CHAPTER 12

Security Analysis Using Value-Based Metrics

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The world of security analysis is undergoing a revolution of sorts with increased focus on "value-based" metrics that are designed to give shareholders their due. Chief among these measures of corporate financial success is a metric called *economic value added* (EVA[1]). EVA and related value-based measures such as *cash flow return on investment* (CFROI[2]) are now making significant inroads into the realm of security analysis and equity portfolio management. These metrics are also paving the way for a "modern" school of equity fundamental analysis that

[1] EVA® is a registered trademark of Stern Stewart & Co. For a discussion and application of their value-based (economic profit) measure in a corporate finance setting, see G. Bennett Stewart III, *The Quest for Value* (New York: Harper Collins, 1991), and Al Ehrbar, *EVA: The Real Key to Creating Wealth* (New York: John Wiley & Sons, 1998).

[2] CFROI® is a value-based metric of HOLT Value Associates, L.P. For a discussion of the CFROI approach to measuring economic profit, see Bartley J. Madden, *CFROI Valuation: A Total Systems Approach to Valuing the Firm* (Woburn, MA: Butterworth-Heinemann, 1999).

departs from the traditional method, with its prior focus on accounting measures such as earnings per share and return on equity.

Perhaps the best-known value-based metric among today's corporate and investment players is EVA. Introduced in 1982 by Joel Stern and G. Bennett Stewart, this economic profit measure gained early acceptance among the corporate financial community because of its innovative way of looking at profitability net of the dollar weighted cost of debt *and* equity capital. Indeed, many firms—including corporate giants like AT&T, Coca-Cola, Diageo, Guidant, and SPX—have used an EVA platform to design incentive pay schemes that lead managers to make wealth-enhancing investment decisions for the shareholders. EVA is also gaining popularity in the investment community. For example, Goldman Sachs U.S. Research, and C.S. First Boston use EVA to evaluate the performance potential of many sectors of the economy. Also, Global Asset Management and Oppenheimer Capital have successfully used economic profit principles to actively manage investment portfolios from a "bottom-up" fundamental perspective.

We'll begin the chapter with a look at how to estimate EVA in a basic setting. This will allow us to see the benefits of a value-based framework without getting tangled up in a plethora of value-based accounting adjustments. We'll then look at standard accounting adjustments that are necessary to estimate economic profit in practice. This entails a closer look at how to estimate a company's net operating profit after tax (NOPAT) as well as the dollar weighted average cost of capital, $WACC. Next, we'll examine the basic link between EVA and its close associate, CFROI. We'll then explain how a multi-factor EVA risk model can be used to obtain improved estimates of the required return on common stock (equivalently, the cost of equity capital). This risk measurement innovation is important in light of the empirical limitations of CAPM that were mentioned in Chapter 4. Finally, we'll see how value-based metrics such as EVA can be used to evaluate companies in a stock selection context.

A WORD ON LEVERED AND UNLEVERED FIRMS

Central to the basic economic profit calculation is the distinction between a *levered* firm and an *unlevered* firm. A levered firm, like most real-world companies, is one that is financed with both debt and equity sources of capital. In contrast, an equivalent business-risk unlevered firm is one that, in principle, is 100% equity financed. This firm-type classification is helpful to understanding the economic profit calculation because EVA is measured by subtracting a company's dollar cost of

invested capital—a reflection of its weighted average cost of debt and equity capital—from its unlevered net operating profit after tax (noted as NOPAT, versus LNOPAT for levered net operating profit). With this distinction, the firm's EVA is generally defined as:

$$EVA = NOPAT - \$WACC$$

NOPAT is used in the EVA formulation for two reasons. First, an economic profit emphasis on this term serves as a modern-day reminder that a company largely receives profits from the desirability, or lack thereof, of its overall products and services. Along this line, the risk or uncertainty of NOPAT is a reflection of the firm's inherent business risk. Second, since most firms have some form of business debt outstanding, they receive a yearly interest tax subsidy—measured by the corporate tax rate *times* a company's interest expense—that is already reflected in the dollar cost of capital, $WACC.

As we'll see shortly, an incorrect focus by managers or investors on the levered firm's net operating profit after tax, LNOPAT, rather than its unlevered net operating profit, NOPAT, would lead to an *upward* bias in the company's reported economic profit. By recognizing the possible "double counting" of a firm's debt-interest tax subsidies (on both debt and debt equivalents such as operating leases), the manager or investor avoids imparting a *positive* bias in the firm's EVA, and, ultimately, its enterprise value and stock price.

THE BASIC EVA FORMULATION

Before getting immersed in a sea of value-based accounting adjustments, we'll look at the key features of economic profit measurement in a *basic* setting. In this context, we'll unfold EVA into its two basic ingredients—namely, NOPAT, which represents a company's unlevered net operating profit after tax, and $WACC, which represents a firm's dollar cost of invested capital. We'll first look at NOPAT.

In the absence of any EVA accounting adjustments, the firm's NOPAT can be expressed in terms of its tax-adjusted earnings before interest and taxes, EBIT, according to:[3]

$$NOPAT = EBIT \times (1 - t) = [S - COGS - SG\&A - D] \times (1 - t)$$

[3] We'll provide an overview of the conventional accounting adjustments to estimating EVA later. For an exhaustive discussion of EVA accounting adjustments, see Stewart, *The Quest for Value*.

In this expression, EBIT $\times (1 - t)$ is the unlevered firm's net operating profit after tax. This basic EVA term is a reflection of the firm's earnings before interest and taxes, EBIT, less *unlevered* business taxes—measured by EBIT less t times EBIT. Likewise, the terms, S, COGS, and SG&A in the NOPAT specification refer to the firm's sales, cost of goods sold, and selling, general and administrative expenses, respectively. In principle, the depreciation term, D, should be a charge that reflects the *economic* obsolescence of the firm's assets. In this context, using an estimate of economic depreciation rather than accounting depreciation when the NOPAT differences are meaningful.[4]

In turn, the firm's dollar cost of capital, $WACC, can be expressed as:

$$\$WACC = WACC \times C$$

In this expression, WACC is the weighted-average cost of debt *and* equity capital (expressed as a required rate in decimal form), and C is the firm's invested capital. In turn, the weighted average cost of capital, WACC, is given by:

WACC = After-tax Debt Cost × Debt Weight + Equity Cost × Equity Weight

Taken together, these financial developments show that the firm's EVA can be expressed in basic terms as:

$$\begin{aligned} EVA &= NOPAT - \$WACC \\ &= EBIT \times (1 - t) - WACC \times C \\ &= (S - COGS - SG\&A - D) \times (1 - t) - WACC \times C \end{aligned}$$

In the next section, we'll look at a simple income statement and balance sheet to show how to measure a firm's "EVA," absent value-based accounting adjustments that will be explained later.

"OK BEVERAGE COMPANY"

In an attempt to reinforce the concept of value-based measurement, we'll now apply the basic EVA formulation to a hypothetical firm called

[4] See, Stephen F. O'Byrne, "Does Value-Based Management Discourage Investment in Intangibles?" Chapter 5 in Frank J. Fabozzi and James L. Grant (eds.), *Value-Based Metrics: Foundations and Practice* (New Hope, PA: Frank J. Fabozzi Associates, 2000).

"OK Beverage Company." Exhibits 12.1 and 12.2 show the standard income statement and balance sheets for the beverage producer at an established point in time.

EXHIBIT 12.1 OK Beverage Company Income Statement

	Status Quo Position
Sales	$125,000
COGS	86,000
SG&A	22,000
Interest Expense	3,312
Pretax Profit	13,688
Taxes (at 40%)	5,475
Net Income	$8,213
Shares Outstanding	6,250
EPS	$1.31

EXHIBIT 12.2 OK Beverage Company Balance Sheet

Cash	750	Accounts Payable	10,000
U.S. Govt. Securities	1,250	Wages Payable	2,000
Accounts Receivable	17,000	Tax Accruals	2,000
Inventory	63,000	Current Liabilities	14,000
Current Assets	82,000	(*non*-interest bearing)	
Property (Land)	4,000	Long-Term Debt	41,400
Net Plant	15,000	(8% Coupon)	
Net Equipment	51,000		
Net Fixed Assets	70,000	Common Stock at Par	625
		Addit'l. Paid in Capital	14,375
		Retained Earnings	81,600
		Stockholders' Equity	96,600
		Liabilities and	
Total Assets	152,000	Stockholders' Equity	152,000

Looking at OK Beverage Company's financial statements from a traditional accounting perspective, it seems that the firm is a profitable beverage producer. Based on the income statement shown in Exhibit 12.1, the firm reports *positive* net income and earnings per share, at $8,213 and $1.31, respectively. In addition, with Stockholders' Equity at $96,600 the beverage producer's rate of return on equity (ROE) is positive, at 8.5% (8,213/96,600 × 100). Moreover, this accounting ROE results from multiplying OK-B's positive return on assets (ROA), at 5.4%, by its equity-leverage multiplier (Assets/Equity) of 1.57.

OK-B's Economic Profit

To see if OK Beverage Company is truly a profitable company—that is, a wealth creator with (discounted) positive EVA—we'll first estimate the firm's *unlevered* net operating profit after tax, NOPAT. Upon substituting the beverage producer's sales; cost of goods sold; selling, general, and administrative expenses, and tax rate figures into the NOPAT formulation, we obtain:[5]

$$\begin{aligned} \text{NOPAT} &= (S - \text{COGS} - \text{SG\&A}) \times (1 - t) \\ &= (125{,}000 - 86{,}000 - 22{,}000) \times (1 - 0.4) = \$10{,}200 \end{aligned}$$

In order to calculate OK-B's projected *dollar* cost of capital, the manager or investor needs to know something about (1) the after-tax cost of debt, (2) the estimated cost of equity capital, and (3) the "target" debt weight, *if any*,[6] in the firm's capital structure, and (4) the amount of invested capital employed in the beverage business. With respect to the first requirement, OK-B's after-tax cost of debt can be estimated according to:

$$\begin{aligned} \text{After-tax Debt Cost} &= \text{Pre-tax Debt Cost} \times (1 - t) \\ &= 0.08 \times (1 - 0.4) = 0.048 \text{ or } 4.8\% \end{aligned}$$

In this expression, the pre-tax debt cost, at 8%, is taken as the firm's average coupon rate on the balance sheet (for simplicity, we assume that the firm's bonds are trading at par value). In this context, OK-B's pre-tax

[5] For convenience, we assume that depreciation is included in selling, general, and administrative expense account of OK Beverage.

[6] The "optimal" mix (if any) of debt and equity capital on a firm's balance sheet is a controversial issue in the study of corporate finance. An economic profit interpretation of the Miller-Modigliani hypothesis on capital structure is explained in Frank J. Fabozzi and James L. Grant, "Value-Based Metrics in Financial Theory," Chapter 2 in *Value-Based Metrics: Foundations and Practice.*

borrowing cost of 8% can also be obtained by dividing the firm's interest expense, $3,312, by the face amount of its long term debt, at $41,400.

In turn, we'll use the Capital Asset Pricing Model (CAPM)[7] to estimate OK-B's cost of equity capital despite its limitations discussed in Chapter 4. With a risk-free interest rate of 6.5%, a market-driven equity risk premium of 6%, and a common stock beta of 1.0, the firm's CAPM-based cost of equity capital becomes:

$$\begin{aligned}\text{Expected return} &= \text{Risk-free rate} + \text{Market risk premium} \times \text{Beta} \\ &= 0.065 + 0.06 \times 1.0 = 0.125 \text{ or } 12.5\%\end{aligned}$$

Moreover, if we assume that OK-B's "target" debt-to-capital ratio is, say, 30%, the firm's weighted average cost of capital can be measured according to:

$$\begin{aligned}\text{WACC} &= \text{After-tax debt cost} \times \text{Debt weight} + \text{Equity cost} \times \text{Equity weight} \\ &= 0.048 \times (0.3) + 0.125 \times (0.7) = 0.102 \text{ or } 10.2\%\end{aligned}$$

Repackaging the Balance Sheet

With knowledge of OK-B's operating capital it is possible to calculate the dollar cost of invested capital, $WACC.[8] In this context, it is helpful to recognize that the firm's balance sheet can be "repackaged" in a way that shows the *equivalency* of the firm's operating and financial capital. Exhibit 12.3 illustrates this result.

Exhibit 12.3 shows that OK-B's operating *and* financing capital is $138,000. The operating capital (left hand side of balance sheet) is equal to net working capital plus net plant, property, and equipment. Likewise, in the absence of EVA accounting adjustments, the financing capital is just long-term debt plus stockholders' equity. Hence, the firm's overall dollar-cost of capital can be calculated by applying the weighted average cost of capital, at 10.2%, to either the firm's tangible operating capital or its equivalent financing source of invested capital. Whatever side of the EVA balance sheet is chosen, OK-B's *dollar* cost of capital is $14,076:

$$\$\text{WACC} = \text{WACC} \times C = 0.102 \times 138{,}000 = \$14{,}076$$

[7] William F. Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," *Journal of Finance* (September 1964), pp. 425–442.

[8] In this basic EVA application, we use the terms operating capital and invested capital interchangeably. In practice, operating capital is generally viewed as invested capital *less* goodwill arising from premiums paid in acquisitions. For an insightful discussion of the difference between these capital measures, see Tom Copeland, Tim Koller, and Jack Murrin, *Valuation: Measuring and Managing the Value of Companies* (New York: John Wiley & Sons, 1996).

EXHIBIT 12.3 OK Beverage Company Operating and Financial Capital (Aggregate Results)

Operating Capital:		Financing Capital:	
Net Working Capital			
Current Assets	82,000		
Current Liabilities (*non*-interest bearing)	(14,000)		
	68,000	Long-Term Debt	41,400
Net Fixed Assets	70,000	Stockholders' Equity	96,600
Totals:	138,000		138,000

Most importantly, since OK-B's dollar cost of financing, $WACC, is higher than its unlevered net operating profit after tax, NOPAT, the firm has *negative* economic profit:

$$EVA = NOPAT - \$WACC = 10,200 - 14,076 = -\$3,876$$

While OK-B *looks* like a profitable beverage producer from a traditional accounting perspective, the EVA insight reveals that the firm is a (potential[9]) wealth destroyer. This happens because the firm's net operating profitability is not sufficient enough to cover the weighted average cost of debt *and* equity capital.

OK-B's Residual Return on Capital (RROC)

We can also show that OK-B has negative EVA because its underlying "residual (or surplus) return on capital," RROC, is negative. This wealth-wasting situation occurs when a firm's after-tax return on invested capital, ROC, falls short of the weighted average capital cost, WACC. To illustrate this, simply define RROC as the firm's EVA-to-Capital ratio. At –2.8%, one sees that OK-B's adverse *surplus* return on invested capital is caused by its negative economic profit:

$$RROC = EVA/Capital = -3,876/138,000 = -0.028 \text{ or } -2.8\%$$

Likewise, since EVA can be expressed as the firm's invested capital, C, times the residual return on capital, RROC, this same result is obtained by focusing on the *spread* (also referred to as the "EVA spread") between

[9] Wealth destruction occurs when persistently adverse EVA leads to negative net present value. This of course results in a decline in a company's enterprise value and its stock price.

the firm's after-tax return on invested capital, ROC, and its weighted average cost of debt and equity capital, WACC:

$$\begin{aligned} \text{RROC} &= \text{EVA}/C = (\text{ROC} - \text{WACC}) \\ &= (0.074 - 0.102) = -0.028 \text{ or } -2.8\% \end{aligned}$$

In this expression, ROC, at 7.4%, results from dividing NOPAT, $10,200, by the firm's invested capital, $138,000. The WACC is the familiar cost of capital percentage of 10.2%.

OK-B's Interest Tax Subsidy

As we noted before, when looking at a firm's economic profit, it is important to use unlevered net operating profit after tax, NOPAT, in the first step of the EVA calculation. This is important because the dollar cost of invested capital (step two in the EVA calculation) already reflects the interest tax subsidy (if any) received on the firm's outstanding debt obligations. By double counting this debt-induced tax subsidy, the manager or investor would not only overestimate the firm's operating profit, but one would also impart a positive bias in the firm's enterprise value and its stock price.

To show leverage-induced bias, it is helpful to note that the levered firm's net operating profit after tax, LNOPAT, can be expressed in terms of the equivalent business-risk unlevered firm's net operating profit, NOPAT, *plus* a yearly interest tax subsidy. Looking at OK-B in this levered (with debt) and unlevered (without debt) fashion yields:

$$\begin{aligned} \text{LNOPAT} &= \text{NOPAT} + t \times \text{Interest} \\ &= \$10{,}200 + 0.4 \times \$3{,}312 = \$11{,}525 \end{aligned}$$

In this expression, $t \times$ Interest (at $1,325) is the yearly interest tax subsidy that OK-B receives as a levered firm, as opposed to a debt-free company. However, this *same* interest tax benefit is already reflected in the firm's dollar cost of capital through the reduced cost of corporate debt financing.

To show this, recall that OK-B's after tax cost of debt was previously expressed as:

$$\begin{aligned} \text{After-tax debt cost} &= \text{Pre-tax debt cost} \times (1 - t) \\ &= 0.08 \times (1 - 0.4) = 0.048 \text{ or } 4.8\% \end{aligned}$$

In this formulation, the firm's pre-tax cost of debt, 8%, is reduced by 320 basis points due to the tax benefit that OK-B receives from

deductibility of its debt interest expense. Expressing this leverage-induced reduction in the firm's dollar cost of capital yields the same yearly interest tax benefit that is already reflected in the beverage company's levered operating profit:

$$\begin{aligned}\$\text{WACC tax subsidy} &= t \times (\text{Pre-tax debt cost}) \times \text{Debt} \\ &= 0.4 \times (3{,}312/41{,}400) \times 41{,}400 = \$1{,}325\end{aligned}$$

Thus, to avoid imparting leverage-induced bias, OK-B's economic profit must be calculated by *first* estimating what its net operating profit after tax, NOPAT, would be as an equivalent business-risk unlevered firm—namely, an "OK-B like" company with no business debt—and *then* subtracting the overall dollar cost of debt and equity capital from this unlevered net operating profit figure.

OK-B's EVA on a Pre-Tax Basis

If the manager or investor were inclined to calculate OK Beverage Company's EVA on a pretax basis, then the beverage producer's unlevered net operating profit before taxes, at $17,000, would be used in conjunction with the *pre*-tax dollar cost of capital. The only complication here is that the after-tax cost of equity capital needs to be "grossed up" by one *minus* the business tax rate to convert it to a pre-tax financing rate.[10] To see how this works, note that OK-B's weighted average cost of capital can be expressed on a before tax basis as:

$$\begin{aligned}&\text{Pre-tax WACC} \\ &= \text{Debt Weight} \times \text{Pre-tax Debt Cost} + \text{Equity Weight} \times \text{Pre-tax Equity Cost} \\ &= 0.3 \times 0.08 + 0.7 \times 0.125/(1 - 0.4) = 0.17 \text{ or } 17\%\end{aligned}$$

In this formulation, the firm's *pre-tax* cost of equity capital is 20.8%, and its pre-tax cost of invested capital is 17%. With this development, OK-B's *pre-tax* EVA is:

$$\begin{aligned}\text{Pre-tax EVA} &= \text{Pre-tax net operating profit} - \text{Pre-tax \$WACC} \\ &= \text{EBIT} - \text{Pre-tax WACC} \times C \\ &= \$17{,}000 - 0.17 \times \$138{,}000 = -\$6{,}460\end{aligned}$$

[10] The pre-tax approach to estimating a firm's economic profit is helpful because the manager or investor focuses *directly* on the unlevered firm's cash operating profit without getting tangled up with tax issues arising from depreciation and other accounting complexities. However, tax considerations *do* arise when converting the after-tax cost of equity capital (CAPM or otherwise) to a pre-tax required rate of return.

Likewise, the firm's pre-tax EVA is equal to its after-tax EVA "grossed up" by one *minus* the business tax rate, t:

$$\begin{aligned}\text{Pre-tax EVA} &= \text{After-tax EVA}/(1-t)\\ &= (-\$3{,}876)/(1-0.4) = -\$6{,}460\end{aligned}$$

OK-B's Growth Opportunities

Given that OK Beverage Company has negative economic profit, the firm has a clear incentive to find a *positive* growth opportunity. In this context, let's suppose that the firm's managers discover that they can invest $20,000 in a new product distribution system that will increase yearly sales by $40,000. In turn, suppose that OK-B's cost of goods sold and selling, general, and administrative expenses will rise by $25,000 and $5,000 per annum, respectively. With these assumptions, the firm's estimated annual NOPAT will go up by $6,000:

$$\begin{aligned}\Delta\text{NOPAT} &= \Delta(S-\text{COGS}-\text{SG\&A})\times(1-t)\\ &= (40{,}000-25{,}000-5{,}000)\times(1-0.4) = \$6{,}000\end{aligned}$$

Since the beverage producer's operating capital rises by $20,000 to support the higher sales forecast, OK-B's estimated (annual) capital costs rise by $2,040:

$$\Delta\$\text{WACC} = \text{WACC}\times\Delta C = 0.102\times 20{,}000 = \$2{,}040$$

If sustainable, the changes in NOPAT and $WACC reveal that OK-B's growth opportunity is a desirable investment for its shareholders.[11] With these figures, OK-B's EVA rises by $3,960:

$$\Delta\text{EVA} = \Delta\text{NOPAT} - \Delta\$\text{WACC} = \$6{,}000 - \$2{,}040 = \$3{,}960$$

As a result of OK Beverage Company's investment opportunity, it is interesting to see that the firm has moved from a wealth-destroyer to a wealth-neutral position. That is, at $84 (–3,876 + $3,960), *total* EVA now exceeds zero. Among other things, this implies that the firm's revised return on invested capital, 10.3% (16,200/158,000), is now close to the overall cost of capital, 10.2%. Likewise, in this wealth neutral situation, the firm's residual return on capital, RROC, is nearly zero. Of course, with further growth opportunities, OK-B has the *potential* to become a wealth creator with *discounted* positive economic profit. In the

[11] In other words, the investment opportunity has discounted positive EVA (equivalently, positive NPV).

next section, we'll look at the valuation consequences of OK-B's growth opportunity, including a basic estimate of the firm's enterprise value.

Valuation Considerations

Up to this point, we used the income and balance sheets for "OK Beverage Company" to calculate economic profit (EVA) in a basic setting. However, nothing was said about the market value of OK-B as an ongoing company. Without getting into detailed valuation considerations,[12] some simple pricing insights are obtained by assuming that investors pay an NPV (net present value) multiple of, say, *10-times* the estimated EVA[13] of "OK-B-like" companies. In the ensuing pricing application, we'll express the firm's enterprise value, V_F, as the sum of (1) the total operating capital employed in the business, C, *plus*, (2) the net present value (NPV=MVA[14]) derived from the firm's existing assets and future growth opportunity:

$$V_F = C + NPV$$

With an EVA multiplier of *10-times* OK-B's aggregate EVA of $84 (recall, −3,876 + 3,960), the firm's market value added is $840. Upon adding this NPV figure to its revised operating capital (with the $20,000 growth opportunity), we obtain:

$$V_F = C + NPV = 158{,}000 + \$840 = \$158{,}840$$

Summarizing these basic valuation findings: With the positive EVA growth opportunity, OK-B has moved from a wealth-waster to a wealth-neutral position. The firm's zero-expected *total* EVA is generated by a return on invested capital, ROC, that now approximately equals the weighted average cost of capital—even though ROC is higher than the firm's pre- and post-tax cost of corporate debt financing. Because of OK-B's wealth-neutral position, the firm's enterprise value-to-capital (or, in more popular terms, the "price-book" ratio) is near unity. At this point, OK-B's profitability index ratio (ROC/WACC) is also close to one.

[12] For an explanation of the economic profit approach to enterprise and stock valuation, see James L. Grant and James A. Abate, *Focus on Value: A Corporate and Investor Guide to Wealth Creation* (New York: John Wiley & Sons, 2001).

[13] In practice, we would *first* need to make the necessary value-based accounting adjustments that we explain in an upcoming section before attempting to measure the firm's NPV, enterprise value, and of course its stock price.

From a valuation perspective, it is worth noting that multiplying a firm's EVA by a NPV multiple of "10" is tantamount to discounting its EVA perpetuity at a rate of 10%.

[14] MVA, for market value added, is the popular equivalent of NPV. These value-added terms are used interchangeably in the EVA literature.

Moreover, with further EVA growth opportunities, the firm has the potential to become a wealth creator and thus witness a noticeably sharp improvement in its enterprise value and stock price. Managers and investors should take note of such positive EVA growth opportunities!

WAYS TO INCREASE EVA

We see that basic EVA is helpful for managers and investors because it provides a transparent look at the key features of economic profit measurement. In this context, basic EVA reveals that a company is not economically profitable until it covers its usual operating expenses and all of its financial capital costs—namely, the dollar cost of debt *and* equity capital. In this fundamental sense, EVA is superior to traditional accounting profit measures such as net income, earnings per share and return on equity. Additionally, we can use basic EVA to gain some strategic insight on the steps that managers must take to permanently improve the economic profit outlook and, thereby, shareholder wealth. Active investors can also benefit by earning abnormal returns ("alpha") to the extent that a company's successful effort to improve the EVA outlook is not already impounded in stock price.[15]

There are several meaningful ways that a company can improve its economic profit outlook.[16] In this context, the basic EVA formulation suggests that wealth conscious managers should take steps to:

- Increase revenue
- Reduce operating expenses where prudent
- Use less capital to produce the same amount of goods and services
- Use more capital in the presence of *positive* growth opportunities
- Reduce WACC

Expanding a firm's market share is of course captured by rising sales levels in the basic EVA formula. All other things being the same (operating expenses and capital costs), higher revenue means higher margins and thus economic profit. It should also be no surprise that reducing a company's operating expenses via cost cutting and/or achieving tax efficiency enhances economic profit because the SG&A and tax accounts go

[15] We'll look at company (or stock) selection using value-based principles in a later section.

[16] The first four ways to improve economic profit are consistent with those emphasized in Shawn Tully, "The Real Key to Creating Wealth," *Fortune*, September 20, 1993.

down. However, when using cost cutting as a tool to improve the EVA outlook, managers (and investors) must be cautioned that too much cost cutting, "cuts" the fabric of a company's future economic profit—and in so doing, reduces the enterprise value of the firm and its stock price.

Also, if EVA is to be taken seriously as an improvement over traditional accounting profit measures, then it must do more than just show that increasing revenue and/or reducing operating expenses will improve the firm's enterprise value and its stock price. Fortunately, this is where economic profit and traditional accounting measures depart since EVA fully "accounts" for the dollar cost of capital in terms of both the amount of operating capital employed in a business and the opportunity cost of that invested capital.

EVA emphasizes the role of invested capital as shown in the basic EVA formulation. Clearly, anything that managers can do to (1) improve inventory and net PP&E (plant, property, and equipment) turnover ratios on the balance sheet, and (2) reduce business uncertainty (as reflected in a decline in NOPAT volatility) will have beneficial dollar cost of capital implications via the impact on C and WACC, respectively. Moreover, we used the basic EVA formula to show that investing more capital in *positive* economic profit growth opportunities is really what shareholder value creation is all about.

On balance, EVA links the income statement and balance sheets with a value-based focus on net operating profit (NOPAT, from adjusted income statement) and invested capital (C, from adjusted balance sheet). Unlike accounting profit, EVA measures the dollar cost of capital by multiplying the amount of invested capital by the *overall* cost of capital. Hence, EVA measures economic profit in the classical economists notion of "profit" because the business owners' normal return on invested capital is "fully reflected" in the profit calculation. Since accounting profit accounts only for the dollar cost of debt financings, via interest expense, it completely misses the dollar cost of equity capital. This cost of financing omission is particularly important for companies that typically finance their growth opportunities with mostly equity capital—such as firms in the technology and health care fields.

EVA MEASUREMENT CHALLENGES

The basic EVA formulation is helpful in showing how a *value-based* metric like EVA differs from a traditional accounting measure of profit such as net income. However, the basic EVA illustration belies the *complexity* of the economic profit calculation in practice. In this context, C.S. First Boston, Goldman Sachs U.S. Equity Research, and Stern Stewart & Co. point

out that there are some 160 accounting adjustments that can be made to a firm's financial statements (income and balance sheets) to convert them to a *value-based* format emphasizing cash operating profit and asset replacement cost considerations.[17] Many of the potential accounting adjustments can have a material impact on a manager or investor's estimate of a company's after-tax return on capital through their *joint* impact on NOPAT and invested capital. Additionally, there are significant empirical anomalies and academic issues that embroil the weighted average cost of capital, WACC—primarily, the cost of equity, which we touch on later.

As mentioned before, the firm's after-tax return on capital is calculated by dividing its *unlevered* net operating profit after tax, NOPAT, by the amount of invested capital employed in the business. In practice, however, there are numerous accounting items that *jointly* impact the numerator and the denominator of the ROC ratio. These potential distortions arise from the accounting-versus-economic treatment of depreciation, intangibles (including research and development and goodwill arising from corporate acquisitions), deferred income taxes, inventory costing (LIFO versus FIFO), and other equity reserve adjustments. Such EVA measurement issues are important because they impact the analyst's estimate of cash operating profit in the numerator of the after-tax return on capital (e.g., profit impact of accounting depreciation *versus* economic obsolescence) and the invested capital estimate used in the denominator of the ROC ratio (e.g., impact of net fixed assets on the balance sheet *versus* economic replacement cost of assets).[18]

NOPAT ADJUSTMENTS

To help reduce the complexity of the EVA calculation, Bennett Stewart offers a practical guide to estimating a firm's net operating profit after tax (NOPAT) and its invested capital.[19] In this context, he shows equivalent "bottom-up and top-down" approaches to estimating a company's net operating profit after taxes along with equivalent "asset and financing" approaches to estimating invested capital. Exhibit 12.4 shows some of the key accounting

[17] For example, see Steven G. Einhorn, Gabrielle Napolitano, and Abby Joseph Cohen, "EVA: A Primer," *U.S. Research* (Goldman Sachs, September 10, 1997).

[18] However, managers and investors must be careful not to get overly caught up in value-based accounting adjustments and, in so doing, miss the "big picture" perspective of economic profit measurement and valuation.

[19] See Stewart, *The Quest for Value*. Also, for a recent application of EVA with accounting adjustments, see Pamela Peterson, "Value-Based Measures of Performance," Chapter 4 in *Value-Based Metrics: Foundations and Practice*.

adjustments in the equivalent NOPAT approaches recommended by Stewart, while Exhibit 12.5 shows the companion accounting adjustments that must be made when estimating a company's invested capital in practice.

EXHIBIT 12.4 Calculation of NOPAT from Financial Statement Data

A. Bottom-up approach

Begin:

Operating profit after depreciation and amortization

Add:

Implied interest expense on operating leases
Increase in LIFO reserve
Increase in capitalized research and development
Increase in accumulated goodwill amortization
*Increase in cumulative write-offs of special items**

Equals:

Adjusted operating profit before taxes

Subtract:

Cash operating taxes

Equals:

NOPAT

B. Top-down approach

Begin:

Sales

Subtract:

Cost of goods sold
Selling, general, and administrative expenses
Depreciation

Add:

Implied interest expense on operating leases
Increase in equity reserve accounts (see above listing)
Other operating income

Equals:

Adjusted operating profit before taxes

Subtract:

Cash operating taxes

Equals:

NOPAT

* To the extent that write-offs are included in operating results rather than an extraordinary or unusual item.

Note: Exhibit based on information in G. Bennett Stewart III, *The Quest for Value* (New York: Harper Collins, 1991).

EXHIBIT 12.5 Calculation of Capital Using Accounting Financial Statements

A. Asset approach
Begin:
Net short term operating assets
Add:
Net plant and equipment
Other assets
LIFO reserve
Capitalized research and development
Accumulated goodwill amortization
Cumulative write-offs of special items
Present value of operating leases
Equals:
Capital
B. Sources of financing approach
Begin:
Book value of common equity
Add equity equivalents:
Preferred stock
Minority interest
Deferred income tax
Equity reserve accounts (see above listing)
Add debt and debt equivalents:
Interest-bearing short-term debt
Long-term debt
Present value of operating leases
Equals:
Capital

Note: Exhibit based on information in G. Bennett Stewart III, *The Quest for Value* (New York: Harper Collins, 1991).

In the "bottom-up" approach to estimating NOPAT (Exhibit 12.4), the manager or investor begins with operating profit after depreciation and amortization. This is just the familiar earnings before interest and taxes (EBIT) figure on a company's income statement. To this amount, several value-based accounting adjustments are made to arrive at a closer approximation of the firm's pre-tax cash operating profit. For examples, the rise in the LIFO reserve account is added back to operating profit to adjust for the overstatement of cost of goods sold—due to an overstatement of product costing—in a period of rising prices, while the net increase in research and development expenditure is added back

to operating profit to recognize that R&D investment generates a *future* stream of benefits.[20]

Likewise, the change in accumulated goodwill amortization is added back to pre-tax operating profit to reflect the fact that goodwill is a form of capital investment that needs to earn a cost of capital return just like expenditures on physical capital. In a value-based (economic profit) context, annual corporate restructuring write-offs (a "special item") get added back since they are viewed as a form of restructuring "investment." Also, the implied interest expense on operating leases is added back to pre-tax operating profit to recognize that leasing is a form of debt financing. In other words, the implied interest expense on operating leases should be reflected in the firm's cost of debt financing, rather than showing up in its *unlevered* net operating profit. However, in industries where operating leases are common and similar in financial magnitude, such as in certain segments of retail for example, the manager or investor should use judgment to decide whether the leasing adjustment will materially enhance the accuracy of the economic profit calculation for company comparisons.

From an EVA tax perspective, the rise in a company's deferred tax account (obtained from the balance sheet) should be subtracted from reported income taxes to adjust for the overstatement of actual cash taxes. Also, the tax subsidies received on debt financings (including debt equivalents such as operating leases) should be added back to reported income taxes to arrive at a more accurate representation of the cash taxes paid by an *unlevered* firm. As we explained before, tax subsidies received by a company from debt financings show up in the after-tax cost of debt and must therefore be excluded in the estimation of NOPAT. Upon making the "bottom-up" accounting adjustments, Exhibit 12.4 shows that the manager or investor arrives at a company's NOPAT by subtracting cash operating taxes from adjusted operating profit before taxes.

Exhibit 12.4 also shows the "top-down" approach to estimating NOPAT. In this approach, the manager or investor begins with sales or revenue. Usual income statement items such as cost of goods sold, selling, general and administrative expenses, and depreciation[21] are then subtracted from this figure. Next, the EVA items that we mentioned before—including the rise in "equity reserve" accounts (e.g. increase in LIFO reserve and accumulated goodwill amortization) as well as the

[20] In a value-based framework, R&D expenditures are generally capitalized and amortized over a useful time period such as five years—rather than expensed in the current year as if these expenditures have no future cash flow benefits.

[21] In principle, an estimate of economic depreciation should be used on EVA financial statements.

implied interest expense on operating leases—are added to the EVA income statement to obtain a more accurate measure of the firm's pre-tax cash operating profit. As with the bottom-up approach, cash operating taxes are then subtracted from adjusted operating profit before taxes to arrive at a company's net operating profit after tax (NOPAT).

Invested Capital

A look at Exhibit 12.5 reveals the companion EVA accounting adjustments that must be made to arrive at invested capital. Based on the "assets" approach, the manager or investor begins with net short-term operating capital. This reflects moneys tied up in current asset accounts like accounts receivables and inventories as well as a *normal* amount of cash needed for operations.[22] Current liability accounts such as accounts payable, accrued expenses, and taxes payable are netted from the short-term operating asset accounts. Notes payable are excluded from net short-term operating capital because they represent a source of debt financing. Also, their interest cost is reflected in the calculation of a company's dollar cost of capital.

Net plant, property, and equipment is then added to capital along with other assets and several equity-based reserve accounts. Some managers or investors may choose to adjust property, plant, and equipment to a *gross* basis by adding back accumulated depreciation in an effort to eliminate differing depreciation policies and to approximate replacement cost of assets. Obviously, the accumulated depreciation adjustment would be made in both asset and financing approaches to calculating capital along with an appropriate annual depreciation add back to arrive at NOPAT.

As shown in Exhibit 12.5, the equity reserve adjustments to arrive at invested capital include (but are not limited to) the add back of LIFO reserve, accumulated goodwill amortization, capitalized research and development, and cumulative write-off of special items like restructuring and re-engineering costs. Unfortunately, some companies view a write-off of restructuring costs that result in a reduction of capital as an immediate boost to return on invested capital and then profess progress in operations. However, unless there is an outright asset disposal, with proceeds received in the sale or liquidation, then this latter adjustment is critical for objective company benchmarking and analysis. Additionally, the present value of operating leases, if any, would be added to the EVA balance sheet to arrive at a company's overall invested capital.

[22] Research estimates on a normal range of cash required for operations vary by industry—such as 0.5% to 2% of net sales. See Copeland, Koller, and Murrin, *Valuation: Measuring and Managing the Value of Companies.*

In the sources of "financing" approach (again, see Exhibit 12.5), the analyst begins with the book value of common equity. To this, he or she adds several "equity equivalent" accounts including preferred stock, minority interest, deferred income tax reserve, and the equity reserve accounts that were listed in the "assets" approach to invested capital. Debt and debt equivalents are then added to arrive at a value-based figure for invested capital. These debt-related accounts include interest bearing short-term debt, long-term debt, and (as before) the present value of operating leases. Either way—the assets or financing approach—we arrive at invested capital for use in calculation of a firm's economic profit.

Caveats

Having introduced the "conventional"[23] accounting adjustments to estimate NOPAT and invested capital, it is important to realize that we have only provided a means to estimate the after-tax return on a company's *existing* assets. This is simply NOPAT divided by invested capital. Estimates of capital returns on future growth assets will of course require similar EVA-based accounting adjustments, but just as importantly, the forecasts themselves can be highly sensitive to unforeseen industry and macroeconomic developments. In other words, an undue focus on all the value-based accounting adjustments that might be made when estimating current economic profit components (such as NOPAT) may cause the manager or investor to miss key valuation and economic profit effects from future growth assets. Moreover, since EVA is NOPAT *less* the dollar cost of capital, the manager or investor needs to consider key economic profit issues that impact the cost of invested capital. We'll highlight some WACC concerns in the context of using CAPM to estimate the cost of equity.[24]

EVA MULTI-FACTOR RISK MODEL

In our calculation of basic EVA, we used the CAPM to estimate the cost of equity; which in turn, is a central component of the overall weighted

[23] There are even EVA refinements that can be made to standard accounting adjustments that we cite in the text. For example, the concept of positive *and* negative economic depreciation can be used to improve economic profit estimates—especially the concept of negative depreciation for strategic investments like corporate acquisitions and R&D investments. For further discussion of these "EVA on EVA" refinements, see O'Byrne, "Does Value-Based Management Discourage Investment in Intangibles?"

[24] Further insight on economic profit and the cost of capital can be found in Fabozzi and Grant, "Value-Based Metrics in Financial Theory."

average cost of capital, WACC. While CAPM is a widely used formula for the pricing of investment risk, as explained in Chapter 4, it does not fully capture risks found to systematically impact the return on stocks. This pricing omission has led to the use of multi-factor risk models that include common factors in addition to market risk (the only risk considered by the CAPM). In Chapter 13, a fundamental multi-factor risk model is described. However, currently the common factors used are based on traditional accounting measures discussed in Chapters 10 and 11 rather than on value-based metrics.

As with the CAPM, a multi-factor risk model's output is the expected return for the stock and can therefore be used to estimate the expected return on equity in the cost of capital formula. Here we describe the common factors in addition to beta used in an EVA-based factor model approach employed by Global Asset Management to estimate the required return on common stock (cost of equity). They are size (equity capitalization), NPV-to-Capital ratio, and the standard deviation of economic profit (EVA). The inclusion of the first common factor, namely size, has considerable empirical support and is also found in the fundamental multi-factor risk models.

The second common factor, NPV-to-Capital ratio, captures the risk associated with troubled firms.[25] The NPV-to-Capital ratio is a measure of a company's ability (or lack thereof) to invest in wealth creating projects. It is therefore a measure of company *strength* or resilience. In this context, wealth creators have a high NPV-to-Capital ratio, while wealth destroyers have a low to negative NPV-to-Capital ratio. For troubled or distressed companies, NPV is low or negative due to their fundamental inability to invest in projects that have an after-tax return on invested capital (ROC) that exceeds the WACC. Consequently, it can be argued that investors require high-expected return for investing in the stocks of troubled firms—companies with low to negative NPV—while comparatively low expected return for investing in the stocks of stable and robust firms—namely, companies with attractive NPV. There is empirical support for the inclusion of this factor.[26]

The standard deviation of economic profit is included as a common factor to account for the market-adjusted volatility in a company's eco-

[25] We employ the NPV-to-Capital ratio rather than price-to-book value ratio typically used in multi-factor risk models for two reasons: (1) the price/book ratio is plagued by accounting problems due to book value, and, most importantly, (2) NPV is a *direct* measure of wealth creation.

[26] See, James L. Grant, *Foundations of Economic Value Added* (New Hope, PA: Frank J. Fabozzi Associates, 1997) and Ken C. Yook and George M. McCabe, "An Examination of MVA in the Cross-Section of Expected Stock Returns," *Journal of Portfolio Management* (Spring 2001), pp. 75–87.

nomic profit. In practice, the EVA-based factor model estimate of the required return on equity is combined with the after-tax cost of debt to obtain the weighted average cost of capital, WACC. At Global Asset Management, the cost of capital is viewed as a critical input in the estimation and analysis of a company's economic profit and its stock price. Moreover, we believe that EVA factors such as the NPV-to-Capital ratio and the standard deviation of economic profit are important considerations in portfolio construction, risk control, and performance measurement.

CASH FLOW RETURN ON INVESTMENT

There are of course other prominent value-based metrics beyond EVA. In this context, we'll provide some basic insight on another well-known and widely used VBM—namely, Cash Flow Return on Investment (CFROI). While in theory, EVA and CFROI can be used to derive the same result for a company's economic profit, the two VBMs differ in practice in several important ways. Specifically, EVA is a dollar-based measure of economic profit while CFROI is an internal rate of return-type metric that measures the expected rate of return over the average life of a company's existing assets. Unlike EVA, CFROI uses gross cash flow and gross capital investment measures and the resulting IRR is measured in real terms as opposed to nominal terms.

Without getting into all the details, the following *five* steps can be used to estimate a company's CFROI:[27]

- Compute the average life of a company's existing assets
- Compute the gross cash flow
- Compute the gross investment
- Compute the sum of *non*-depreciating assets
- Solve for the CFROI (or internal rate of return)

In the first step, the average life of a company's existing assets can be measured by dividing gross depreciable assets by depreciation expense. Next, gross cash flow is equal to net income adjusted for financing expenses—such as interest expense and operating rental payments—and *non*-cash operating expenses including depreciation and amortization. Gross cash flow also includes the changes in LIFO reserve, deferred income taxes, and other equity reserve accounts.

[27] For rigorous explanation and application of CFROI, see Madden, *CFROI Valuation: A Total Systems Approach to Valuing the Firm.*

EXHIBIT 12.6 OK Beverage Company: CFROI

Gross Investment[a] (present value)	$150,000
Gross Cash Flow[b] (payment)	$20,000
Non-Depreciating Assets[c] (future value)	$72,000
Average Asset Life (n)	10 years
Nominal CFROI (IRR)	10.08%

[a] Sum of gross plant and equipment, cumulative equity reserve accounts, present value of operating leases
[b] Sum of net income, changes in equity reserves, interest and rental expense
[c] Sum of net working capital and land

In turn, gross investment includes *gross* plant and equipment and the EVA capital adjustments that we looked at before—including LIFO reserve, capitalized research and development, accumulated goodwill amortization, restructuring charges, and the present value of operating leases (among others). Also, in the CFROI calculation, *non*-depreciating assets include net short-term operating assets (current assets *less* non-interest bearing current liabilities), land, and other *non*-depreciating assets. Following the above-mentioned procedure, managers and investors can estimate a company's (nominal[28]) cash flow return on investment. The resulting CFROI or IRR-based percentage is then compared to the (percentage) cost of capital to determine whether a company's has positive or negative economic profit. Equivalently, a manager or investor, to decide whether a company is a wealth creator or a wealth destroyer, can use the "spread" between CFROI and WACC, just like we explained before using the "EVA spread."

CFROI Application

Before moving on, we'll look at the IRR (internal rate of return) nature of cash flow return on investment. We'll explain this relationship in terms of "OK Beverage Company." Suppose that after making all the necessary accounting adjustments (equity reserve accounts and other adjustments *not* shown for sake of brevity) to estimate CFROI, we obtain the *gross* cash flow and *gross* investment information for the beverage producer shown in Exhibit 12.6. The IRR "keystrokes" are indicated within parentheses.

Based on the five-step procedure to estimate CFROI, we see that OK Beverage Company's CFROI is 10.08%. This figure is equivalent to the estimated after-tax internal rate of return (IRR) earned on the company's existing assets over a useful life of 10 years. Since OK Beverage Company's estimated CFROI just meets the firm's cost of invested capi-

[28] For simplicity, we'll look at nominal as opposed to real CFROI.

tal, at 10.2% (calculated before), the firm remains in a position of wealth neutrality. Clearly, OK Beverage still needs a positive growth opportunity (as defined by CFROI *greater than* WACC) so that it can (1) (finally) become a wealth creator, and (2) experience a noticeable improvement in its enterprise value and stock price.

COMPANY SELECTION USING VBM

Now that we have explained the accounting and economic issues that surround value-based metrics such as EVA and CFROI, we'll demonstrate that an economic profit approach to company or security analysis has real world practical merit. In this context, we'll provide an overview of the economic profit (or value-based) approach to company analysis that has been developed by the authors and expanded upon elsewhere.[29] In this context, Exhibit 12.7 shows the "Excess Return on Invested Capital" versus the "Market Value of Invested Capital-to-Replacement Cost of Invested Capital"[30] for a universe of U.S. companies that we track at Global Asset Management.

In Exhibit 12.7, the excess return on invested capital is simply the after-tax return on invested capital (ROC, including the value-based accounting adjustments that we spoke of before) *less* the weighted average cost of capital (WACC). In this exhibit, we show the market value of invested capital (equivalently, the "enterprise value") measured relative to replacement cost of invested capital for consistency with the conventional method of evaluating companies in profitability versus "price-to book" context. There is *no* slippage of EVA focus here because it can be shown that the market value of invested capital-to-replacement cost of invested capital is *directly* related to a company's NPV-to-invested capital.[31]

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[29] For additional insight on security analysis using EVA, see Grant and Abate, *Focus on Value: A Corporate and Investor Guide to Wealth Creation.*

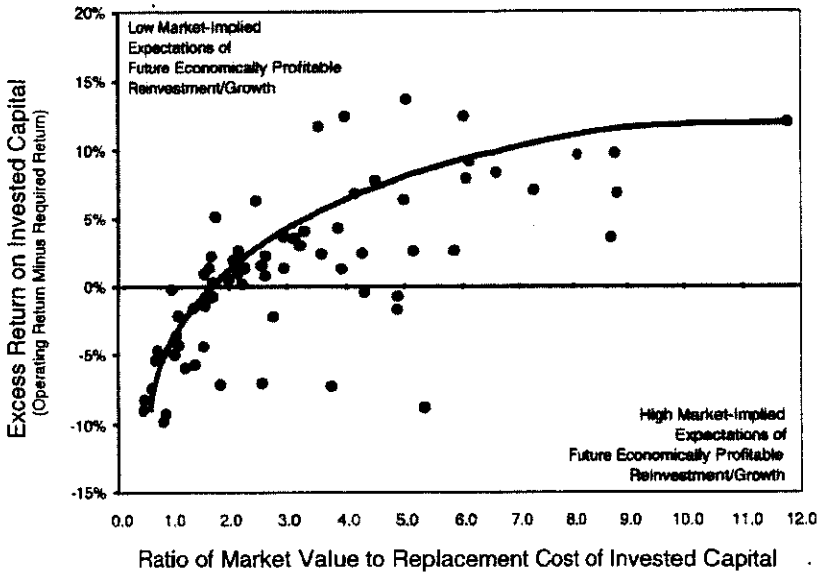
[30] Note that the "excess return on invested capital" is equivalent to the economic profit-to-capital ratio or the residual return on capital that we spoke of before. This is also referred to as the "EVA spread." Moreover, the use of market value-to-replacement cost of invested capital is really just a scaling of the NPV-to-invested capital ratio.

[31] In principle, the enterprise value-to-invested capital ratio can be written as:

$$V/C = 1 + NPV/C$$

In this expression, V refers to enterprise value (or market value of invested capital) and C is an EVA measure of invested capital. Hence, V/C is greater than one when NPV is positive, while V/C is less than one when NPV is negative. The market value of invested capital-to-replacement cost of invested capital is also a measure of "Tobin's Q."

EXHIBIT 12.7 Excess Returns Relative to Valuation



Source: James L. Grant and James A. Abate, *Focus on Value: A Corporate and Investor Guide to Wealth Creation* (New York: John Wiley & Sons, 2001).

Exhibit 12.7 shows a scatter plot of companies measured relative to a curve of "best fit" through the data points. The data points that lie above the curve represent potentially undervalued companies (or stocks), while those data points that fall below the curve represent potentially overvalued companies. For companies that plot above the curve, Exhibit 12.7 suggests that at such excess return on invested capital positions, the companies should command a higher market valuation. If correct, this upward revaluation would be reflected in a rise in the market value of invested capital-to-replacement cost of invested capital ratio. In a more fundamental sense, internal or "warranted" expectation of economic profit growth for companies that plot above the curve is higher than the market implied growth rate of economic profit imbedded in current stock price.

Specifically, while the capital market at large is expecting compression in future economic profit down to the curve for any given market value-to-replacement cost of invested capital ratio, actual internal expectations of economically profitable reinvestment for combinations above the curve imply a noticeably higher valuation for any company's stock. Astute investors can expect to earn potentially positive abnormal

return (alpha) on stocks that plot above the curve because of the fortuitously positive (and presumed consistent) economic profit positions of these companies.

Conversely, for companies that plot below the curve, Exhibit 12.7 implies that these firms should command a lower stock market valuation. In this case, internal expectation of economic profit growth is lower than the market implied growth (rate) imbedded in current share price. Here, the capital market incorrectly expects an upward revision in economic profit to the curve for any given market value of invested capital-to-replacement cost of invested capital ratio. However, consistently low to negative expectations of economically profitable reinvestment for companies that fall below the curve implies a lower stock valuation. Active-minded investors should thus look elsewhere if they are restricted to a "long only" position in common stocks. Taken together, we see that the stocks of companies that plot above the curve are potential buy opportunities, while stocks that plot below the curve are potential sell (or short sell) candidates. On a more sophisticated note, the "longs" and "shorts" can be combined into an economic profit approach to long-short investing.