess FV of EVA	3,739	-14,071
	Actual FGV	10,445	15,798
	Expected FGV	9,619	15,111
B	Unexpected FGV	826	687
C	Share Re-purchases and Changes in WACC	1,693	3,036
A+B+C	Total Excess Return	6,258	-10,348
	Six Year Expected Return	13,437	22,807
	Excess Return/Expected Return	0.47	-0.45
	EVA Bonus Excess Bonus Multiple	0.37	-0.36
	Actual Emerson Excess Bonus Multiple	0.22	0.12

Table 6

Variance Explained By:	1 Year TSR	3 Year TSR	5 Year TSR
EPS	7.1%	38.7%	50.8%
EPS and Initial Expectations	9.1%	41.8%	52.7%
EPS, Initial Expectations & Industry TSR	32.7%	51.5%	58.3%
Improvement from Taking Account of Initial Expectations	2.0%	3.1%	1.9%
Improvement from Taking Account of Industry TSR	23.6%	9.7%	5.6%
Cases	15,553	14,376	13,528

Sample: All one, three or five year periods ending in 1992 or later for companies that are current members of the S&P 1500

period 1994-2004, a 10% change in Emerson shareholder wealth increased Emerson top management cash compensation by less than 1%.

Ex-Ante vs. Ex-Post Adjustment for Expectations

To make the measure of corporate performance held up by C&D—the change during the year in analysts' forecasts of future earnings—the basis for an incentive comp plan would require companies to make year-end, and thus after the fact, adjustments, in managers' EVA targets. But such ex-post adjustments are rarely used in EVA or any kind of bonus plans, and for good reasons. Ex-post adjustments make it much more difficult for a manager to project the personal financial consequences of a new investment or strategy, which substantially weakens the incentive provided by the plan. Ex-post adjustments based on analyst estimates are not possible for business units below the corporate level, and we are not aware of any company that has considered using ex-post adjustments for a corporate bonus plan based on analyst estimates. Ex-post adjustments to expected ΔEVA based on industry performance are possible, but the calculation of such industry-adjusted ΔEVA is much more difficult than the calculation of excess stock return. Stock return data is available immediately and measured daily, while peer company ΔEVA data are measured quarterly and are available one to two months after the end of the quarter at the earliest. And with only four observations per year per company, it is difficult to demonstrate statistically significant industry effects to support an ex-post adjustment to expected ΔEVA.

As a result, companies that make ex-post adjustments to their EVA bonus plans usually limit the adjustments to extreme negative outcomes that occur infrequently. One EVA company provided for bonus bank relief, but only when a business unit had negative bonus bank balances for two consecutive years—and the relief was limited to the lesser of the shortfall attributable to industry factors (based on a statistical model) or the amount needed to create a 25% probability that business unit managers would earn more than the target bonus over the next two years.

The long measurement periods used in EVA bonus plans—as exemplified by the six-year horizon of the hypothetical Emerson plans just described—significantly reduce the need for ex-post adjustments. Table 6 shows the impact of operating performance (measured by ΔEPS, excluding special items, per $1 of beginning stock), initial expectations (measured by FGV per $1 of beginning stock price), and industry stock performance on total shareholder return for one-year, three-year, and five-year periods. Over one-year measurement periods, shareholder return is only weakly correlated with operating performance improvement and heavily influenced by industry returns. Over five-year periods, shareholder return is highly correlated with operating performance improvement and much less affected by industry performance. The coefficients of the models in Table 6 (not reported in the table) show that, for one-year periods, a 10% change in industry return changes individual company return, on average, by 8.2%. But for five-year periods, a 10% change in industry return is associated with an only 4.1% change in individual company return, on average.

The Problem of the Delayed Productivity of Capital

EVA companies and security analysts using EVA have long struggled with acquisitions because of their negative impact on current EVA even when there is strong evidence that they are positive-NPV investments. In fact, we would argue that the biggest obstacle to broader adoption of value-based management systems today is the need for a practical,

Table 7 **Based on a model that excludes initial FGV as an explanatory variable**

Investment Year	Cost of Equity	Expected Wealth At Year 5	Capital Coefficient	Earnings Coefficient	Required Year 5 Return on Capital
1	10%	$1.46	-0.743	12.561	17.6%
2	10%	$1.33	0.347	12.561	7.8%
3	10%	$1.21	0.472	12.561	5.9%
4	10%	$1.10	0.486	12.561	4.9%
5	10%	$1.00	0.967	12.561	0.3%

Cases: 14,307
Sample: S&P 1500 companies

empirically validated, approach to adjust for the delayed productivity of capital.

The underlying problem is accounting. A positive-NPV acquisition with a negative impact on current EVA should give rise to *negative* economic depreciation of the acquired goodwill to reflect the expected increase in the acquired company's value, but GAAP accounting does not permit a write-up of the acquired goodwill.[15] Within the context of GAAP, a more useful way to characterize the problem is to say that the acquisition investment has delayed productivity. And the same is likely to be true of all corporate investments with long-term payoffs that must be immediately expensed.

If the time horizon of full capital productivity can be identified ex ante (that is, when the acquisition is being contemplated and closed), it should be possible to develop a better EVA measure by deferring the capital charge to reflect the delayed productivity of capital. To estimate the time horizon of full capital productivity, we developed a model of five-year shareholder returns with separate explanatory variables for each year's capital investment. The explanatory variables in the model were ΔEPS and the change in capital investment in each year of the five-year period (each change expressed as a percentage of market equity value at the start of the five-year period). If the coefficient of a particular year's capital investment is positive, it means that that year's investment makes a contribution to shareholder return beyond the value provided by the earnings from that year's investment—or, in other words, that the value of that year's investment is not fully reflected in year-five earnings.

As shown in Table 7, the investments made in years 2-5 have a positive contribution to five-year shareholder returns, while the investment made in year 1 has a negative contribution. This means that the investment made in year 1 makes no contribution to shareholder return beyond that provided by the earnings from that investment. This implies that the investment made in year 1 is fully productive by the end of year 5, and thus that the time horizon of full capital productivity is between four and five years.

Since one solution to the problem of delayed capital productivity is to use a cost of capital that increases over the life of the investment, it is useful to compute the return on book capital needed in year 5 to give investors a cost-of-capital return. For the shareholder to earn the cost of equity on $1 of capital investment, the value of the earnings provided by the capital (at a multiple of 12.561) plus the change in company value attributable to the capital itself (i.e., the capital coefficient) must equal the opportunity cost of the capital investment, i.e., $(1 + \text{cost of equity})^{\text{investment years}}$. For example, an investment of $1 in year 2 that earns a return of ROE in year 5 has a value in year 5 of $1 × capital coefficient + ROE × $12.561. Since the year 5 opportunity cost of the investment, with a 10% cost of equity, is $\$1 \times (1.1)^3$, the investment will give the shareholder a cost-of-equity return as long as $1 × 0.347 + ROE × $12.561 is greater than $\$1 \times (1.1)^3$. This will happen only if year five ROE is at least 7.8%. Table 7 shows that the required return in year 4 on an acquisition closed today is 7.8%, but the required return in the current year is only 0.3%.[16] This means that the EVA cost of capital would need to be set at 0.3% in the first year to avoid discouraging any value-creating investments.

In theory, companies could have multiple costs of capital applied to multiple layers of capital investments. In practice, few companies find it cost-effective to have a performance evaluation system with that degree of complexity. A more common solution to the problem of delayed capital productivity is "strategic investment treatment," which means deferring the capital charge on selected investments that have substantially delayed capital productivity.[17] But EVA companies struggle to determine an objective basis for the capital charge deferral schedule. It is our hope that empirical research on capital productivity can be used to define simple capital measures—such as, for example, a trailing three-year

15. See Stephen F. O'Byrne, "Does Value-Based Management Discourage Investment in Intangibles?" in *Value-Based Metrics: Foundations and Practice*, edited by Frank J. Fabozzi and James L. Grant (2000).

16. Our analysis ignores dividends, which overstate the required return on capital in year 5 when part or all of current and prior year earnings have been paid out as dividends.

17. For further discussion, see S. David Young and Stephen F. O'Byrne, *EVA® and Value-Based Management*, [pp. 236-247].

average for fixed assets—that capture the delayed productivity of capital with a reasonable amount of precision.

Conclusion

We agree with Copeland and Dolgoff that it is important to account for investors' (and management's) expectations when setting up internal performance measurement and compensation systems. But the major challenge in designing an expectations-based performance measure and compensation plan is to develop a practical measure of investors' expectations. Unfortunately, the measure that C&D cite as having such a strong correlation with stock returns—the change in analysts' long-run earnings forecasts over a given year—doesn't provide a workable basis for a compensation plan.

We have presented a practical and widely used expectations-based EVA bonus plan and shown how to calibrate expected EVA improvement and management's share of excess EVA improvement. We have also presented a new approach to overcome the biggest obstacle to broader use of value-based management systems—the lack of a practical, empirically validated approach to adjust for the delayed productivity of capital.

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