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CHAPTER 32

Value Enhancement: Economic Value Added, Cash Flow Return on Investment, and Other Tools

The discounted cash flow model provides for a rich and thorough analysis of all the different ways in which a firm can increase value, but it can become complex as the number of inputs increases. It is also difficult to tie management compensation systems to a discounted cash flow model, since many of the inputs need to be estimated and can be manipulated to yield the results management wants.

If we assume that markets are efficient, we can replace the unobservable value from the discounted cash flow model with the observed market price and reward or punish managers based on the performance of the stock. Thus, a firm whose stock price has gone up is viewed as having created value, whereas one whose stock price has fallen has destroyed value. Compensation systems based on the stock price, including stock grants and warrants, have become a standard component of most management compensation packages.

While market prices have the advantage of being up-to-date and observable, they are also noisy. Even if markets are efficient, stock prices tend to fluctuate around the true value, and markets sometimes do make mistakes. Thus, a firm may see its stock price go up and its top management rewarded, even as ~~it destroys value~~. Conversely, the managers of a firm may be penalized as its stock price drops, even though the managers may have taken actions that increase firm value. The other problem with stock prices as the basis for compensation is that they are available only for the entire firm. Thus stock prices cannot be used to analyze the managers of individual divisions of a firm, or for their relative performance.

In the past decade, while firms have become more focused on value creation, they have remained suspicious of financial markets. While they might understand the notion of discounted cash flow value, they are unwilling to tie compensation to a value that is based on dozens of estimates. In this environment, new mechanisms for measuring value that are simple to estimate and use, do not depend too heavily on market movements, and do not require a lot of estimation find a ready market. While the mechanisms are too numerous to list, we focus on two in this chapter that encapsulate most of the other approaches.

1. *Economic value added (EVA),* which measures the dollar surplus value created by a firm on its existing investment.
2. *Cash flow return on investment (CFROI)*, which measures the percentage return made by a firm on its existing investments.

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This chapter looks at how each is related to discounted cash flow valuation. It also looks at the conditions under which firms using these approaches to judge performance and evaluate managers may end up making decisions that destroy value rather than create it.

ECONOMIC VALUE ADDED

The economic value added (EVA) is a measure of the dollar surplus value created by an investment or a portfolio of investments. It is computed as the product of the excess return made on an investment or investments and the capital invested in that investment or investments.

$$\begin{aligned}\text{Economic value added} &= (\text{Return on capital invested} - \text{Cost of capital}) \\ &\quad \times (\text{Capital invested}) \\ &= \text{After-tax operating income} - (\text{Cost of capital} \\ &\quad \times \text{Capital invested})\end{aligned}$$

This section begins by looking at the measurement of economic value added, then considers its links to discounted cash flow valuation, and closes with a discussion of its limitations as a value enhancement tool.

Calculating EVA

The definition of EVA outlines three basic inputs we need for its computation—the return on capital earned on investments, the cost of capital for those investments, and the capital invested in them. In measuring each of these, we will make many of the same adjustments that were discussed in the context of discounted cash flow valuation.

How much capital is there invested in existing assets? One obvious answer is to use the market value of the firm, but market value includes capital invested not just in assets in place but in expected future growth.[1] Since we want to evaluate the quality of assets in place, we need a measure of the ~~market value of~~ just these assets. Given the difficulty of estimating ~~market~~ value of assets in place, it is not surprising that we turn to the book value of capital as a proxy for the ~~market value of~~ capital invested in assets in place. The book value, however, is a number that reflects not just the accounting choices made in the current period, but also accounting decisions made over time on how to depreciate assets, value inventory, and deal with acquisitions. At the minimum, the three adjustments we made to capital invested in the discounted cash flow valuation—converting operating leases into debt, capitalizing R&D expenses, and eliminating the effect of one-time or cosmetic charges—have to be made when computing EVA as well. The older the firm, the more extensive the adjustments that have to be made to book value of capital to get to a reasonable estimate of the market value of capital invested in assets in place. Since this requires that we know and take into account every accounting decision over time, there are cases where the book value of capital is too flawed to be fixable. Here, it is best to estimate the capital invested from the ground up, starting

[1]As an illustration, computing the return on capital at Google or Apple in 2011, using the market value of the firm, instead of book value, results in a low return on capital. It would be a mistake to view this as a sign of poor investments on the part of the firm's managers.

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EVA COMPUTATION IN PRACTICE

During the 1990s, EVA was promoted most heavily by Stern Stewart, a New York–based consulting firm. The firm's founders, Joel Stern and Bennett Stewart, became the foremost evangelists for the measure. Their success spawned a whole host of imitators from other consulting firms, all of which were variants on the excess return measure.

In the process of applying this measure to real firms, Stern Stewart found that it had to modify accounting measures of earnings and capital to get more realistic estimates of surplus value. In his book *The Quest for Value* Bennett Stewart mentions some of the adjustments that should be made to capital invested, including adjusting for goodwill (recorded and unrecorded). He also suggests adjustments that need to be made to operating income, including the conversion of operating leases into financial expenses.

Many firms that adopted EVA during this period also based management compensation on measured EVA. Consequently, how it was defined and measured became a matter of significant concern to managers at every level.

with the assets owned by the firm, estimating the market value of these assets, and cumulating this market value.

To evaluate the return on this invested capital, we need an estimate of the after-tax operating income earned by a firm on these investments. Again, the accounting measure of operating income has to be adjusted for operating leases, R&D expenses, and one-time charges to compute the return on capital.

The third and final component needed to estimate the economic value added is the cost of capital. In keeping with our arguments both in the investment analysis and the discounted cash flow valuation sections, the cost of capital should be estimated based on the market values of debt and equity in the firm, rather than book value. There is no contradiction between using book value for purposes of estimating capital invested and using market value for estimating cost of capital, since a firm has to earn more than its market value cost of capital to generate value. From a practical standpoint, using the book value cost of capital will tend to understate cost of capital for most firms, and will understate it more for more highly levered firms than for lightly levered firms. Understating the cost of capital will lead to overstating the economic value added.

Economic Value Added, Net Present Value, and Discounted Cash Flow Valuation

One of the foundations of investment analysis in traditional corporate finance is the net present value rule. The net present value (NPV) of a project, which reflects the present value of expected cash flows on a project, netted against any investment needs, is a measure of dollar surplus value on the project. Thus, investing in projects with positive net present value will increase the value of the firm, while investing in projects with negative net present value will reduce value. Economic

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value added is a simple extension of the net present value rule. The net present value of the project is the present value of the economic value added by that project over its life.[2]

$$NPV = \sum_{t=1}^{t=n} \frac{EVA_t}{(1+k_c)^t}$$

where EVA_t is the economic value added by the project in year t, and the project has a life of n years.

This connection between economic value added and NPV allows us to link the value of a firm to the economic value added by that firm. To see this, let us begin with a simple formulation of firm value in terms of the value of assets in place and expected future growth:

$$\text{Firm value} = \text{Value of assets in place} + \text{Value of expected future growth}$$

Note that in a discounted cash flow model, the values of both assets in place and expected future growth can be written in terms of the net present value created by each component:

$$\text{Firm value} = \text{Capital invested}_{\text{assets in place}} + \text{NPV}_{\text{assets in place}} + \sum_{t=1}^{t=\infty} \text{NPV}_{\text{future projects, t}}$$

Substituting the economic value added version of net present value into this equation, we get:

$$\text{Firm value} = \text{Capital invested}_{\text{assets in place}} + \sum_{t=1}^{t=\infty} \frac{EVA_{t,\text{ assets in place}}}{(1+k_c)^t} + \sum_{t=1}^{t=\infty} \frac{EVA_{t,\text{ future projects}}}{(1+k_c)^t}$$

Thus the value of a firm can be written as the sum of three components: the capital invested in assets in place, the present value of the economic value added by these assets, and the expected present value of the economic value that will be added by future investments.

[2]This is true, though, only if the expected present value of the cash flows from depreciation is assumed to be equal to the present value of the salvage of the capital invested in the project. A proof of this equality can be found in my paper on value enhancement in the *Contemporary Finance Digest* in 1999.

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ILLUSTRATION 32.1: Discounted Cash Flow Value and Economic Value Added

Consider a firm that has existing assets in which it has capital invested of $100 million. Assume these additional facts about the firm:

- The after-tax operating income on assets in place is $15 million. This return on capital of 15% is expected to be sustained in the future, and the company has a cost of capital of 10%.
- At the beginning of each of the next five years, the firm is expected to make new investments of $10 million each. These investments are also expected to earn 15% as a return on capital, and the cost of capital is expected to remain 10%.
- After year 5, the company will continue to make investments, and earnings will grow 5% a year, but the new investments will have a return on capital of only 10%, which is also the cost of capital.
- All assets and investments are expected to have infinite lives.[3] Thus, the assets in place and the investments made in the first five years will make 15% a year in perpetuity, with no growth.

This firm can be valued using an economic value added approach, as follows:

Capital invested in assets in place	$100
+ EVA from assets in place = (.15 – .10)(100)/.10	$ 50
+ PV of EVA from new investments in year 1 = [(.15 – .10)(10)/.10]	$ 5
+ PV of EVA from new investments in year 2 = [(.15 – .10)(10)/.10]/1.1	$ 4.55
+ PV of EVA from new investments in year 3 = [(.15 – .10)(10)/.10]/1.1^2	$ 4.13
+ PV of EVA from new investments in year 4 = [(.15 – .10)(10)/.10]/1.1^3	$ 3.76
+ PV of EVA from new investments in year 5 = [(.15 – .10)(10)/.10]/1.1^4	$ 3.42
Value of firm	$170.85

Note that the present values are computed assuming that the cash flows on investments are perpetuities and that the investments are made at the beginning of each year. In addition, ~~today~~ value of the economic value added by the investments made in future years are discounted to today, using the cost of capital. To illustrate, the present value of the economic value added by investments made at the beginning of year 2 is discounted back one year. The value of the firm, which is $170.85 million, can be written using the earlier equation as follows:

$$\text{Firm value} = \text{Capital invested}_{\text{assets in place}} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{t,\text{ assets in place}}}{(1+k_c)^t} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{t,\text{ future projects}}}{(1+k_c)^t}$$

$$\$170.85 \text{ million} = \$100 \text{ million} + \$50 \text{ million} + \$20.85 \text{ million}$$

The value of existing assets is therefore $150 million, and the value of future growth opportunities is $20.85 million.

Another way of presenting these results is in terms of market value added (MVA). The market value added, in this case, is the difference between the firm value of $170.85 million and the capital invested of $100 million, which yields $70.85 million. This value will be positive only if the return on capital is greater than the cost of capital and will be an increasing function of the spread between the two numbers. The number will be negative if the return on capital is less than the cost of capital.

[3]Note that this assumption is purely for convenience, since it makes the net present value easier to compute. This also allows us to assume the depreciation is offset by capital maintenance expenditures.

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Note that although the firm continues to grow operating income and makes new investments after the fifth year, these marginal investments create no additional value because they earn the cost of capital. A direct implication is that it is not growth that creates value, but growth in conjunction with excess returns. This provides a ~~new~~ perspective on the quality of growth. A firm can be increasing its operating income at a healthy rate, but if it is doing so by investing large amounts at or below the cost of capital, it will not be creating value and may actually be destroying it.

This firm could also have been valued using a discounted cash flow valuation, with free cash flows to the firm discounted at the cost of capital. The following table shows expected free cash flows and the firm value, using the cost of capital of 10% as the discount rate.

	0	*1*	*2*	*3*	*4*	*5*	*Terminal Year*
EBIT(1 – t) from assets in place	$ 0.00	$15.00	$15.00	$15.00	$15.00	$ 15.00	
EBIT(1 – t) from investments—Year 1		$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	
EBIT(1 – t) from investments—Year 2			$ 1.50	$ 1.50	$ 1.50	$ 1.50	
EBIT(1 – t) from investments—Year 3				$ 1.50	$ 1.50	$ 1.50	
EBIT(1 – t) from investments—Year 4					$ 1.50	$ 1.50	
EBIT(1 – t) from investments—Year 5						$ 1.50	
Total EBIT(1 – t)		$16.50	$18.00	$19.50	$21.00	$ 22.50	$23.63
– Net capital expenditures	$ 10.00	$10.00	$10.00	$10.00	$10.00	$ 11.25	$11.81
FCFF		$ 6.50	$ 8.00	$ 9.50	$11.00	$ 11.25	$11.81
PV of FCFF	($ 10)	$ 5.91	$ 6.61	$ 7.14	$ 7.51	$ 6.99	
Terminal value						$236.25	
PV of terminal value						$146.69	
Value of firm	$170.85						
Return on capital	15%	15%	15%	15%	15%	15%	10%
Cost of capital	10%	10%	10%	10%	10%	10%	10%

In looking at this valuation, note the following:

- The capital expenditures occur at the beginning of each year and thus are shown in the previous year. The investment of $10 million in year 1 is shown in period 0, the year 2 investment in year 1, and so on.
- In year 5, the net investment needed to sustain growth is computed by using two assumptions—that growth in operating income would be 5% a year beyond year 5, and that the return on capital on new investments starting in year 6 (which is shown in year 5) would be 10%.

$$\text{Net investment}_5 = [EBIT_6(1-t) - EBIT_5(1-t)]/ROC_6 = (\$23.625 - \$22.50)/.10 = \$11.25 \text{ million}$$

The value of the firm obtained by discounting free cash flows to the firm at the cost of capital is $170.85, which is identical to the value obtained using the economic value added approach.

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ILLUSTRATION 32.2: An EVA Valuation of Lululemon in 2011

Lululemon is a Canadian apparel company, specializing in exercise and leisure clothes. To illustrate the equivalence of FCFF and EVA valuations, we will begin with a discounted cash flow valuation of the company, using the following inputs:

Length	*Summary of Inputs: Boeing High-Growth Phase 10 years (5 years of constant growth, 5 years of transition)*	*Stable-Growth Phase Forever after Year 10*
Growth inputs		
– Reinvestment rate	50.00%	30.00%
– Return on capital	35.00%	10.00%
– Expected growth rate	17.50%	3.00%
Cost of capital inputs		
– Beta	1.40	1.10
– Cost of debt	NA	5.00%
– Debt ratio	0.00%	20.00%
– Cost of capital	10.50%	7.80%
General information		
– Tax rate	40%	40%

The risk-free rate was 3.5% and the equity risk premium was estimated to be 5%. During the transition period, we adjust the growth rate, reinvestment rate and cost of capital in linear increments from high growth levels to stable growth values. With these inputs, we can estimate the free cash flows to the firm in the following table:

Expected Free Cashflows to the Firm: Lululemon (in '000s)

Year	*EBIT (a – t)*	*Expected Growth Rate*	*Reinvestment Rate*	*FCFF*	*Cost of Capital*	*Cumulated Cost of Capital*	*PV*
Base	$106,756		50.00%	$53,378			
1	$125,438	17.50%	50.00%	$ 62,719	10.50%	1.1050	$ 56,759.20
2	$147,389	17.50%	50.00%	$ 73,695	10.50%	1.2210	$ 60,354.80
3	$173,183	17.50%	50.00%	$ 86,591	10.50%	1.3492	$ 64,178.19
4	$203,490	17.50%	50.00%	$101,745	10.50%	1.4909	$ 68,243.77
5	$239,100	17.50%	50.00%	$119,550	10.50%	1.6474	$ 72,566.91
6	$274,009	14.60%	46.00%	$147,965	9.98%	1.8118	$ 81,665.09
7	$306,068	11.70%	42.00%	$177,519	9.45%	1.9830	$ 89,518.51
8	$333,002	8.80%	38.00%	$206,461	8.91%	2.1597	$ 95,596.60
9	$352,649	5.90%	34.00%	$232,748	8.36%	2.3402	$ 99,454.60
10	$363,228	3.00%	30.00%	$254,260	7.80%	2.5228	$100,785.36
Sum							$789,123.02

The sum of the present value of the cash flows over the growth period is $789.123 million. The terminal value is estimated based upon the cash flow in the terminal year and the cost of capital of 7.80%.

$$\text{Terminal value (in '00)} = \frac{\text{EBIT}(1 - \text{tax rate})_{10}\,(1+g)(1 - \text{Reinvestment rate})}{(\text{Cost of capital} - g)}$$

$$= \frac{\$363{,}228(1.03)(1-.30)}{(.078-.03)} = \$5{,}455{,}994$$

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The discounted cash flow estimate of the value of the operating assets in Lululemon is shown below:

$$\text{Value of operating assets (in '000s)} = \$789{,}123 + \frac{5{,}455{,}994}{2.5228} = \$2{,}951{,}809$$

In the following table, we estimate the EVA for Lululemon each year for the next 10 years, and the present value of the EVA. To make these estimates, we begin with the current capital invested in the firm of $353,394 (thousands) and add the reinvestment each year to obtain the capital invested at the start of the next year

Present Value of EVA (in '000s) for high growth period

Year	Capital Invested at Start of Year	Reinvestment	Return on Capital	Cost of Capital	EVA	Cumulated Cost of Capital	PV
1	$ 358,394	$ 62,719	35.00%	10.50%	$ 87,806	1.1050	$ 79,463
2	$ 421,113	$ 73,695	35.00%	10.50%	$103,173	1.2210	$ 84,497
3	$ 494,807	$ 86,591	35.00%	10.50%	$121,228	1.3492	$ 89,849
4	$ 581,399	$101,745	35.00%	10.50%	$142,443	1.4909	$ 95,541
5	$ 683,144	$119,550	35.00%	10.50%	$167,370	1.6474	$101,594
6	$ 802,694	$126,044	34.14%	9.98%	$193,906	1.8118	$107,021
7	$ 928,738	$128,549	32.96%	9.45%	$218,313	1.9830	$110,090
8	$1,057,286	$126,541	31.50%	8.91%	$238,810	2.1597	$110,575
9	$1,183,827	$119,901	29.79%	8.36%	$253,691	2.3402	$108,403
10	$1,303,728	$108,969	27.86%	7.80%	$261,538	2.5228	$103,670
Sum							$990,704

AU: Six million, seven hundred forty-one thousand...thousands? (Here and below.)

The sum of the present values of the EVA for the high growth period is $990,704 (thousands). At the end of year 10, the firm continues to earn excess returns (albeit at a lower pace), with a return on capital of 10% in perpetuity and a cost of capital of 7.80%. We compute the present value of the EVA after year 10 as follows:

$$\text{PV of EVA after year 10} = \frac{\text{EBIT}(1-t)_{10}\,(1+g) - (\text{Capital invested}_{11})(\text{Cost of capital}_{11})}{(\text{Cost of capital}_{11} - g)}$$

$$= \frac{\$1{,}303{,}728(1.03) - (3,\,741{,}253)(0.078)}{(.078 - .03)}$$

$$= \$1{,}741{,}701 \text{ (thousands)}$$

AU: Is Stable ROC the denominator just for (1+g)? Is .10 the denominator just for (1.03)? Need more fences to clarify

The total EVA can be computed by adding the present value of the terminal EVA to the present value of EVA over the next 10 years:

$$\text{PV of EVA from Assets in place} = \$990{,}704 + \frac{\$1{,}741{,}701}{2.5228} = \$1{,}670{,}405 \text{ (thousands)}$$

Note that the capital invested in the terminal EVA computation is an imputed capital invested based on the expected after tax operating income in the terminal year and the assumed ROC of 10%:

$$\text{Imputed capital invested} = \frac{\text{EBIT}\,(1-\text{t})_{10}\,(1+\text{g})}{\text{Stable ROC}}$$

$$= \frac{\$1{,}303{,}728(1.03)}{.10}$$

$$= \$3{,}741{,}253$$

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If we had not made this adjustment, the capital invested at the start of year 11 would have been only $1,412,696 (thousands):

$$\text{DCF capital invested} = \text{Capital invested}_{10} + \text{Reinvestment}_{10}$$
$$= \$1{,}303{,}728 + \$108{,}969 = \$1{,}412{,}696$$

The final component of value captures the present value of this change in capital invested:

$$\text{Change in capital invested at end of year 10} = \text{Imputed capital invested} - \text{DCF capital invested}$$
$$= \$3{,}741{,}253 - \$1{,}412{,}696 = \$2{,}328{,}557$$

AU: I[illegible]uted" correct?

$$\text{PV of change in capital invested} = \frac{\$2{,}328{,}557}{2.5228} = \$923{,}010 \text{ (thousands)}$$

The total value of the firm (in thousands) can then be computed as follows:

Capital invested in assets in place	= $ 358,394
PV of EVA from assets in place	= $1,670,405
PV of change in capital invested	= $ 923,010
Value of operating assets	= $2,951,809

This is identical to the value from the discounted cash flow model.



fcffeva.xls: **This spreadsheet allows you to convert a discounted cash flow valuation into an EVA valuation, and vice versa.**

EVA and Firm Value: Potential Conflicts

Assume that a firm adopts economic value added as its measure of value and decides to judge managers on their capacity to generate greater-than-expected economic value added. What is the potential for abuse? Is it possible for a manager to deliver greater than expected economic value added, while destroying firm value at the same time? If so, how can we protect stockholders against these practices?

To answer these questions, let us go back to the earlier equation where we decomposed firm value into capital invested, the present value of economic value added by assets in place, and the present value of economic value added by future growth.

$$\text{Firm value} = \text{Capital invested}_{\text{assets in place}} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{t,\text{ assets in place}}}{(1+k_c)^t}$$
$$+ \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{t,\text{ future projects}}}{(1+k_c)^t}$$

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EVA VALUATION VERSUS DCF VALUATION: WHEN THEY WILL DISAGREE

To get the same value from discounted cash flow and EVA valuations, you have to ensure that the following conditions hold:

- The after-tax operating income that you use to estimate free cash flows to the firm should be equal to the after-tax operating income you use to compute Economic Value Added. Thus, if you decide to adjust the operating income for operating leases and research and development expenses when doing discounted cash flow valuation, you have to adjust it for computing EVA as well.
- The growth rate you use to estimate after-tax operating income in future periods should be estimated from fundamentals when doing discounted cash flow valuation. In other words, it should be set to:

$$\text{Growth rate} = \text{Reinvestment rate} \times \text{Return on capital}$$

If growth is an exogenous input into a DCF model and the relationship between growth rates, reinvestments, and return on capital outlined above does not hold, you will get different values from DCF and EVA valuations.

- The capital invested that is used to compute EVA in future periods should be estimated by adding the reinvestment in each period to the capital invested at the beginning of the period. The EVA in each period should be computed as follows:

$$EVA_t = \text{After-tax operating income}_t - \text{Cost of capital} \times \text{Capital invested}_{t-1}$$

- You have to make consistent assumptions about terminal value in your discounted cash flow and EVA valuations. In the special case, where the return on capital on all investments—existing and new—is equal to the cost of capital after your terminal year, this is simple to do. The terminal value will be equal to your capital invested at the beginning of your terminal year. In the more general case, you will have to ensure that the capital invested at the beginning of your terminal year is consistent with your assumption about return on capital in perpetuity. In other words, if your after-tax operating income in your terminal year is 1.2 billion and you are assuming a return on capital of 10 percent in perpetuity, you will have to set your capital invested at the beginning of your terminal year to be $12 billion.

The Capital Invested Game The first two terms in the preceding equation, the capital invested and the present value of economic value added by these investments, are both sensitive to the measurement of capital invested. If capital invested is reduced, keeping the operating income constant, the first term in the equation will drop but the present value of economic value added will increase proportionately. To illustrate, consider the firm valued in Illustration 32.1. Assume that the capital invested is estimated to be $50 million rather than $100 million, and that the

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TABLE 32.1 EVA Valuation of Firm: EVA and Assets in Place

Capital invested in assets in place	$ 50.00
+ EVA from assets in place = (.30 – .10)(50)/.10	$100.00
+ PV of EVA from new investments in year 1 = [(.15 – .10)(10)/.10]	$ 5.00
+ PV of EVA from new investments in year 2 = [(.15 – .10)(10)/.10]/1.1	$ 4.55
+ PV of EVA from new investments in year 3 = [(.15 – .10)(10)/.10]/1.1^2	$ 4.13
+ PV of EVA from new investments in year 4 = [(.15 – .10)(10)/.10]/1.1^3	$ 3.76
+ PV of EVA from new investments in year 5 = [(.15 – .10)(10)/.10]/1.1^4	$ 3.42
Value of firm	$170.85

operating income on these investments stays at $15 million. This will increase the return on capital on existing assets to 30 percent. The assumptions about future investments remain unchanged. The firm value can then be written as shown in Table 32.1.

The value of the firm is unchanged, but it is redistributed to the economic value added component. When managers are judged on the economic value added, there will be strong incentives to reduce the capital invested, at least as measured for EVA computations.

There are some actions managers can take to reduce capital invested that truly create value. Thus, in the example, if the reduction in capital invested came from closing down a plant that does not (and is not expected to) generate any operating income, the cash flow generated by liquidating the plant's assets will increase value. Some actions, however, are purely cosmetic in terms of their effects on capital invested and thus do not create and may even destroy value. For instance, firms can take one-time restructuring charges that reduce capital, or lease assets rather than buy them because the capital impact of leasing may be smaller.

To illustrate the potential destructiveness of these actions, assume that the managers of the firm in Illustration 32.1 are able to replace half their assets with leased assets. Assume further that the estimated capital invested in these leased assets is only $40 million, which is lower than the capital invested in the replaced assets of $50 million. In addition, assume that the action actually reduces the adjusted annual operating income from these assets from $15 million to $14.8 million. The value of the firm can now be written in Table 32.2. Note that the firm value declines by $2 million, but the economic value added increases by $8 million.

When economic value added is estimated for divisions, the capital invested at the divisional level is a function of a number of allocation decisions made by the firm, with the allocation based on prespecified criteria (such as revenues or number of

TABLE 32.2 Value Reduction with Higher EVA

Capital invested in assets in place	$ 90.00
+ EVA from assets in place = (.1644 – .10)(90)/.10	$ 58.00
+ PV of EVA from new investments in year 1 = [(.15 – .10)(10)/.10]	$ 5.00
+ PV of EVA from new investments in year 2 = [(.15 – .10)(10)/.10]/1.1	$ 4.55
+ PV of EVA from new investments in year 3 = [(.15 – .10)(10)/.10]/1.1^2	$ 4.13
+ PV of EVA from new investments in year 4 = [(.15 – .10)(10)/.10]/1.1^3	$ 3.76
+ PV of EVA from new investments in year 5 = [(.15 – .10)(10)/.10]/1.1^4	$ 3.42
Value of firm	$168.85

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employees). While we would like these rules to be objective and unbiased, they are often subjective and overallocate capital to some divisions and underallocate it to others. If this misallocation were purely random, we could accept it as error and use changes in economic value added to measure success. Given the natural competition that exists among divisions in a firm for the marginal investment dollar, however, these allocations are also likely to reflect the power of individual divisions to influence the process. Thus, the economic value added will be overestimated for those divisions that are underallocated capital, and underestimated for divisions that are overallocated capital.

The Future Growth Game The value of a firm is the value of its existing assets and the value of its future growth prospects. When managers are judged on the basis of economic value added in the current year, or on year-to-year changes, the economic value added that is being measured is just that from assets in place. Thus, managers may trade off the economic value added from future growth for higher economic value added from assets in place.

Again, this point can be illustrated simply using the firm in Illustration 32.1. The firm earned a return on capital of 15 percent on both assets in place and future investments. Assume that there are actions the firm can take to increase the return on capital on assets in place to 16 percent, but that ~~this action reduces~~ the return on capital on future investments to 12 percent. The value of this firm can then be estimated in Table 32.3. Note that the value of the firm has decreased, but the economic value added in year 1 is higher now than it was before. ~~In fact, the~~ economic value added at this firm for each of the next five years is graphed in Figure 32.1 for both the original firm and this one. The growth trade-off, while leading to a lower firm value, results in economic value added in each of the first three years that is larger than it would have been without the trade-off.

Compensation mechanisms based on EVA are sometimes designed to punish managers who give up future growth for current EVA. Managers are partly compensated based on the economic value added this year, but another part is held back in a compensation bank and is available to the manager only after a period (say three or four years). There are significant limitations with these approaches. First, the limited tenure that managers have with firms implies that this measure can at best look at economic value added only over the next three or four years. The real costs of the growth trade-off are unlikely to show up until much later. Second, these approaches are really designed to punish managers who increase economic value added in the current period while reducing economic value added in future periods. In the more subtle case, where the economic value added continues to increase but at a rate lower than it otherwise would have, it is difficult to devise a punishment for managers who trade off future

TABLE 32.3 Trading Off Future Growth for Higher EVA

Capital invested in assets in place	$100.00
+ EVA from assets in place = (.16 – .10)(100)/.10	$ 60.00
+ PV of EVA from new investments in year 1 = [(.12 – .10)(10)/.10]	$ 2.00
+ PV of EVA from new investments in year 2 = [(.12 – .10)(10)/.10]/1.1	$ 1.82
+ PV of EVA from new investments in year 3 = [(.12 – .10)(10)/.10]/1.1^2	$ 1.65
+ PV of EVA from new investments in year 4 = [(.12 – .10)(10)/.10]/1.1^3	$ 1.50
+ PV of EVA from new investments in year 5 = [(.12 – .10)(10)/.10]/1.1^4	$ 1.37
Value of firm	$168.34

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growth. In the preceding example, for instance, the economic value added with the growth trade-off increases over time. The increases are smaller than they would have been without the trade-off, but that number would not have been observed, anyway.

The Risk Shifting Game The value of a firm is the sum of the capital invested and the present value of the economic value added. The latter term is therefore a function not just of the dollar economic value added but also of the cost of capital. A firm can invest in projects to increase its economic value added but still end up with a lower value, if these investments increase its operating risk and cost of capital.

Again, using the firm in Illustration 32.1, assume that the firm is able to increase its return on capital on both assets in place and future investments from 15 percent to 16.25 percent and from 10 percent to 11 percent after year 5. Simultaneously, assume that the cost of capital increases to 11 percent. The economic value added in each year for the next five years is contrasted with the original economic value added in each year in Figure 32.2. While the economic value added in each year is higher with the high-risk strategy, the value of the firm is shown in Table 32.4. Note that the risk effect dominates the higher excess dollar returns, and the value of the firm decreases.

This risk shifting can be dangerous for firms that adopt economic value added based on objective functions. When managers are judged based on year-to-year economic value added changes, there will be a tendency to shift into riskier investments. This tendency will be exaggerated if the measured cost of capital does not reflect the changes in risk or lags it.[4]

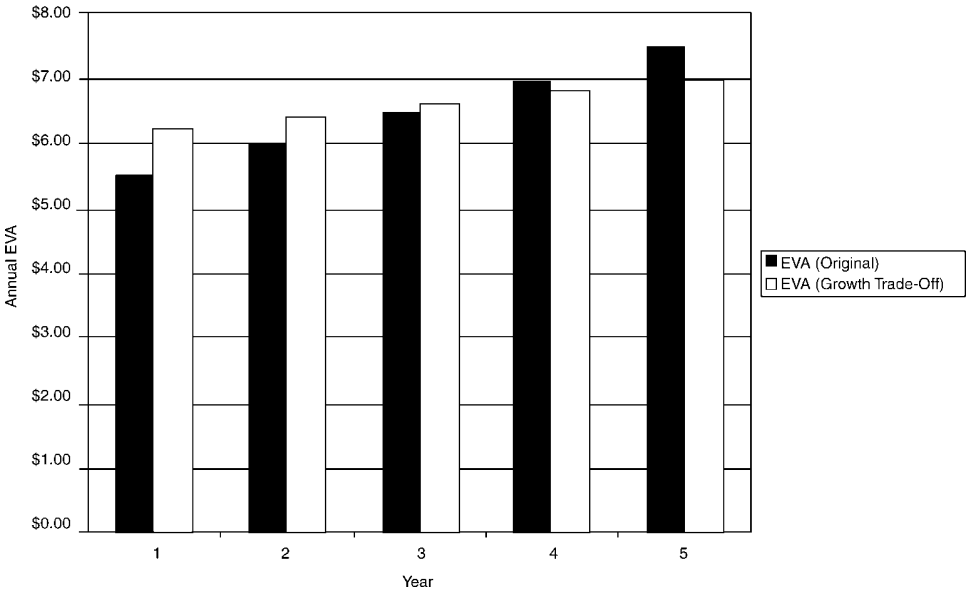


FIGURE 32.1 Annual EVA: With and Without Growth Trade-Off

[4]In fact, beta estimates that are based on historical returns will lag changes in risk. With a five-year return estimation period, for instance, the lag might be as long as three years and the full effect will not show up for five years after the change.

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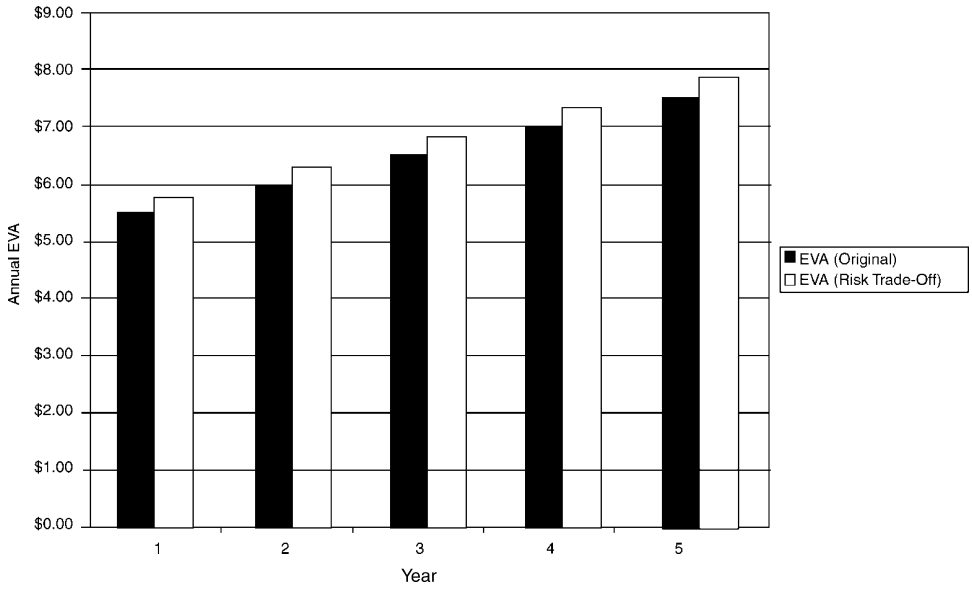


FIGURE 32.2 EVA: Higher Risk and Return

TABLE 32.4 EVA with High-Risk Strategy

Capital invested in assets in place	$100.00
+ EVA from assets in place = (.1625 – .11) (100)/.11	$ 47.73
+ PV of EVA from investments in year 1 = [(.1625 – .11)(10)/.11]	$ 4.77
+ PV of EVA from investments in year 2 = [(.1625 – .10)(10)/.11]/1.11	$ 4.30
+ PV of EVA from investments in year 3 = [(.1625 – .11)(10)/.11]/1.11^2	$ 3.87
+ PV of EVA from investments in year 4 = [(.1625 – .11)(10)/.11]/1.11^3	$ 3.49
+ PV of EVA from investments in year 5 = [(.1625 – .11)(10)/.11]/1.11^4	$ 3.14
Value of firm	$167.31

In closing, economic value added is an approach skewed toward assets in place and away from future growth. It should not be surprising, therefore, that when economic value added is computed at the divisional level of a firm, the higher-growth divisions end up with the lowest economic value added, and in some cases with negative economic value added. Again, while these divisional managers may still be judged based on changes in economic value added from year to year, the temptation at the firm level to reduce or eliminate capital invested in these divisions will be strong, since it will make the firm's overall economic value added look much better.

EVA and Market Value

Will increasing economic value added cause market value to increase? While an increase in economic value added will generally lead to an increase in firm value, barring the growth and risk games described earlier, it may or may not increase the stock price. This is so because the market value has built into it expectations of

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EVA FOR HIGH-GROWTH FIRMS

The fact that the value of a firm is a function of the capital invested in assets in place, the present value of economic value added by those assets, and the economic value added by future investments points to some of the dangers of using it as a measure of success or failure for high-growth and especially high-growth technology firms. In particular, there are three problems:

1. We have already noted many of the problems associated with how accountants measure capital invested at technology firms. Given the centrality of capital invested to economic value added, these problems have a much bigger effect when firms use EVA than when you use discounted cash flow valuation.
2. When 80 percent to 90 percent of your value comes from future growth potential, the risks of managers trading off future growth for current EVA are magnified. It is also very difficult to monitor these trade-offs at young firms.
3. The constant change that these firms go through also makes them much better candidates for risk shifting. In this case, the negative effect (of a higher discount rate) can more than offset the positive effect of a higher economic value added.

Finally, it is unlikely that there will be much correlation between actual changes in economic value added at technology firms and changes in market value. The market value is based on expectations of economic value added in future periods, and investors expect an economic value added that grows substantially each year. Thus if the economic value added increases, but by less than expected, you could see its market value drop on the report.



eva.xls: **This dataset on the Web summarizes economic value added by industry group for the United States.**

future economic value added. Thus a firm like ~~Microsoft~~ is priced on the assumption that it will earn large and increasing economic value added over time. Whether a firm's market value increases or decreases on the announcement of higher economic value added will depend in large part on what the expected change in economic value added was. For mature firms, where the market might have expected no increase or even a decrease in economic value added, the announcement of an increase will be good news and cause the market value to increase. For firms that are perceived to have good growth opportunities and are expected to report an increase in economic value added, the market value will decline if the announced increase in economic value added does not measure up to expectations. This should be no surprise to investors, who have recognized this phenomenon with earnings per share for decades; the earnings announcements of firms are judged against expectations, and the earnings surprise is what drives prices.

We would therefore not expect any correlation between the magnitude of the economic value added and stock returns, or even between the change in economic

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value added and stock returns. Stocks that report the biggest increases in economic value added should not necessarily earn high returns for their stockholders.[5] These priors are confirmed by a study done by Richard Bernstein at Merrill Lynch, who examined the relationship between EVA and stock returns, and concluded that:

- A portfolio of the 50 firms which had the highest absolute levels[6] of economic value added earned an annual return on 12.9% between February 1987 and February 1997, while the S&P index returned 13.1% a year over the same period.
- A portfolio of the 50 firms that had the highest growth rates[7] in economic value added over the previous year earned an annual return of 12.8% over the same time period.

Equity Economic Value Added

While EVA is usually calculated using total capital, it can easily be modified to be an equity measure:

$$\begin{aligned}\text{Equity EVA} &= (\text{Return on equity} - \text{Cost of equity})(\text{Equity invested in project or firm}) \\ &= \text{Net income} - \text{Cost of equity}(\text{Equity invested})\end{aligned}$$

Again, a firm that earns a positive equity EVA is creating value for its stockholders while a firm with a negative equity EVA is destroying value for its stockholders.

Why might a firm use this measure rather than the traditional measure? Chapter 21, when looking at financial service firms, noted that defining debt (and therefore capital) ~~may~~ open you open to measurement problems, since so much of the firm could potentially be categorized as debt. Consequently, it was argued that financial service firms should be valued using equity valuation models and multiples. Extending that argument to economic value added holds that equity EVA is a much better measure of performance for financial service firms than the traditional EVA measure.

It must be added that much or all of the issues raised in the context of the traditional EVA measure affect the equity EVA measure as well. Banks and insurance companies can play the capital invested, growth, and risk games to increase equity EVA just as other firms can with traditional EVA.

CASH FLOW RETURN ON INVESTMENT

The cash flow return on investment (CFROI) for a firm is the internal rate of return on existing investments, based on real cash flows. Generally, it should be compared to the real cost of capital to make judgments about the quality of these investments.

Calculating CFROI

The cash flow return on investment for a firm is calculated using four inputs. The first is the gross investment (GI) the firm has in its existing assets, obtained by

[5]A study by Kramer and Pushner found that differences in operating income (NOPAT) explained differences in market value better than differences in EVA. O'Byrne (1996), however, finds that changes in EVA explain more than 55 percent of changes in market value over five-year periods.

[6]See Quantitative Viewpoint, Merrill Lynch, December 19, 1997.

[7]See Quantitative Viewpoint, Merrill Lynch, February 3, 1998.

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adding back cumulated depreciation and inflation adjustments to the book value. The second input is the gross cash flow (GCF) earned in the current year on that asset, which is usually defined as the sum of the after-tax operating income of a firm and the ~~noncharges~~ against earnings, such as depreciation and amortization. The third input is the expected life of the assets (n) in place at the time of the original investment, which varies from sector to sector but reflects the earning life of the investments in question. The expected salvage value (SV) of the assets at the end of this life, in current dollars, is the final input. This is usually assumed to be the portion of the initial investment, such as land and building, that is not depreciable, adjusted to current dollar terms. The CFROI is the internal rate of return of these cash flows (i.e., the discount rate that makes the net present value of the gross cash flows and salvage value equal to the gross investment), and it can thus be viewed as a composite internal rate of return in current dollar terms.



n = Life of the asset at time of original purchase
CFROI is the internal rate of return that makes the PV of GCF + SV = GI

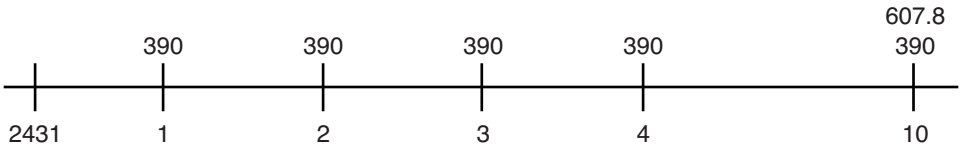
An alternative formulation of the CFROI allows for setting aside an annuity to cover the expected replacement cost of the asset at the end of the project life. This annuity is called the economic depreciation and is computed as follows:

$$\text{Economic depreciation} = \frac{\text{Replacement cost in current dollars}(k_c)}{\left[\left(1+k_c\right)^n - 1\right]}$$

where n is the expected life of the asset, k_c is the cost of capital, and the expected replacement cost of the asset is defined in current dollar terms to be the difference between the gross investment and the salvage value. The CFROI for a firm or a division can then be written as follows:

$$\text{CFROI} = \frac{\text{Gross cash flow} - \text{Economic depreciation}}{\text{Gross investment}}$$

For instance, assume that you have existing assets with a ~~book value~~ of $2,431 million, a gross cash flow of $390 million, an expected salvage value (in today's dollar terms) of $607.8 million, and a life of 10 years.



CFROI = Internal rate of return = 11.71%

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The conventional measure of CFROI is 11.71 percent, and the real cost of capital is 8 percent. The estimate using the alternative approach is computed as follows:

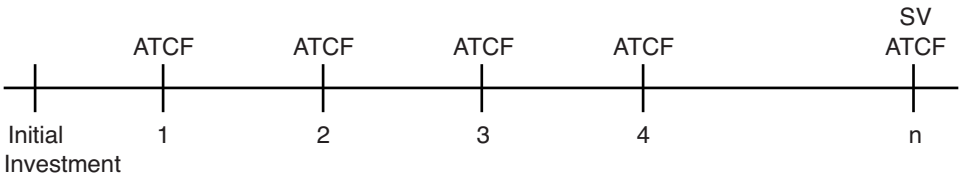
$$\text{Economic depreciation} = \frac{(\$2.431 \text{ billion} - \$0.6078 \text{ billion})(.08)}{(1.08^{10}-1)} = \$125.86 \text{ million}$$

$$\begin{aligned}\text{CFROI} &= (\$390.00 \text{ million} - \$125.86 \text{ million})/\$2{,}431 \text{ million} \\ &= 10.87\%\end{aligned}$$

The difference in the reinvestment rate assumption accounts for the difference in CFROI estimated using the two methods. In the first approach, intermediate cash flows get reinvested at the internal rate of return, while in the second, at least the portion of the cash flows that are set aside for replacement get reinvested at the cost of capital. In fact, if we estimated that the economic depreciation using the internal rate of return of 11.71 percent, the two approaches would yield identical results.[8]

Cash Flow Return on Investment, Internal Rate of Return, and Discounted Cash Flow Value

If net present value provides the genesis for the economic value added approach to value enhancement, the internal rate of return is the basis for the CFROI approach. In investment analysis, the internal rate of return on a project is computed using the initial investment on the project and all cash flows over the project's life:



where the ATCF is the after-tax cash flow on the project, and SV is the expected salvage value of the project assets. This analysis can be done entirely in nominal terms, in which case the internal rate of return is a nominal IRR and is compared to the nominal cost of capital, or in real terms, in which case it is a real IRR and is compared to the real cost of capital.

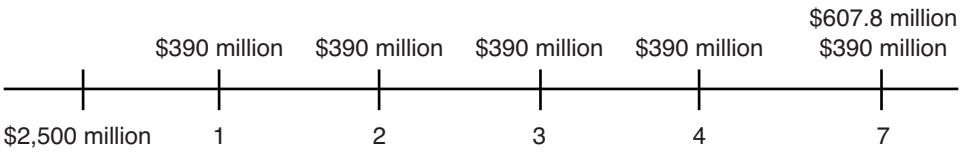
At first sight, the CFROI seems to do the same thing. It uses the gross investment in the project (in current dollars) as the equivalent of the initial investment, assumes that the gross current-dollar cash flow is maintained over the project life and computes a real internal rate of return. There are, however, some significant differences.

The internal rate of return does not require the after-tax cash flows to be constant over a project's life, even in real terms. The CFROI approach assumes that real cash flows on assets do not ~~increase~~, over time. This may be a reasonable assumption for investments in mature sectors, but will understate project returns if there is real growth. ~~Note, however, that the CFROI approach can be modified to allow for real growth.~~

[8]With an 11.71 percent rate, the economic depreciation works out to $105.37 million, and the CFROI to 11.71 percent.

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The second difference is that the internal rate of return on a project or asset is based on incremental future cash flows. It does not consider cash flows that have occurred already, since these are viewed as "sunk." The CFROI, on the other hand, tries to reconstruct a project or asset, using both cash flows that have occurred already and cash flows that are yet to occur. To illustrate, consider the project described in the previous section. At the time of the original investment, assuming that the inputs for initial investment, after-tax cash flows, and salvage value are unchanged, both the internal rate of return and the CFROI of this project would have been 11.71 percent. The CFROI is, however, being computed three years into the project life and remains at 11.71 percent since none of the original inputs have changed. The IRR of this project will change, though. It will now be based on the current market value of the asset, the expected cash flows over the remaining life of the asset, and a life of seven years. Thus, if the market value of the asset has increased to $2.5 billion, the internal rate of return on this project would be computed to be only 6.80 percent.



Given the real cost of capital of 8 percent, this would mean that the CFROI is greater than the cost of capital, while the internal rate of return is lower. Why is there a difference between the two measures, and what are the implications? The reason for the difference is that IRR is based entirely on expected future cash flows, whereas the CFROI is not. A CFROI that exceeds the cost of capital is viewed as a sign that a firm is deploying its assets well. If the IRR is less than the cost of capital, that interpretation is false, because the owners of the firm would be better off selling the asset and getting the market value for it rather than continuing its operation.

To link the cash flow return on investment with firm value, let us begin with a simple discounted cash flow model for a firm in stable growth:

$$\text{Firm value} = \frac{FCFF_1}{(k_c - g_n)}$$

where FCFF is the expected free cash flow to the firm k_c is the cost of capital, and g_n is the stable growth rate. Note that this can be rewritten, approximately, in terms of the CFROI as follows:

$$\text{Firm value} = \frac{[(CFROI \times GI - DA)(1- t)-(CX - DA) - \Delta WC]}{(k_c - g_n)}$$

where CFROI is the cash flow return on investment, GI is the gross investment, DA is the depreciation and amortization, CX is the capital expenditure and ΔWC is the change in working capital. To illustrate, consider a firm with a CFROI of 30%, a gross investment of $100 million, capital expenditures of $15 million, depreciation of $10 million, and no working capital requirements. If we assume a 10 percent cost of capital, a 40 percent tax rate, and a 5 percent stable growth rate, it would be valued as follows:

$$\text{Firm value} = \frac{[(.30 \times 100 - 10)(1-.4)-(15 -10)-0]}{(.10 - .05)} = \$140 \text{ million}$$

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More important than the mechanics, however, is the fact that firm value, while a function of the CFROI, is also a function of the other variables in the equation—the gross investment, the tax rate, the growth rate, the cost of capital, and the firm's reinvestment needs.

Again, sophisticated users of CFROI do recognize the fact that value comes from the CFROI not just on assets in place but also on future investments. In fact, Holt Associates, one of CFROI's leading proponents, allows for a fade factor in CFROI, where the current CFROI fades toward the real cost of capital over time. The fade factor is estimated empirically by looking at firms in different CFROI classes and tracking them over time. Thus, a firm that has a current CFROI of 20 percent and real cost of capital of 8 percent will be projected to have lower CFROI over time. The value of the firm, in this more complex format, can then be written as a sum of the following:

- The present value of the cash flows from assets in place over their remaining life, which can be written as:

$$\sum_{t=1}^{t=n} \frac{CFROI_{aip} \times GI_{aip}}{(1+k_c)^t}$$

  where $CFROI_{aip}$ is the CFROI on assets in place, GI_{aip} is the gross investment in assets in place, and k_c is the real cost of capital.

- The present value of the excess cash flows from future investments, which can be written in real terms as

$$\sum_{t=1}^{t=\infty} \frac{CFROI_{t,NI} \times \Delta GI_t}{(1+k_c)^t} - \Delta GI_t$$

  where $CFROI_{t,NI}$ is the CFROI on new investments made in year t and ΔGI_t is the new investment made in year t. Note that if $CFROI_{t,NI} = k_c$, this present value is equal to zero.

Thus, a firm's value will depend on the CFROI it earns on assets in place and both the abruptness and the speed with which this CFROI fades toward the cost of capital. Thus, a firm can therefore potentially increase its value by doing either of the following:

- Increasing the CFROI from assets in place for a given gross investment.
- Reducing the speed at which the CFROI fades toward the real cost of capital.

Note that this is no different from our earlier analysis of firm value in the discounted cash flow approach in Chapter 31, in terms of cash flows from existing investments (increase current CFROI), the length of the high growth period (reduce fade speed), and the growth rate during the growth period (keep excess returns from falling as steeply).



cfroi.xls: **This spreadsheet allows you to estimate the cash flow return on investment for a firm or project.**

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CFROI and Firm Value: Potential Conflicts

The relationship between CFROI and firm value is less intuitive than the relationship between EVA and firm value, partly because it is a percentage return. Notwithstanding this fundamental weakness, managers can take actions that increase CFROI while reducing firm value.

- *Reduce gross investment.* If the gross investment in existing assets is reduced, the CFROI may be increased. Since it is the product of CFROI and gross investment that determines value, it is possible for a firm to increase CFROI and end up with a lower value.
- *Sacrifice future growth.* CFROI, even more than EVA, is focused on existing assets and does not look at future growth. To the extent that managers increase CFROI at the expense of future growth, the value can decrease while CFROI goes up.
- ~~*Trade off risk.*~~ While the CFROI is compared to the real cost of capital to pass judgment on whether a firm is creating or destroying value, it represents only a partial correction for risk. The value of a firm is still the present value of expected future cash flows. Thus a firm can increase its spread between the CFROI and cost of capital but still end up losing value if the present value effect of having a higher cost of capital dominates the higher CFROI.

In general, then, an increase in CFROI does not, by itself, indicate that the firm value has increased, since it might have come at the expense of lower growth and/or higher risk.

CFROI INNOVATIONS: THE FADE FACTOR AND IMPLIED COST OF CAPITAL

The biggest contribution made by practitioners who use CFROI has been the work that they have done on how returns on capital fade over time toward the cost of capital. Madden (1999) makes the argument that not only is this phenomenon widespread but it is at least partially predictable. He presents evidence done by Holt Associates, a leading proponent of CFROI, which sorted the largest 1,000 firms by CFROI from highest to lowest, and tracked them over time to find a convergence toward an average. It should be noted that this book has used fade factors, without referring to them as such, in the chapters on discounted cash flow valuation. The fade to a lower return on capital occurred either precipitously in the terminal year or over a transition period. ~~It was mentioned that the return on capital could converge to the cost of capital or to the industry average.~~

To compute the cost of capital, CFROI practitioners look to the market instead of the risk and return models that we have used to compute DCF value. Using the current market values of stocks and their estimates of expected aggregate cash flows, they compute internal rates of return that they use as the cost of capital in analysis. Chapter 7 used a very similar approach to estimate an implied risk premium, though this premium was used as an input into traditional risk and return models.

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CFROI and Market Value

There is a relationship between CFROI and market value. Firms with high CFROI generally have high market value. This is not surprising, since it mirrors what we noted earlier about economic value added. However, it is *changes* in market value that create returns, not market value per se. When it comes to market value changes, the relationship between CFROI and value changes tends to be much weaker. Since market values reflect expectations, there is no reason to believe that firms that have high CFROI will earn excess returns.

The relationship between changes in CFROI and excess returns is more intriguing. To the extent that any increase in CFROI is viewed as a positive surprise, firms with the biggest increases in CFROI should earn excess returns. In reality, however, the actual change in CFROI has to be measured against expectations; if CFROI increases, but less than expected, the market value should drop; if CFROI drops but by less than expected, the market value should increase.

A POSTSCRIPT ON VALUE ENHANCEMENT

The value of a firm has three components. The first is its capacity to generate cash flows from existing assets, with higher cash flows translating into higher value. The second is its willingness to reinvest to create future growth, and the quality of these reinvestments. Other things remaining equal, firms that reinvest well and earn significant excess returns on these investments will have higher value. The final component of value is the cost of capital, with higher costs or capital resulting in lower firm values. To create value, then, a firm has to:

- Generate higher cash flows from existing assets, without affecting its growth prospects or its risk profile.
- Reinvest more and with higher excess returns, without increasing the riskiness of its assets.
- Reduce the cost of financing its assets in place or future growth, without lowering the returns made on these investments.

All value enhancement measures are variants on these simple themes. Whether these approaches measure dollar excess returns, as does economic value added, or percentage excess returns, like CFROI, they have acquired followers because they seem simpler and less subjective than discounted cash flow valuation. This simplicity comes at a cost, since these approaches make subtle assumptions about other components of value that are often not visible or not recognized by many users. Approaches that emphasize economic value added and reward managers for increasing the same often assume that increases in economic value added are not being ~~accomplished~~ at the expense of future growth or by increasing risk. Practitioners who judge performance based on the cash flow return on investment make similar assumptions.

Is there something of value in the new value enhancement measures? Absolutely, but only in the larger context of valuation. One of the inputs we need for traditional valuation models is the return on capital (to get expected growth). Making the adjustments to operating income suggested by those who use economic value added and augmenting it with a cash flow return, with CFROI, may help us come up with

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a better estimate of this number. The terminal value computation in traditional valuation models, where small changes in assumptions can lead to large changes in value, becomes much more tractable if we think in terms of excess returns on investments rather than just growth and discount rates. Finally, the empirical evidence that has been collected by practitioners who use CFROI on fade factors can be invaluable in traditional valuation models, where practitioners sometimes make the mistake of assuming that current returns will continue forever.

CONCLUSION

This chapter considers two widely used value enhancement measures. Economic value added measures the dollar excess return on existing assets. The cash flow return on investment is the internal rate of return on existing assets, based on the original investment in these assets and the expected future cash flows. While both approaches can lead to conclusions consistent with traditional discounted cash flow valuation, their simplicity comes at a cost. Managers can take advantage of measurement limitations in both approaches to make their firms look better with either approach while reducing firm value. In particular, they can trade off less growth in the future for higher economic value added today and shift to riskier investments.

As we look at various approaches to value enhancement, we should consider a few facts. The first is that no value enhancement mechanism will work at generating value unless there is a commitment on the part of managers to making value maximization their primary objective. If managers put other goals first, then no value enhancement mechanism will work. Conversely, if managers truly care about value maximization, they can make almost any mechanism work in their favor. The second is that while it is sensible to connect whatever value enhancement measure we have chosen to management compensation, there is a downside. Managers, over time, will tend to focus their attention on making themselves look better on that measure even if that can be accomplished only by reducing firm value. Finally, there are no magic bullets that create value. Value creation is hard work in competitive markets and almost involves a trade-off between costs and benefits. Everyone has a role in value creation, and it certainly is not the sole domain of financial analysts. In fact, the value created by financial engineers is smaller and less significant than the value created by good strategic, marketing, production, or personnel decisions.

QUESTIONS AND SHORT PROBLEMS

In the problems following, use an equity risk premium of 5.5 percent if none is specified.

1. Everlast Batteries Inc. has hired you as a consultant. The firm had after-tax operating earnings in 1998 of $180 million and net income of $100 million, and it paid a dividend of $50 million. The book value of equity at the end of 1998 was $1.25 billion, and the book value of debt was $350 million. The firm raised $50 million of new debt during 1998. The market value of equity at the end of 1998 was twice the book value of equity, and the market value of debt was the same

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as the book value of debt. The firm has a cost of equity of 12% and an after-tax cost of debt of 5%.
   a. Estimate the return on capital earned by Everlast Batteries.
   b. Estimate the cost of capital earned by Everlast Batteries.
   c. Estimate the economic value added by Everlast Batteries.
2. Assume, in the preceding problem, that Everlast Batteries is in stable growth, and that it expects its economic value added to grow at 5% a year forever.
   a. Estimate the value of the firm.
   b. How much of this value comes from excess returns?
   c. What is the market value added (MVA) of this firm?
   d. How would your answers to a, b, and c change if you were told that there would be no economic value added after year 5?
3. Stereo City is a retailer of stereos and televisions. The firm has operating income of $150 million, after operating lease expenses of $50 million. The firm has operating lease commitments for the next five years and beyond:

Year	*Operating Lease Commitment*
1	55
2	60
3	60
4	55
5	50
Years 6–15	40 each year

   The book value of equity is $1 billion, and the firm has no debt outstanding. The firm has a cost of equity of 11% and a pretax cost of borrowing of 6%. The tax rate is 40%.
   a. Estimate the capital invested in the firm, before and after adjusting for operating leases.
   b. Estimate the return on capital, before and after adjusting for operating leases.
   c. Estimate the economic value added, before and after adjusting for operating leases. (The market value of equity is $2 billion.)
4. Sevilla Chemicals earned $1 billion in after-tax operating income on capital invested of $5 billion last year. The firm's cost of equity is 12%, its debt-to-capital ratio is 25%, and the after-tax cost of debt is 4.5%.
   a. Estimate the economic value added by Sevilla Chemicals last year.
   b. Assume now that the entire chemical industry earned $40 billion after taxes on capital invested of $180 billion, and that the cost of capital for the industry is 10%. Estimate the economic value added by the entire industry.
   c. Based on economic value added, how did Sevilla do relative to the industry?
5. Jeeves Software is a small software firm in high growth. The firm is all equity financed. In the current year, the firm earned $20 million in after-tax operating income on capital invested of $60 million. The firm's cost of equity is 15%.
   a. Assume that the firm will be able to grow its economic value added 15% a year for the next five years, and that there will be no excess returns after year 5. Estimate the value of the firm. How much of this value comes from the EVA and how much from capital invested?
   b. Now, assume the firm is able to reduce its capital invested this year by $20 million by selling its assets and leasing them back. Assuming operating income and cost of capital do not change as a result of the sale-lease-back, estimate

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the value of the firm now. How much of the value of the firm now comes from EVA and how much from capital invested?

6. Healthy Soups is a company that manufactures canned soups made without preservatives. The firm has assets that have a book value of $100 million. The assets are five years old and have been depreciated $50 million over that period. In addition, the inflation rate over those five years has averaged 2% a year. The assets are currently earning $15 million in after-tax operating income. They have a remaining life of 10 years, and the depreciation each year is expected to be $5 million. At the end of these 10 years, the assets will have an expected salvage value, in current dollars, of $50 million.
   a. Estimate the CFROI of Healthy Foods, using the conventional CFROI approach.
   b. Estimate the CFROI of Healthy Foods, using the economic depreciation approach.
   c. If Healthy Foods has a cost of capital in nominal terms of 10%, and the expected inflation rate is 2%, evaluate whether Healthy Foods' existing investments are value-creating or value-destroying.