Value Creation and Enhancement: Back to the Future

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Abstract

In recent years, firms have turned to their attention increasingly to ways in which they can increase their value. A number of competing measures, each with claims to being the "best" approach to value creation, have been developed and marketed by investment banking firms and consulting firms. In this paper, we begin with a generic discounted cash flow model, and consider the ways in which value can be created or destroyed in a firm. We then look at two of the most widely used value enhancement measures, Economic Value Added and Cash Flow Return on Investment, and consider where these approaches yield similar results to those obtained from traditional valuation models, and where (and why) there might be differences. In conclusion, we show that there is little that is new or unique in these competing measures, and while they might be simpler than traditional discounted cash flow valuation, the simplicity comes at a cost that is substantial for high growth firms with shifting risk profiles.

Financial theorists have long argued that the objective in decision making should be to maximize firm value. Managers and practitioners have often criticized them for being too single minded about value maximization and for not considering the broader aspects of corporate strategy or the interests of other stakeholders. In the last decade, however, managers seem to have come around to the view that value maximization should be, if not the only, at least the primary objective for their firms. This turn-around can be partly attributed to the frustration that many of them have felt with strategic consulting and its failures, or partly to an increase in their ownership of equity in the firms that they manage. Whatever the reason, the shift of focus to value maximization has created an opening for investment bankers and consultants to offer their advice on the best ways to create value.

To exploit this opening and differentiate their offerings, firms have come up with measures that they claim offer new insights into value enhancement. In some cases, these measures have been promoted as needing less information than traditional approaches, and in other cases, the claim is made that value is better estimated using these new measures. In this paper, we return to basics. We begin with a generic model of value, where we relate value to expected cash flows in the future and consider all of the potential routes that are available for a firm to create value. In the process, we consider the interaction between corporate finance and the other functional areas of the firm, as well as the role that corporate strategy can play in value creation. We then look at two of the most widely used value enhancement strategies, Economic Value Added(EVA) and its numerous imitators, and Cash Flow Return on Investment (CFROI), and examine their roots in discounted cash flow valuation. We consider how they are used in practice, and the potential limitations with using each approach. We conclude with the arguments that there is little that is new, unique or revolutionary in either of these approaches, and that the way in which they are often used in practice leaves them open to abuse.

The Determinants of Value

The value of any asset is a function of the cash flows generated by that asset, the life of the asset, the expected growth in the cash flows and the riskiness associated with the cash flows. Building on one of the first principles in finance, the value of an asset can be viewed as the present value of the expected cash flows on that asset.

$$\text{Value of Asset} = \sum_{t=1}^{t=N} \frac{E(\text{Cash Flow}_t)}{(1+r)^t}$$

where the asset has a life of N years and r is the discount rate that reflects both the riskiness of the cash flows and financing mix used to acquire it. If we view a firm as a collection of assets, this approach can be extended to value a firm, using cash flows to the firm over its life and a discount rate that reflects the collective risk of the firm's assets. This process is complicated by the fact that while some of the assets of a firm have already been made, and are thus assets-in-place, a significant component of firm value reflects expectations about future investments. Thus, to value a firm we need to measure not just the cash flows from investments already made, but also estimate the expected value from future growth. In the following section, we will consider some of the basic principles that should guide our estimates of cash flows, growth and discount rates.

1. Cash Flow to the Firm

The cash flow to the firm that we would like to estimate should be both after taxes and after all reinvestment needs have been met. Since a firm includes both debt and equity investors, the cash flow to the firm should be before interest and principal payments on debt.

The cash flow to the firm can be measured in two ways. One is to add up the cash flows to all of the different claim holders in the firm. Thus, the cash flows to equity investors (which take the form of dividends or stock buybacks) are added to the cash flows to debt holders (interest and net debt payments) to arrive at the cash flow. The other approach to estimating cash flow to the firm, which should yield equivalent results, is to estimate the cash flows to the firm prior to debt payments but after reinvestment needs have been met:

EBIT (1 - tax rate)

– (Capital Expenditures - Depreciation)

– Change in Non-cash Working Capital

= Free Cash Flow to the Firm

The difference between capital expenditures and depreciation (net capital expenditures) and the increase in non-cash working capital represent the reinvestments made by the firm to generate future or contemporaneous growth.

Another way of presenting the same equation is to cumulate the net capital expenditures and working capital change into one number, and state it as a percentage of the after-tax operating income. This ratio of reinvestment to after-tax operating income is called the reinvestment rate, and the free cash flow to the firm can be written as:

Free Cash Flow to the Firm = EBIT (1-t) (1 – Reinvestment Rate)

Note that the reinvestment rate can exceed 100%[1], if the firm has substantial reinvestment needs. If that occurs, the free cash flow to a firm will be negative even though after-tax operating income is positive.

2. Expected Growth

In valuation, it is the expected future cash flows that determine value. While the definition of the cash flow, described in the last section, still holds, it is the forecasts of earnings, net capital expenditures and working capital that will yield these cash flows. One of the most significant inputs into any valuation is the expected growth rate in operating income. While one could use past growth or consider analyst forecasts to make this

[1] In practical terms, this firm will have to raise external financing, either from debt or equity or both, to cover the excess reinvestment.

estimate, the fundamentals that drive growth are simple. The expected growth in operating income is a product of a firm's reinvestment rate, i.e., the proportion of the after-tax operating income that is invested in net capital expenditures and changes in non-cash working capital, and the quality of these reinvestments, measured as the return on the capital invested.

$$\text{Expected Growth}_{EBIT} = \text{Reinvestment Rate} * \text{Return on Capital}$$

where,

$$\text{Reinvestment Rate} = \frac{\text{Capital Expenditure - Depreciation} + \Delta \text{ Non-cash WC}}{\text{EBIT (1 - tax rate)}}$$

$$\text{Return on Capital} = \text{EBIT (1-t)} / \text{Capital Invested}$$

Both measures should be forward looking and the return on capital should represent the expected return on capital on future investments. Having said that, it is often based upon the firm's return on capital on assets in place, where the book value of capital is assumed to measure the capital invested in these assets. Implicitly, we assume then that the current accounting return on capital is a good measure of the true returns earned on assets in place, and that this return is a good proxy for returns that will be made on future investments.

3. Discount Rate

The expected cashflows need to be discounted back at a rate that reflects the cost of financing these assets. The cost of capital is a composite cost of financing, that reflects the costs of both debt and equity, and their relative weights in the financing structure:

$$\text{Cost of Capital} = k_{equity} \text{ (Equity/(Debt+Equity))} + k_{debt} \text{ (Debt/(Debt + Equity))}$$

where the cost of equity represents the rate of return required by equity investors in the firm, and the cost of debt measures the current cost of borrowing, adjusted for the tax benefits of borrowing. The weights on debt and equity have to be market value weights.

Without getting into the specifics of models of risk and return in finance, the cost of equity should reflect the risk added on by an investment to a diversified portfolio and can be measured with a beta (in the single-factor model) or betas.

4. Asset Life

Publicly traded firms do not have finite lives. Given that we cannot estimate cash flows forever, we generally impose closure in valuation models by stopping our estimation of cash flows sometime in the future and then computing a terminal value that reflects all cash flows beyond that point. A number of different approaches exist for computing the terminal value, including the use of multiples. The approach that is most consistent with a discounted cash flow model is one where we assume that cash flows, beyond the terminal year, will grow at a constant rate forever, in which case the terminal value can be estimated as follows:

$$\text{Terminal value}_n = \text{FCFF}_{n+1} / (\text{Cost of Capital}_{n+1} - g_n)$$

where the cost of capital and the growth rate in the model are sustainable forever. It is this fact, i.e., that they are constant forever, that allows us to put some reasonable constraints on them. Since no firm can grow forever at a rate higher than the growth rate of the economy in which it operates, the stable growth rate cannot be greater than the overall growth rate of the economy. In the same vein, stable growth firms should be of average risk . Finally, the relationship between growth and reinvestment rates that we noted earlier can be used to generate the free cash flow to the firm in the first year of stable growth:

$$\text{Terminal Value} = \frac{\text{EBIT}_{n+1}(1-t)\left(1 - \frac{g_n}{\text{ROC}_n}\right)}{(\text{WACC}_n - g_n)}$$

where the ROC_n is the return on capital that the firm can sustain in stable growth. In the special case where ROC is equal to the cost of capital, this estimate simplifies to become the following:

$$\text{Terminal Value}_{\text{ROC=WACC}} = \frac{\text{EBIT}_{n+1}(1-t)}{\text{WACC}_n}$$

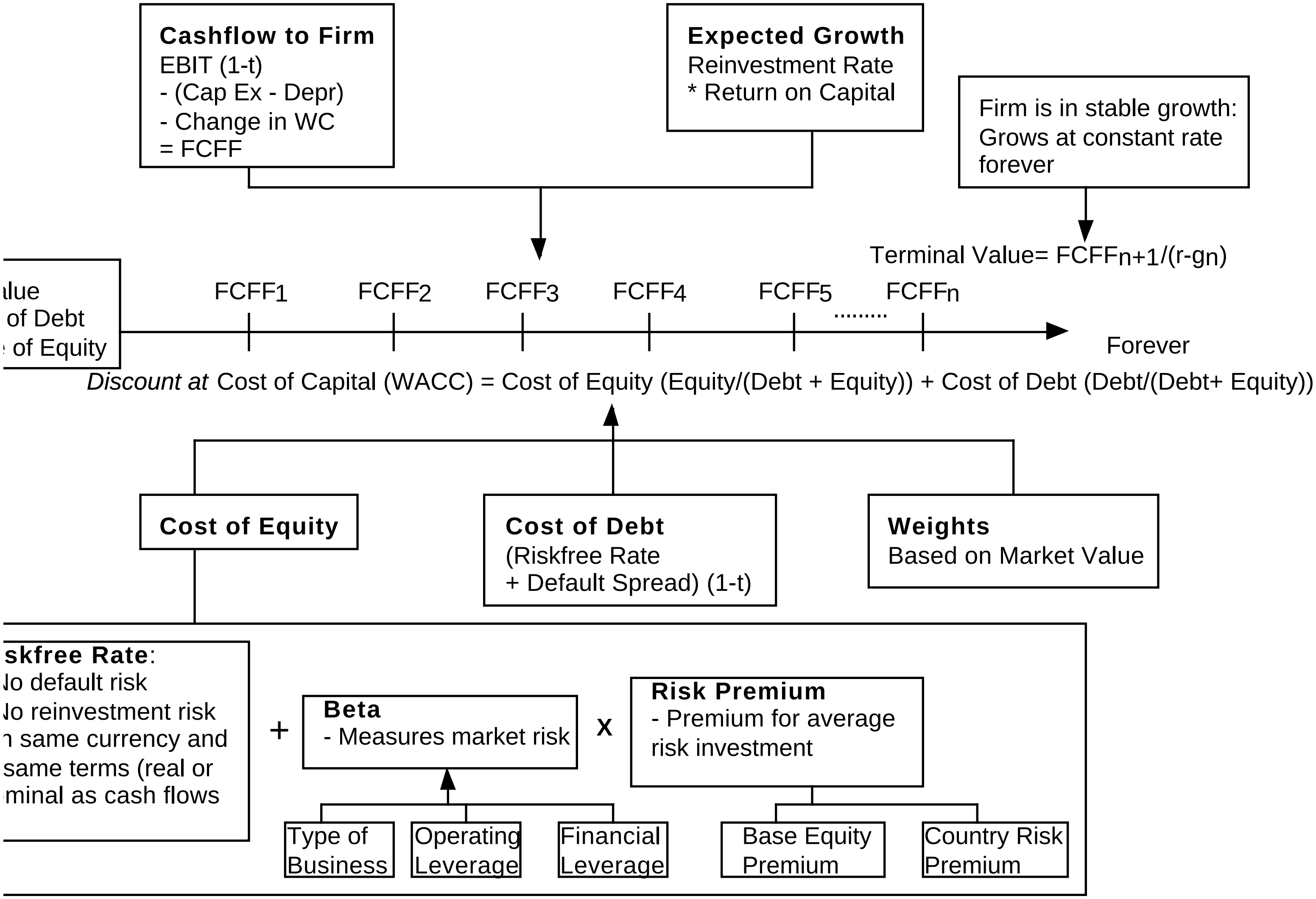
Thus, in every discounted cash flow valuation, there are two critical assumptions we need to make on stable growth. The first relates to when the firm that we are valuing will become a stable growth firm, if it is not one already. The second relates to what the characteristics of the firm will be in stable growth, in terms of return on capital and cost of capital.

5. Bringing it All Together

In summary, then, to value any firm, we begin by estimating how long high growth will last, how high the growth rate will be during that period and the cash flows during the period. We end by estimating a terminal value and discounting all of the cash flows, including the terminal value, back to the present to estimate the value of the firm. Figure 1 summarizes the process and the inputs in a discounted cash flow model.

This spreadsheet allows you to estimate the value of a firm, when there is the potential for high growth for a period of time.

Figure 1: Firm Value



A Framework for Value Creation

In this section, we will explore the requirements for an action to be value creating, and then go on to explore the different ways in which a firm can go about creating value. In the process, we will also examine the role that marketing decisions, production decisions and strategic decisions have in value creation.

Value Creating and Value Neutral Actions

For an action to be value creating, it has to do one or more of the following:

1. increase the cash flows generated by assets in place currently,
2. increase the expected growth rate in earnings,
3. increase the length of the high growth period
4. reduce the cost of capital that is applied to discount the cash flows

Conversely, an action that does not do affect cash flows, the expected growth rate, the length of the high growth period or the cost of capital cannot affect value.

While this might seem obvious, there are a number of value-neutral actions taken by firms that receive disproportionate attention from both managers and analysts. Consider three examples:

1. Stock dividends and stock splits change the number of units of equity in a firm but do not affect cash flows, growth[2] or value.
2. Accounting changes in inventory valuation and depreciation methods that are restricted to the reporting statements and do not affect tax calculations have no effect on cashflows, growth or value.
3. When doing acquisitions, firms often try to structure the deal in such a way that they can pool their assets and not show the market premium paid in the acquisition. When

[2] There are some who argue that a stock split may affect market perceptions of growth. This may be true but real growth can be affected only by changes in the reinvestment rate or the return on capital.

they fail and they are forced to show the difference between market value and book value as goodwill, their earnings are reduced by the amortization of the goodwill over subsequent periods. This amortization is not tax deductible, however, and thus does not affect the cash flows of the firm. Thus, whether a firm adopts purchase or pooling accounting, and how long it takes to write off the goodwill do not really make any difference to value.

Ways of Increasing Value

A firm can increase its value by increasing cash flows from current operations, increasing expected growth and the period of high growth and by reducing its composite cost of financing. In reality, however, none of these is easily accomplished and is likely to reflect all of the qualitative factors that we are often accused of ignoring in valuation - the quality of management, the strength of brand name, strategic decisions and good marketing.

1. Increase Cash Flows From Assets In Place

The first place to look for value is in the assets in place of the firm. These assets reflect investments that have already been made by the firm and they generate the current operating income for the firm. To the extent that these investments earn less than their cost of capital, or are earning less than they could, if optimally managed, there is potential for value creation.

1.1: Poor Investments: Keep, Divest or Liquidate

Every firm has some investments that can be categorized as poor investments, earning less than what they need to make to break even (the cost of capital) and sometimes even losing money. At first sight, it would seem to be a simple argument to make that investments that do not earn their cost of capital should either be liquidated or divested. If, in fact, one could get back the original capital on liquidation, this would be true, but that assumption is not generally true. To see why, consider three different measures of value for an existing investment. The first is the continuing value, and reflects the present value of the expected cash flows from continuing the investment through the end of its life. The second is the liquidation or salvage value, which is the net cash flow that the firm will receive if it terminated the project today. Finally, there is the divestiture value, which is the price that will be paid by the highest bidder for this investment.

Whether a firm should continue with an existing project, liquidate the project or sell it to someone else will depend upon which of the three values- continuing, liquidating or divestiture - is highest. If the continuing value is the highest, the firm should continue with the project to the end of its life, even though it might be earning less than the cost of capital. If the liquidation or divestiture value is higher than the continuing value, there is a potential for an increase in value. The value increment can then be summarized below:

If liquidation is optimal: Expected Value Increase = Liquidation Value - Continuing Value

If divestiture is optimal: Expected Value Increase = Divestiture Value - Continuing Value

1.2: Improving Operating Efficiency

The operating efficiency of a firm plays a large role in determining its operating margin and, thus, its operating income. If a firm can increase its operating margin on existing assets, it will generate additional value. There are a number of indicators of this potential, but the most important is a measure of how much a firm's operating margin deviates from its peer group. Firms whose current operating margins are well below their industry average have to start off with the presumption, at least, that there is a tangible reason for the difference and try to "fix" it.

In most firms, this is the first leg of value enhancement and it takes the form of cost cutting and layoffs. At the same time, note that these actions are value enhancing only if the resources that are pruned are not contributing adequately either to current operating income or to future growth. It is all too easy for companies, however, to show increases in current operating income by cutting back on expenditures (such as research and training) that are designed to create future growth.

1.3: Reducing the Tax Burden

The value of a firm is the present value of its after-tax cash flows. Thus, any action that can reduce the tax burden on a firm, for a given operating income, will increase value. While there are some aspects of the tax code that offer no flexibility to the firm, the tax rate of a firm can be reduced over time by doing any or all of the following:

1. Multinational firms that generate earnings in different markets may be able to move income from high-tax locales to low-tax or no-tax locales.
2. A firm may be able to acquire net operating loss carry forwards that can be used to shield future income. In fact, this might provide the rationale for a profitable firm acquiring an unprofitable one.
3. A firm can use risk management to reduce the average tax rate paid over time on income because the marginal tax rate on income tends to rise, in most tax regimes, as income increases. By using risk management to smooth income over time, firms can make their income more stable and reduce their exposure to the highest marginal tax rates. This is especially the case when there are windfall or supernormal profit taxes.

1.4: Reducing net capital expenditures on assets in place

The net capital expenditures refers to the difference between capital expenditures and depreciation, and, as a cash outflow, it reduces the free cash flow to the firm. Part of the net capital expenditure is designed to generate future growth, but part of is to maintain assets in place. If a firm can reduce its net capital expenditures on assets in place, it will increase value. During short periods, the capital expenditures can even be lower than depreciation for assets in place, creating a cash inflow from net capital expenditures.

There is generally a trade off between capital maintenance expenditures and the life of asset in place. A firm that does not make any capital expenditures on assets in place will generate much higher after-tax cash flows from these assets, but the assets will have a far shorter life. At the other extreme, a firm that reinvests all of the cash flows it gets from depreciation back into capital maintenance may be able to extend the life of its assets in place significantly. This trade-off, again, is often ignored when firms embark on cost cutting and reduce or eliminate capital maintenance expenditures. While these actions increase cash flows from assets in place in the current period, the firm might actually lose value as it depletes these assets faster.

1.5: Reducing non-cash Working capital

The non-cash working capital in a firm can be measured as the difference between non-cash current assets, generally inventory and accounts receivable, and the non-debt portion of current liabilities, generally accounts payable. Since money invested in non-cash working capital is tied up and cannot be used elsewhere; thus, increases in non-cash working capital represent cash outflows, while decreases represent cash inflows. For retailing firms and firms in the service industry, this item may be a much larger drain in cash flows than traditional capital expenditures.

At first sight, the path to value creation seems simple. Reducing non-cash working capital as a percent of revenues should increase cash flows, and therefore, value. This, however, assumes that there are no negative consequences for growth and operating income. Firms generally maintain inventory and provide credit because it allows them to sell more. If cutting back on one or both results in lost sales, the net effect on value may be negative.

The advent of technology and the availability of updated reliable data has made it easier for firms to plan, and reduced the need for inventory and working capital. In fact, the average non-cash working capital as a percent of revenues at major US corporations has dropped from 17.6% in 1988 to 14.5% in 1998.

2. Increase Expected Growth

A firm with low current cash flows can still have high value if it is able to grow quickly. As noted earlier, higher growth can come either from more reinvestment or a higher return on capital. Higher growth does not always translate into higher value, since the growth effect can be offset by changes elsewhere in the valuation. Thus, higher reinvestment rates usually result in higher expected growth but at the expense of lower cash flows, since reinvestment reduces the free cash flows. Higher returns on capital also cause expected growth to increase, but value can still go down if the new investments are in riskier businesses and there is a more than proportionate increase in the cost of capital.

2.1: Increase the reinvestment rate

The trade off from increasing the reinvestment rate is provided below. On the right, we present the positive effect of reinvesting more, which is higher growth. On the left, we measure the negative effect of reinvesting more, which is the drop in free cash flows:

Negative Effects	*Positive Effects*
Reduces free cash flow to firm: FCFF = EBIT (1- tax rate) * (1- Reinvestment Rate)	Increases Expected Growth: Expected Growth = Reinvestment Rate * Return on Capital Invested

One could work through the entire valuation and examine if the present value of the additional cash flows created by higher growth is greater than the present value of the actual reinvestments made, in cash flow terms. There is, however, a far simpler test that allows us to determine the effect on value. Note that the net present value of a project measures the value added by the project to overall firm value and that the net present value is positive only if the internal rate of return on the project exceeds the cost of capital. If we make the assumption that the accounting return on capital on a project is a reasonable proxy for the internal rate of return[3], then increasing the reinvestment rate will increase value if and only if the return on capital is greater than the cost of capital. If the return on capital is less than

[3] As we will see later in this paper, the internal rate of return converges on the return on capital as the project life approaches infinity.

the cost of capital, the positive effects of growth will be more than offset by the negative effects of making the reinvestment.

Note that the return on capital that we are talking about here is the marginal return on capital, i.e., the return on capital earned on the actual reinvestment, rather than the average return on capital. Given that firms tend to take projects in the order of their returns, the average returns on capital will tend to be greater than the marginal returns on capital. Thus, a firm with a return on capital of 18% and a cost of capital of 12% may really be making only 11% on its marginal project. In addition, the marginal return on capital will be much lower if the increase in the reinvestment rate is substantial. Thus, we have to be cautious about assuming large changes in the reinvestment rate while keeping the current return on capital constant.

2.2. Increase the Return on Capital

A firm that is able to increase its return on capital, while keeping the cost of capital fixed, has found an undiluted value lever. The increase in growth will increase value, and there are no offsetting effects. If, however, the increase in return on capital comes from the firm entering new businesses that are far riskier than its existing business, there might be an increase in the cost of capital that offsets the increase in growth. The general rule for value creation remains simple, however. As long as the projects, no matter how risky they are, have a marginal return on capital that exceeds the cost of capital, they will create value.

Using this comparison, firms that have returns on capital that are less than their cost of capital can get an increase in value from improving their returns on capital, but they would get an even greater increase in value by not investing at all and returning the cash to the owners of the business. Liquidation or partial liquidation might be the most value enhancing strategy for firms trapped in businesses where it is impossible to earn the cost of capital.

2.3: Pricing Decisions, Return on Capital and Value Creation

The return on capital on a project or firm can be written as a function of its after-tax operating margin and its turnover ratio.

ROC = EBIT (1-t)/ Sales * Sales/ Capital

= After-tax Operating Margin * Capital Turnover Ratio

By decomposing the return on capital into margin and turnover ratio components, we get some insight into how product pricing decisions can be used to enhance value. When firms increase prices for their products, they improve operating margins but reduce sales (and turnover ratios). The extent to which revenues will drop will depend upon how elastic the demand for the product is and how competitive the overall product market is.

Michael Porter[4] suggests that when it comes to pricing strategy, there are two basic routes a firm can take. It can choose to be a volume leader, reducing price and hoping to increase volume sufficiently to compensate. For this strategy to work, the firm needs a cost advantage over its competitors, to prevent predatory pricing that may make all firms in the sector worse off. Alternatively, it can attempt to be a price leader, increasing prices and hoping that the effect on volume will be smaller. From a purely value maximization standpoint, we can examine which approach yields the higher value and use that approach. In doing so, however, it is critical that we not assume a static environment[5] and consider the actions that the firm's competitors would take in response to the firm's actions.

[4] "Competitive Strategy", Michael Porter

[5] The effect of pricing actions on value are among the most difficult to analyze, because they are the most likely to attract counter actions from competitors. Thus, a firm that reduces prices to increase turnover may find its competitors cutting prices in response, and end up with lower margins and a lower turnover. (The airlines in the late eighties are a good example)

2.4: Acquisitions and Value Creation

All too often, firms use one set of rules for investment projects and another set of rules for acquisitions. In general, acquisitions are judged far more loosely than traditional investments. From a valuation perspective, an acquisition is just a large-scale project. All of the rules that apply to individual investments apply to acquisitions, as well. For an acquisition to create value, it has to generate a higher return on capital, after allowing for synergy and control factors, than the cost of capital.

Put another way, an acquisition will create value only if the present value of the cash flows on the acquired firm, inclusive of synergy and control benefits, exceeds the cost of the acquisitions. As noted earlier, a divestiture is the reverse of an acquisition, with a cash inflow in the current period (from divesting the assets) followed by cash outflows (i.e., cash flows foregone on the divested asset) in the future. If the present value of the future cash outflows is less than the cash inflow today, the divestiture will increase value. A fair-price acquisition or divestiture is value neutral.

It is worth noting that the track record on value creation from acquisitions is not positive. Studies[6] indicate that the return on capital, even on acquisitions that work, barely exceed the cost of capital, and lags the cost of capital substantially for almost half the firms in the sample. The odds of creating value from an acquisition strategy should improve when there is a substantial potential for synergy and when the acquirer does not get into a bidding war on the acquisition. Thus, a strategy of acquiring private firms, where the potential synergies are much larger[7] and the premium is not on top of market value, should have better odds of success than a high-profile strategy of acquiring publicly traded companies.

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[6] These studies include those done by practitioners such as McKinsey and KPMG, as well as some academic studies that look at post-merger performance of firms relative to their peer group.

3. Lengthen the Period of High Growth

As noted above, every firm, at some point in the future, will become a stable growth firm, growing at a rate equal to or less than the economy in which it operates. In addition, growth creates value only if the return on investments exceeds the hurdle rate. Clearly, the longer the high growth lasts, other things remaining equal, the greater the value of the firm. Note, however, that no firm should be able to earn excess returns for any length of period in a competitive product market, since competitors will be attracted by the excess returns into the business. Thus, implicit in the assumption that there will be high growth, in conjunction with excess returns, is also the assumption that there exist some barriers to entry that prevent firms from earning excess returns for extended time periods.

Given this relationship between how long firms can grow at above-average rates and the existence of barriers to entry, one way firms can increase value is by increasing existing barriers to entry and coming up with new barriers to entry. Another way of saying the same thing is to note that companies that earn excess returns have significant competitive advantages. Nurturing these advantages can increase value.

3.1: The "Brand Name" Advantage

When doing valuation, we are often accused of ignoring intangible assets like brand name value in coming up with the value for a firm. This is not true, since the inputs to the traditional discounted cash flow valuation provides plenty of opportunity to consider the effects of brand name. In particular, firms with more valuable brand names either are able to under price the competition, and/or sell more than the competitors. They usually end up with higher returns on capital, higher margins and much more value than their peer group.

Creating a brand name is a difficult, long term and expensive process, but firms can often build on existing brand names and make them valuable. Conversely, the managers of

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[7] Private firms are much more likely to be capital-constrained and their owners tend to be undiversified. Thus, a public firm can increase value substantially from synergy.

a firm who take over a valuable brand name and then dissipate its value, will reduce the values of the firm substantially. Brand management and advertising can play a role in value creation. Consider the extraordinary success that Coca Cola has had in increasing its market value over the last two decades. While there are some who attribute its success to its high return on equity or capital, they are missing the point. The return on equity and capital is not the cause of their success, but the consequence of it. It can be traced to the company's relentless focus on making its brand name more valuable globally[8]. In contrast, the near death experience of Apple Computers in 1996 and 1997, and the travails of Quaker Oats after the Snapple acquisition, suggest that managers can quickly squander the advantage that comes from valuable brand names.

3.2: Patents, Licenses and Other Legal Protection

The second competitive advantage that companies can possess is a legal one. Firms may enjoy exclusive rights to produce and market a product because they own the patent rights on the product. This would be the case in the pharmaceutical and bio-technology businesses. Alternatively, they may have exclusive licensing rights to service a market, as is the case with utilities in the United States.

The key to value enhancement is to not just preserve but to increase any competitive advantages that one possesses. If the competitive advantage that a firm has comes from its existing patents, it has to work at coming up with new patents that can allow it to maintain this advantage over time. While spending more money or research and development is clearly one way, what we said earlier about the efficiency of reinvestment applies here as well. The companies that will see the greatest increases in value are not necessarily the companies that spend the most on R&D, but those who have the most productive R&D

[8] Companies like Coca Cola and Levi Strauss have taken advantage of the global perception that they represent American culture, and used it to grow strongly in other markets.

departments not only in generating patents but also in converting patents into commercial products.

The competitive advantage that comes from exclusive licensing or a legal monopoly is a mixed blessing and may not lead to value enhancement. When a firm is granted these rights by another entity, say the government, that entity usually preserves the right to control the prices charged and margins earned through regulation. In the United States, for instance, much of the regulation of power and phone utilities was driven by the objective of ensuring that these firms did not earn excess returns. In these circumstances, firms may actually gain in value by giving up their legal monopolies, if they get pricing freedom in return. One can argue that this has already occurred, in great part, in the airline and long distance telecommunications businesses, and will occur in the future in other regulated businesses. In the aftermath, the firms that retain competitive advantages will gain value at the expense of others in the business.

3.3: Switching Costs

There are some businesses where neither brand name nor patenting provides adequate protection against competition. Products have short life cycles, competition is fierce and customers develop little loyalty to companies or products. This was arguably the case with the computer software business in the late eighties, and it still describes a significant portion of that business today. How, then, in such a business did Microsoft succeed so well in establishing its presence in the word processing, presentation and spreadsheet markets? While many would attribute its success entirely to the fact that it owned the operating system underlying the software, there is another reason. Microsoft recognized earlier than most firms that the most significant barrier to entry in the software business is the cost to the end-user of switching from one product to a competitor. In fact, Microsoft Excel, early in its life, was impeded by the fact that most users, at that stage, were using Lotus and did not want to bear the switching cost. In the last decade, Microsoft has worked to make it easier for end-users to switch into their products (by allowing Excel to open Lotus spreadsheets, for instance), and made it more and more expensive for them to switch out. Thus, a user who has Microsoft Office installed on his or her system, who wants to try to switch from Microsoft Word to WordPerfect has to run multiple gauntlets - Will the conversion work well on the hundreds of Word files that exist already? Will he or she still be able to cut and paste from Microsoft Excel and Power Point into Word documents or not? The end result, of course, is that it becomes very difficult for competitors who do not have Microsoft's resources to compete with it in this arena.

There are a number of other businesses where the switching cost concept can be used to augment an argument for value enhancement or debunk it. To provide and example of the latter, we remain wary of the capacity of companies like Yahoo and Excite to continue to earn excess returns. These companies' primary product remain a search engine for the internet, and there is little cost to an end-user from switching from one engine to another, and no barriers to new search engines being developed. Unless these firms can come up with a compelling strategy for increasing switching costs, assuming that growth will continue for extended periods seems dangerous.

3.4: Cost Advantages

There are other potential barriers to entry that firms can use to enhance value. There are a number of ways in which firms can establish a cost advantage over their competitors, and use this cost advantage as a barrier to entry:

- In businesses, where scale can be used to reduce costs, economies of scale can give bigger firms advantages over smaller firms. This is the advantage, for instance, that the Home Depot has used to gain market share at the expense of its smaller and often local competitors.
- Owning or having exclusive rights to a distribution system can provide firms with a cost advantage over its competitors.
- Having access to lower-cost labor or resources can also provide cost advantages. Thus, Southwest Airlines, with its non-unionized labor force, has an advantage over its

competitors, as do natural resource companies which have access to reserves that are less expensive to exploit.

These cost advantages will show up in valuation in one of two ways: One is that the firm with the cost advantage may charge the same price as its competitors, but have a much higher operating margin. The other is that the firm may charge lower prices than its competitors and have a much higher capital turnover ratio. In fact, the net effect of increasing margins or turnover ratios or doing both will show up in the return on capital, and through it in expected growth.

The cost advantage from economies of scale can be augmented by the fact that the high capital requirements impede new firms from entering the business. In businesses like aerospace and automobiles, the competition is almost entirely among existing competitors. The absence of new competitors may allow these firms to maintain above-normal returns, though the intra-firm competition will constrain how high returns get.

4. Reduce the cost of financing

The cost of capital for a firm was defined earlier to be a composite cost of debt and equity financing. The cash flows generated over time are discounted back to the present at the cost of capital. Holding the cash flows constant, reducing the cost of capital will increase the value of the firm. In this section, we will explore the ways in which a firm may bring its cost of capital down, or more generally, increase its firm value by changing both financing mix and type.

4.1. Changing Operating Risk

The operating risk of a firm is a direct function of the kinds of products or services it provides, and the degree to which these products are services are discretionary to the customer. The more discretionary they are, the greater the operating risk faced by the firm. Both the cost of equity and cost of debt of a firm are affected by the operating risk of the business or businesses in which it operates. In the case of equity, only that portion of the operating risk that is not diversifiable will affect value.

Firms can reduce their operating risk by making their products and services less discretionary to their customers. Advertising clearly plays a role, but coming up with new uses for a product/service may be another.

4.2: Reducing Operating Leverage

The operating leverage of a firm measures the proportion of its costs that are fixed. Other things remaining equal, the greater the proportion of the costs of a firm that are fixed, the more volatile its earnings will be, and the higher its cost of capital will be. Reducing the proportion of the costs that are fixed will make firms much less risky and reduce their cost of capital.

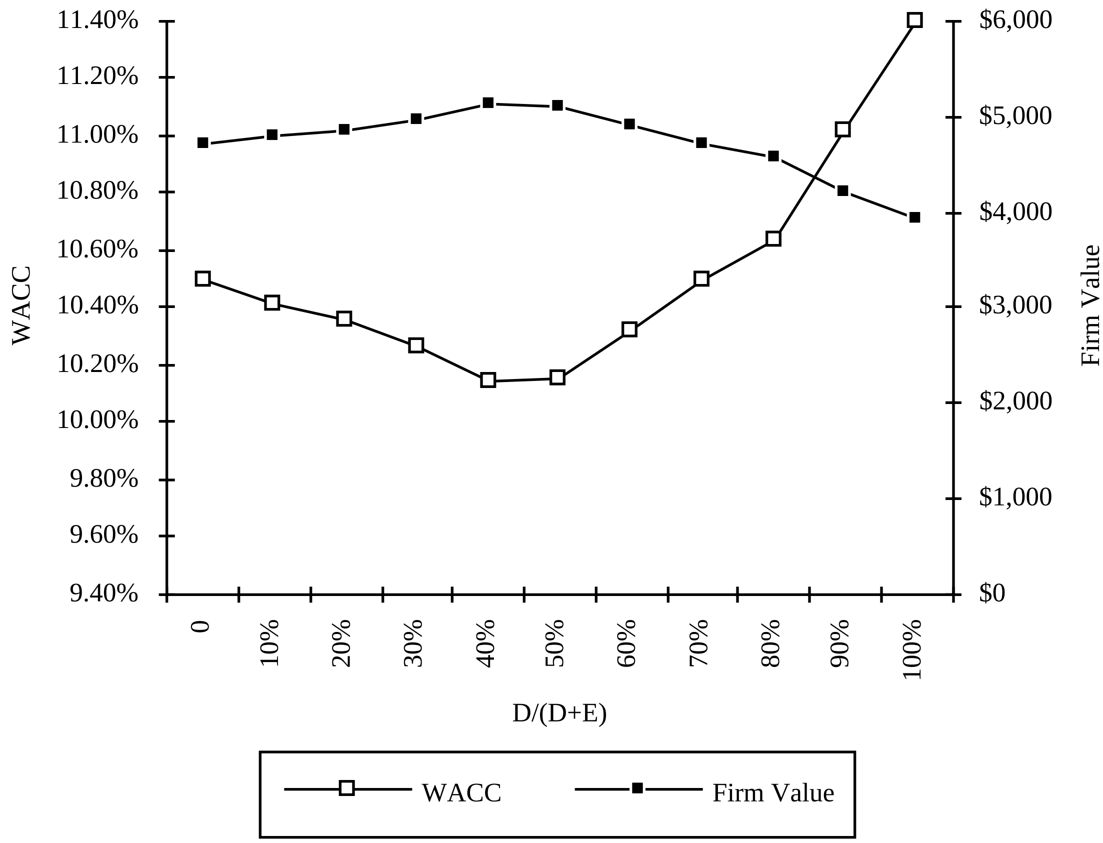
This can be accomplished in a number of different ways:

4. By using outside contractors for some services; if business does not measure up, the firm is not stuck with the costs of providing this service.
5. By tying expenses to revenues; in particular, with wage contracts tying wages paid to revenues made will reduce the proportion of the costs that are fixed.

4.3: Changing the Financing Mix

The third approach to reducing the cost of capital is to change the mix of debt and equity used to finance the firm. Debt is always cheaper than equity, partly because lenders bear less risk and partly because of the tax advantage associated with debt. Taking on debt increases the risk (and the cost) of both debt (by increasing the probability of bankruptcy) and equity (by making earnings to equity investors more volatile). The net effect will determine whether the cost of capital will increase or decrease if the firm takes on more debt. This effect is illustrated in the following graph:

WACC AND FIRM VALUE AS A FUNCTION OF LEVERAGE



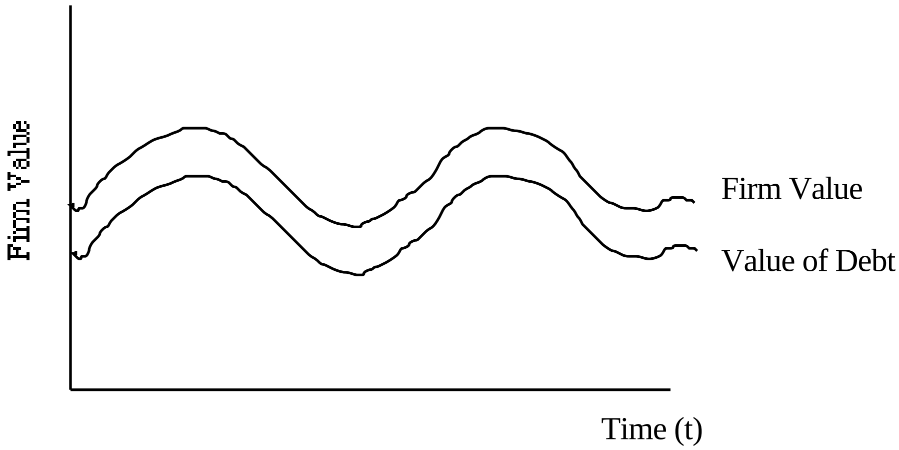
It is important to note, however, that firm value will increase as the cost of capital decreases if and only if the operating cash flows are unaffected by the higher debt ratio. If, as the debt ratio increases, the riskiness of the firm decreases, and this, in turn, affects the firm's operations and cash flows, the firm value may decrease even as cost of capital declines. If this is the case, the objective function when designing the financing mix for a firm has to be restated in terms of firm value maximization rather than cost of capital minimization.

4.4: Changing Financing Type

The fundamental principle in designing the financing of a firm is to ensure that the cash flows on the debt should match as closely as possible the cash flows on the asset.

By matching cash flows on debt to cash flows on the asset, a firm reduces its risk of default and increases its capacity to carry debt, which, in turn, reduces its cost of capital, and increases value.

Firm Value, Cash Flows on Debt and Default Risk



In the graph above, for instance, the firm has substantial debt but never runs the risk of bankruptcy because the value of debt moves up and down with firm value. In fact, if the same firm had used an equal amount of short term debt with fixed value to finance its operations, it would have run a much higher risk of bankruptcy.

Firms that mismatch cash flows on debt and cash flows on assets (by using short term debt to finance long term assets, debt in one currency to finance assets in a different currency or floating rate debt to finance assets whose cash flows tend to be adversely impacted by higher inflation) will end up with higher default risk, higher costs of capital and lower firm value. To the extent that firms can use derivatives and swaps to reduce these mismatches, firm value can be increased.

The Value Enhancement Chain

Looking at the spectrum of actions that firms can take to increase value, we can categorize them on several levels. One is in terms of whether they affect cash flows from assets in place, growth, the financing cost or the length of the growth period. There are two other levels at which we can distinguish between actions that create value:

- *Whether an action creates a value trade off or is a pure value creator*: There are very few actions that increase value without any qualifiers. Among these would be the divestitures of assets where the divestiture value exceeds the continuing value, and the elimination of deadweight costs that contribute nothing to the firm's earnings or future growth. Most actions have both positive and negative effects on value and it is the net effect that will determine whether it is value enhancing. In some cases, the trade off is largely determined by the firms and the odds are much better for value creation. An example would be a firm changing its mix of debt and equity to reduce the cost of capital. In other cases, however, the net effect on value will be a function of how competitors react to a firm's actions. As an example, changing pricing strategy to increase margins may not work as a value enhancement measure, if competitors react and change prices as well.
- *How quickly actions pay off*: There are some actions that generate an immediate increase in value. Among these we would include the divestiture and cost cutting actions mentioned above. Many actions, however, are designed to create value in the long term. Thus, building up brand name value is clearly positive for value creation in the long term, but is unlikely to affect value today.

The following table summarizes a value enhancement chain, where actions that create value are categorized both on how quickly they create value and how much control the firm has over the value creation. Under the first column, titled "Gimmes", we have categorized those actions where the firm has considerable control over the outcome and where the payoff in terms of value creation is immediate. Under the second column, titled "Odds on", we have included actions that are likely to create value in the near or medium term and where the firm still continues to exercise significant control over the outcome. Under the third column, titled "Might Work", we include actions that would create value in a static environment, but might not if competitors react by matching or beating the firm.

The Value Enhancement Chain

More control — *Less control*
Payoff quickly — *Payoff in long term*

	Gimme'	*Odds on..*	*Might Work..*
Assets in Place	1. Divest assets/projects with Divestiture Value > Continuing Value 2. Terminate projects with Liquidation Value > Continuing Value 3. Eliminate operating expenses that generate no revenues and no growth. 4. Take advantage of tax law to increase cash flow	1. Reduce net working capital requirements, by reducing inventory and accounts receivable, or by increasing accounts payable. 2. Reduce capital maintenance expenditures on assets in place. 3. Reduce marginal tax rate	1. Change pricing strategy to maximize the product of profit margins and turnover ratio. 2. Move to more efficient technology for operations to reduce expenses and improve margins.
Expected Growth	Eliminate new capital expenditures that are expected to earn less than the cost of capital	Increase reinvestment rate or marginal return on capital or both in firm's existing businesses.	Increase reinvestment rate or marginal return on capital or both in new businesses.
Length of High Growth Period	If any of the firm's products or services can be patented and protected, do so	Use economies of scale or cost advantages to create higher return on capital.	1. Build up brand name 2. Increase the cost of switching from product and reduce cost of switching to it.
Cost of Financing	1. Use swaps and derivatives to match debt more closely to firm's assets 2. Recapitalize to move the firm towards its optimal debt ratio.	1. Change financing type and use innovative securities to reflect the types of assets being financed 2. Use the optimal financing mix to finance new investments. 3. Make cost structure more flexible to reduce operating leverage.	Reduce the operating risk of the firm, by making products less discretionary to customers.

Alternatives to the Traditional Valuation Model

The traditional discounted cash flow model provides for a rich and thorough analysis of all of the different ways in which a firm can increase value, but it can become complex, as the number of inputs increases. It is also very 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 that one 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 upon the performance of the stock. Thus, a firm whose stock price has gone up is viewed as having created value, while one whose stock price goes down has destroyed value. Compensation systems based upon the stock price, including stock grants and warrants, have become a standard component of most management compensation package.

While market prices have the advantage of being updated 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 big 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 using stock prices as the basis for compensation is that it cannot be disaggregated beyond the firm level. Thus, it cannot be used to analyze the managers of individual divisions of a firm, and their relative performance.

In the last decade, while firms have become more focused on value creation, they have remained suspicious of market gyrations. While they might understand the notion of discounted cash flow value, they are unwilling to tie compensation to a value that is based upon 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. The two mechanisms that seem to have made the most impact are:

- Economic Value Added, and its variants, which measures the dollar surplus value created by a firm on its existing investment, and
- Cash Flow Return on Investment, which measured the percentage return made by a firm on its existing investments

Each approach has its proponents, and each is claimed to be an improvement on traditional approaches. In this part of the paper, we look at each approach, how it is measured and the links to traditional valuation. We also look at the conditions under which firms using these approaches to judge performance and evaluate managers may end up making decisions that are value-destroying rather than value-creating.

Economic Value Added

The economic value added 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. The excess return itself is defined as the difference between the return made on the investment and the composite cost of financing that investment.

Economic Value Added = (Return on Capital Invested– Cost of Capital) (Capital Invested)

Definition

Looking at the definition of economic value added, there are three basic inputs that we need for its computation - the return on capital earned on a investment, the cost of capital for that investment and the capital invested in it.

a. Capital Invested

How much capital is there invested in an investment or investments? This question, which may seem trivial at first sight, is not easy to answer at the level of individual projects, especially when these projects have been on the books for long time periods. It becomes even more difficult at the level of the firm, where projects tend to be aggregated and expenses are allocated across them. One obvious solution may be 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[9]. 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 many analysts 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. It is also influenced by the accounting classification of expenses into operating and capital expenditures, with only the latter showing up as part of capital.

The limitations of book value as a measure of capital invested has led analysts who use EVA to adjust the book value of capital to get a better measure of capital invested. Some of these adjustments include:

6. <u>Capitalizing any operating expense that is not intended to create income in the current period</u>, but is designed to create income in future periods. An obvious example is research and development expenses, which accounting standards in the United States require be expensed, but which clearly are intended to generate future growth. The

[9] As an illustration, computing the return on capital at Microsoft using the market value of the firm, instead of book value, results in a return on capital of about 3%. It would be a mistake to view this a sign of poor investments on the part of the firm's managers.

standard treatment is to capitalize research and development expenses[10] and augment the capital invested by this amount.

7. Capitalizing any operating expenses that are really financing expenses in disguises. The most common illustration of this is operating lease expenses, which reduce operating income in the period in which they are paid. This is in contrast to the treatment of capital leases, where firms are required to compute the present value of lease obligations and treat it as debt. From a financial standpoint, there is little difference in terms of commitment to make payments between operating and capital leases. Therefore, it does make sense to compute the present value of operating lease commitments and treat them as debt, thus increasing capital invested.
8. Eliminating any items that may cause the book value of capital to drop without really impacting capital invested. Here, we would consider one-time restructuring charges and the amortization of goodwill. Though both actions reduce the book value of capital, they do not reduce capital invested and should be added back. Similarly stock buybacks[11] have a disproportionate impact on book value of capital when market value is well in excess of book value.
9. Adjust for any actions that should have caused book value of capital but did not because of accounting treatment: Consider a firm that acquires another firm for $ 1 billion, and assume that the book value of the acquired firm is $ 100 million. Clearly, the capital investment in the acquisition is $ 1 billion. If, however, the firm is able to qualify for

[10] The easiest approach to capitalizing R&D expenses is to cumulate the expenses over time, and view the cumulated amount as the "book value" of R&D. There are some in accounting, such as Baruch Lev at NYU, who have suggested far better ways of dealing with expenses like R&D.

[11] When firms buy back stock, the book value of equity is reduced by the market value of the buy back. Thus, a firm with a price to book ratio of 10, that buys back 5% of its stock, can reduce its book value of equity by 50%.

pooling, its book value of capital will be increased only by $ 100 million and not reflect the premium paid on the acquisition. Thus, when pooling is used to account for a merger, the book value of capital is usually augmented to reflect the price paid on the acquisition and the premium[12] over book value.

The book value of capital reflects the initial values at which equity and debt were issued, any retained earnings since then and any stock buybacks or issues in the interim. 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 with the assets owned by the firm, estimating the market value of these assets and cumulating this market value. This approach requires a substantial amount of private information, since firms generally do not make available an inventory list of every asset that they own to outsiders, and may be feasible only if one has access to that information either as a consultant to the firm or as a manager.

b. Return on Capital

Many of the issues that apply with capital invested also apply when measuring return on capital. The conventional definition of return on capital uses after-tax operating income and capital invested:

Return on Capital = Operating Income (1 - tax rate) / Capital Invested

[12] To be consistent with the notion that the capital invested should only measure investment in assets in place, the portion of the premium that is paid for expected future growth potential in the acquired firm should not be added on to arrive at capital invested.

The operating income that we would like to estimate would be the operating income made by assets in place. The operating income, usually measured as earnings before interest and taxes in an income statement, may not be a good measure of this, for several reasons:

- The first relates back to a factor that we considered while looking at capital invested. There are some expenses, such as R&D expenses, that accountants treat as operating expenses that are really designed to generate future growth. Reducing operating income due to these expenses is in a sense unfair to the assets in place, since they do not benefit from these expenses. The appropriate response is to consider operating income without these expenses, while capitalizing R&D expenses[13].

  $$ROC_{\text{R\&D Adjusted}} = (\text{EBIT + R\& D Expenses}) / (\text{BV of Capital + Capitalized R\&D})$$

  Making this adjustment for high-technology firms will drastically alter their return on capital, reducing it in most cases considerably. While R&D expenses may be an obvious example of an operating expense that is really a capital expenditure, there are other expenses such as training and development that can be considered in the same vein. Even more invidious is the fact that there might be expenses embedded in other categories that are designed to create future growth.

- The second factor to consider in adjusting operating income is operating expenses that are really disguised financial expenses. The example that we used in the previous section, operating lease expenses, provides a simple case. To get an adjusted operating income, we need to add back operating lease expenses to operating income. Simultaneously, we need to estimate the present value of expected lease commitments over time, and treat them as the equivalent of debt, which will increase capital invested in the firm.

[13] Once you have capitalized R&D, any new R&D increases this asset, but existing R&D will get amortized over time, reducing it. The rate at which the R& D is amortized will be sector-specific and reflect the rate at which the benefits of new R& D decay in the sector.

$$ROC_{\text{Operating Lease Adjusted}} = (\text{EBIT} + \text{Operating Lease Expenses}) / (\text{BV of Capital} + \text{Present Value of Operating Lease Expenses})$$

These are two of many adjustments that need to be made to the accounting measure of operating income to arrive at the corrected measure of operating income generated by assets in place. The practitioners who use EVA claim to make many more[14]. While I would not contest that claim, I would make two counter points. First, many of these adjustments are at the margin and do not affect economic value added very much. Second, many of these adjustments can be made only by someone who either works with the management of the firm (as a consultant) or as an insider. External analysts who choose to use economic value added have to accept the reality that their estimates of operating income can adjust only for the variables (such as R&D and operating lease expenses) on which there is public information.

c. Cost of Capital

The third and final component needed to estimate the economic value added is the cost of capital. There are two schools of thought when it comes to estimating the cost of capital for this purpose. The first school argues that the cost of capital should be estimated using book value weights for debt and equity, since the return on capital and capital invested are measured in book value terms. This argument does not really hold up, for the following reasons. First, note that it is not the book value of capital that we should really be measuring in capital invested, but the market value of assets in place. When we think about it in those terms, it is clear that using a book value cost of capital essentially is equivalent to assuming that all debt is attributable to assets in place, and that all future growth comes from equity. Put another way, if we adopted this rationale in valuation, we would discount cash flows from assets in place at the book cost of capital, and all cash flows from expected

[14] As an example, Bennett Stewart in his treatise on EVA, titled "Quest for Value" claims that Stern Stewart makes as many as 164 adjustments to operating income to arrive at the EVA.

future growth at the cost of equity. Second, using a book value cost of capital for all economic value added estimates, including the portion that comes from future growth, will destroy the basis of the approach, which is that maximizing the present value of economic value added over time is equivalent to maximizing firm value. Third, if changing capital structure is one tool that can be used to increase economic value added, the mechanics work far better if market value cost of capital is used rather than book 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. Thus, rankings based on book value cost of capital are biased against firms with less leverage, and biased towards firms with high leverage.

EVA and NPV: The Parallels

One of the foundations of investment analysis in traditional corporate finance is the net present value rule. The net present value 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, taking projects with positive net present value will increase the value of the firm, while taking projects with negative net present will reduce value.

Economic value added is a throwback to the net present value rule. As we will see, in the following simple proof, the present value of the economic value added by a project over its life is the net present value of the project. To illustrate, consider a project with the following characteristics:

1. The project requires an initial investment of $ I, and has an expected life of n years, at the end of which it is assumed to have a salvage value of SV_n. The project will have depreciation of $Depr_t$ in year t.
2. The project will generate earnings before interest and taxes in year t of $EBIT_t$ and the firm has a marginal tax rate of t.

3. The firm is assumed to have a cost of capital of k_c

The net present value of this project can be written as follows:

$$NPV = \sum_{t=1}^{t=n} \frac{(EBIT_t(1-t)+Depr_t)}{(1+k_c)^t} + \frac{SV_n}{(1+k_c)^n} - I \qquad \ldots\ldots\ldots\ldots \quad (1)$$

Now consider an alternative investment that requires an initial investment of I, earns exactly the cost of capital and allows for the entire investment to be salvaged at the end of the project life of n years. The net present value of this project will be zero. Solving for I in this case, we get:

$$I = \sum_{t=1}^{t=n} \frac{k_c\,(I)}{(1+k_c)^t} + \frac{I}{(1+k_c)^n} \qquad \ldots\ldots\ldots\ldots \quad (2)$$

Substituting this into equation (1), we get the net present value of the original project to be the following:

$$NPV = \sum_{t=1}^{t=n} \frac{(EBIT_t(1-t)+Depr_t)}{(1+k_c)^t} + \frac{SV_n}{(1+k_c)^n} - \sum_{t=1}^{t=n} \frac{k_c\,(I)}{(1+k_c)^t} - \frac{I}{(1+k_c)^n} \quad \ldots. \quad (3)$$

Now assume that

1. the project has a salvage value of zero, and

2. that the present value of depreciation is equal to the present value of initial investment, discounted back over the project life. In other words, assume that the cash flow from depreciation is really the capital being returned to the firm.

Then, the net present value of this project can be simplified, and written as:

$$NPV = \sum_{t=1}^{t=n} \frac{(EBIT_t(1-t)}{(1+k_c)^t} - \sum_{t=1}^{t=n} \frac{k_c\,(I)}{(1+k_c)^t} \qquad \ldots\ldots\ldots\ldots \quad (4)$$

Working through the terms and noting that ROC=EBIT(1-t)/I, then, we get

$$NPV = \sum_{t=1}^{t=n} \frac{(ROC_t - k_c)\,(I)}{(1+k_c)^t} = \sum_{t=1}^{t=n} \frac{EVA_t}{(1+k_c)^t} \qquad \ldots\ldots\ldots\ldots \quad (5)$$

Thus, the net present value of the project is the present value of the economic value added by that project over its life. Note, however, that when the salvage value is large and/or the present value of depreciation tax benefits is greater than or lesser than the present value of the capital invested, the present value of economic value added will not yield the correct[15] net present value for the project.

EVA and DCF Value

The linkage between economic value added and net present value allows us to link the value of a firm to the economic value added by it. 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:

Firm Value = Value of Assets in Place + 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:

$$\text{Firm Value} = \text{Capital Invested}_{\text{Assets in Place}} + \text{NPV}_{\text{Assets in Place}} + \sum_{t=1}^{t=\infty} \text{NPV}_{\text{Future Projects, t}} \quad \ldots(6)$$

Substituting the economic value added version of net present value in equation (6) back into this equation, we get:

$$\text{Firm Value} = \text{Capital Invested}_{\text{Assets in Place}} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{\text{t, Assets in Place}}}{(1+k_c)^t} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{\text{t, Future Projects}}}{(1+k_c)^t} \quad (7)$$

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.

[15] As an example, consider a thirty-year project with heavy infrastructure investments, using accelerated depreciation for tax purposes. The net present value computed for this project using the economic value added alone will understate the net present value, since the salvage value is likely to be large and/or the present value of depreciation is likely to exceed the present value of capital invested.

Illustration 1: DCF Value and Economic Value Added

As a simple illustration, consider a firm that has assets in place in which it has capital invested of $ 100 million. Assume the following further facts about the firm:

1. 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%.
2. At the beginning of each of the next 5 years, the firm is expected to make 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%.
3. 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.
4. All assets and investments are expected to have infinite lives[16]. 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

[16] Note that this assumption is purely for convenience, since it makes the net present value easier to compute.

Note that the present values are computed on the basis of the perpetuity assumption. In additon, the present value of the economic value added by the investments made in future years are discounted back to the present, 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 equation (7) as follows:

$$\text{Firm Value} = \text{Capital Invested}_{\text{Assets in Place}} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{\text{t, Assets in Place}}}{(1+k_c)^t} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{\text{t, Future Projects}}}{(1+k_c)^t}$$

\$ 170.85 m = \$ 100 million + \$ 50 million + \$ 20.85 million

The value of assets in place 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 and the capital invested, which is \$70.85 million. Clearly, 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. Conversely, the number will be negative if the return on capital is less than the cost of capital.

Note that the while the firm continues to grow in operating income terms and take 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 growing 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 traditional discounted cash flow model, with free cashflows to the firm discounted back at the cost of capital. The following table summarizes expected free cash flows and the firm value, using the cost of capital of 10% as the discount rate. In looking at this valuation, note the following:

4. 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.
5. 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%.

Net $\text{Investment}_5 = [\text{EBIT}_6(1\text{-t}) – \text{EBIT}_5(1\text{-t})]/\text{ROC}_6$ = ($23.625 - $22.50)/.10 = $11.25 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.

Firm Value using DCF Valuation

	0	1	2	3	4	5	Term. 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- Yr 1		$ 1.50	$ 1.50	$ 1.50	$ 1.50	$ 1.50	
EBIT(1-t) from Investments- Yr 2			$ 1.50	$ 1.50	$ 1.50	$ 1.50	
EBIT(1-t) from Investments -Yr 3				$ 1.50	$ 1.50	$ 1.50	
EBIT(1-t) from Investments - Yr 4					$ 1.50	$ 1.50	
EBIT(1-t) from Investments- Yr 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%

Implication of this Valuation

There are several implications that flow from the fact that the value of a firm can be written in terms of the present value of the economic value added by both projects in place and expected future projects.

1. The first is good news for those who are proponents of economic value added. A policy of maximizing the present value of economic value added over time is equivalent to a policy of maximizing firm value, and is thus consistent with traditional corporate financial theory.
2. The second implication, however, is that the notion that the economic value added approach requires less information than a discounted cash flow valuation, or that it provides a better estimate of value is false. The economic value added approach, done right, should yield the same value as a DCF valuation, and it requires more information, not less. To see why, consider the valuation of the firm in illustration 1. The discounted cash flow valuation required cash flows and a discount rate to arrive at a value. The economic value added approach requires these inputs and an additional one - the capital invested in the firm. It uses this measure to then break firm value up into capital invested and economic value added components. Note that changing the capital invested number has no impact on overall value.
3. It is often claimed that the economic value added valuations provide us with fresh insights on value enhancement because of its focus on excess returns, defined in terms of return and cost of capital. A discounted cash flow model where growth is linked to the reinvestment rate and the return on investments accomplishes the same objectives and arrives at the same results.

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

EVA in Practice

In the last decade, we have seen a number of converts among corporations to economic value added. Without debating, at this stage, whether the companies have in fact gained value by doing so, it is worth noting the way in which economic value added has been put in practice at these firms

1. Most firms that have adopted economic value added as their value enhancement measure have also tied management compensation, often at all levels, to it. Some firms have made it the sole basis for compensation, while others continue to augment it with other compensation schemes, including stock grants and options.
2. The firms that use economic value added to judge success or failure still measure it looking at year to year changes rather than in terms of the present value of economic value added over time. In some firms, the reward is simply based upon delivering an economic value added next year that is greater than this year's number. In other firms, managers are rewarded only if they beat the expected economic value added, rather than last year's economic value added. In almost no case is the reward based upon the present value of economic value added over time. While one can see the reasons for not considering expected economic value added, which are subjective estimates, this does create a significant potential for abuse, as we will see in the next section.
3. Firms that have converted to economic value added have done so not just at the firm level, but also at the level of individual divisions and sub-divisions within the firm. Thus, the success or failure of an employee is often measured by the economic value added by the unit to which this employee is most closely connected. While this clearly makes sense from a corporate finance perspective, it makes the estimation problems we referred to in our earlier section much greater.

There is another group of converts to economic value added. These include equity research analysts and portfolio managers, who view economic value added as a way of earning excess returns. Here, the practice is still much more primitive. First, many of these users have far less information than those in the first group. Firms that adopt economic value added, and their consultants, can use internal information to augment public information and arrive at better estimates. Portfolio managers or equity research analysts often have to work with just public information and make rough adjustments to arrive at noisier estimates of economic value added. Second, the year-to-year comparisons among these users still seem to simply compare this year's economic value added to last year's number, and conclude that increases in economic value added are good news for investors while decreases are bad news. As we will see in a subsequent section, this can be a dangerous assumption to make.

EVA and Firm Value: Potential Conflicts

Assume that a firm adopts economic value added and decides to judge managers based upon 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 against these practices? These are the questions that we would like to consider in this section. To answer these questions, let us go back to equation (7), 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.

$$\text{Firm Value} = \text{Capital Invested}_{\text{Assets in Place}} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{\text{t, Assets in Place}}}{(1+k_c)^t} + \sum_{t=1}^{t=\infty} \frac{\text{EVA}_{\text{t, Future Projects}}}{(1+k_c)^t}$$

The Capital Invested Game

The first two terms in the equation above, the capital invested and the present value of economic value added by these investments, are both sensitive to how capital invested is measured. 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 that we valued in illustration 1. Assume that the capital invested is estimated to be \$ 50 million rather than \$ 100 million, and that the operating income on these investments stays at $ 15 million. The assumptions about future investments remain unchanged. The firm value can then be written as:

Capital Invested in Assets in Place	$ 50
+ EVA from Assets in Place = (.30 – .10) (50)/.10	$ 100
+ 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

The value of the firm is unchanged, but the value is redistributed to the economic value added component. When managers are judged based upon the economic value added, there will be strong incentives to keep the capital invested down.

There are some actions that managers take to reduce capital invested that can be truly value creating. Thus, in the above example, if the reduction in capital invested came from closing down a plant that was not (and does not expect to) generate any operating income, the cash flow generated by liquidating the plant's assets will increase value. There are some actions, however, that are purely cosmetic in terms of their effects on capital invested and thus do not create and may even destroy value. Among these I would include:

- Accounting changes that reduce the book value of capital, but do not generate tax benefits or higher operating income in future periods: The most egregious examples of these are large one-time restructuring charges, which result in large negative operating incomes and declines in book value of capital. To the extent that these actions are transparent, the economic value added and capital invested can be corrected to reflect the real values.
- Game playing once the rules for economic value added have been defined: Even the most meticulous measurers of economic value added have to specify the way in which

capital invested is measured for economic value added purposes. While the managers who are measured on economic value added may not be able to control how much capital they are assigned in the initial iteration, they can play the game to reduce capital invested in future periods. As an example, assume that the capital invested includes the present value of operating lease expenses as a component of capital, but that this present value is consistently lower than the attributed capital invested when the same asset is purchased. Over time, we should not be surprised to see more assets being leased rather than bought. The response on the part of the measurer is to create new rules and methods to fight the game playing, but the irony is that the game playing becomes easier and more prevalent as the number of rules increases.

To illustrate the potential value destructiveness of this approach, assume that the managers of the firm in illustration 1 are able to replace half of the assets that they own now 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 as:

Capital Invested in Assets in Place	\$ 90
+ EVA from Assets in Place = (.1644 – .10) (90)/.10	\$ 58
+ 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	\$ 168.85

Note that the firm value declines by \$ 2 million, but the economic value added increases by \$ 8 million.

- Capital Allocations across Divisions in Firms: 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. A significant component of the allocation will be based upon rules devised by the firm. While we would like these rules to be objective and unbiased, they are often subjective and over allocate capital to some divisions and under allocate capital to others. If this misallocation were purely random, we could accept this as noise 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 over estimated for those divisions that are under allocated capital, and under estimated for divisions that are over allocated capital.

The Future Growth Game

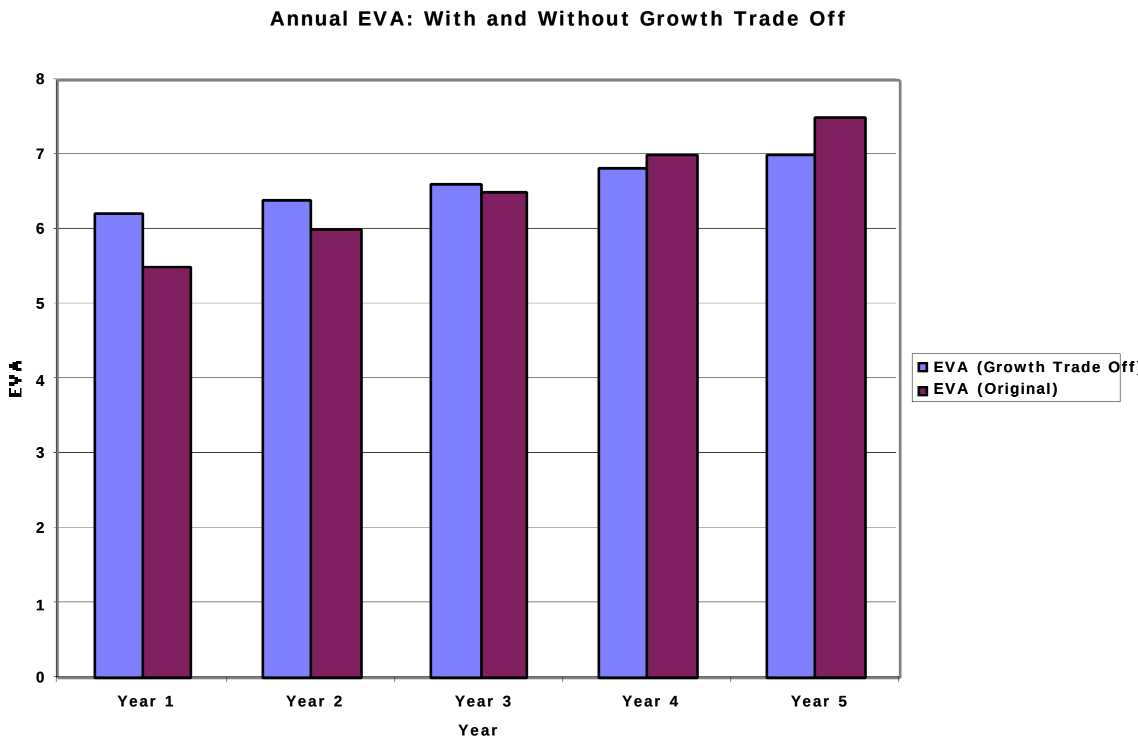
The value of a firm is the value of its assets in place and the value of its future growth prospects. When managers are judged on the basis of economic value added in the current year, or on year-to-year changes, the economic value added that is being measured is just that from assets in place. Thus, 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 1. The firm, in that example, earned a return on capital of 15% on both assets in place and future investments. Assume that there are actions that the firm can take to increase the return on capital on assets in place to 16%, but that this action reduces the return on capital on future investments to 12%. The value of this firm can then be estimated as follows:

Capital Invested in Assets in Place	\$ 100
+ EVA from Assets in Place = (.16 – .10) (100)/.10	\$ 60
+ PV of EVA from New Investments in Year 1 = [(.12 – .10)(10)/.10]	\$ 2

+ 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

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 below for both the original firm and this one.



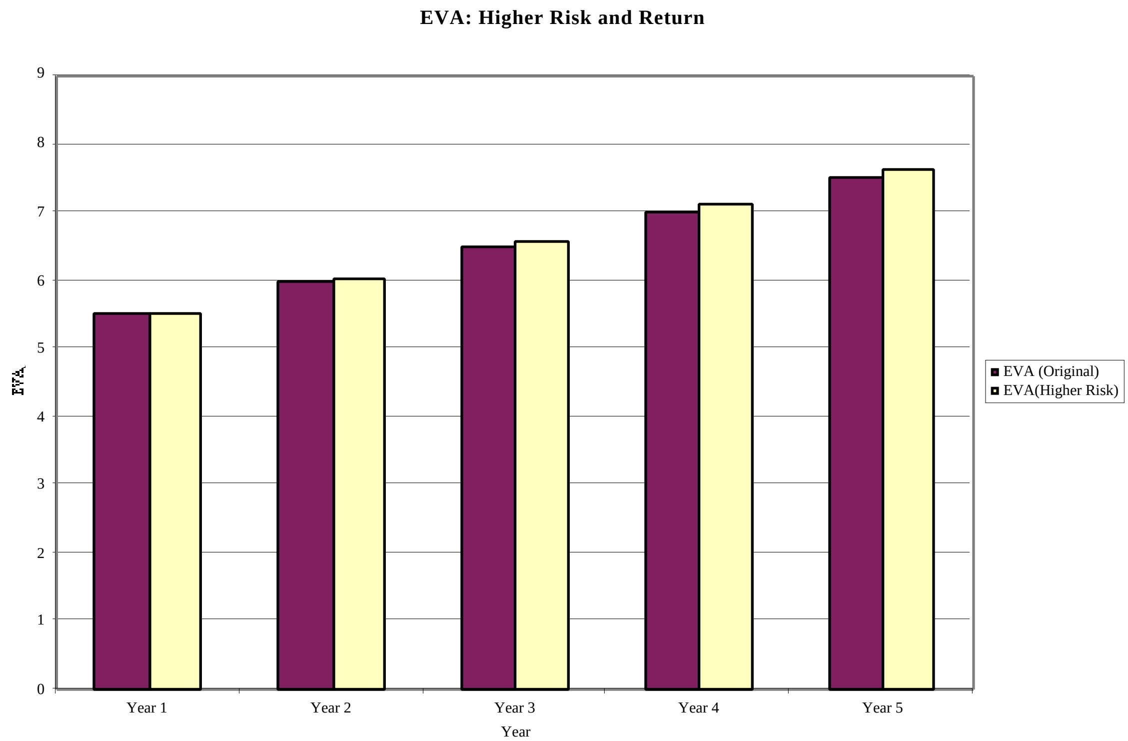
The growth trade off, while leading to a lower firm value, results in economic value added in each of the first three years that is larger than it would have been without the trade off.

Practitioners who use economic value added would respond with the contention that the compensation mechanism can be designed to punish managers who do this trade off. For instance, managers at some firms that adopt economic value added are compensated partially based upon 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). Thus, managers who increase the current economic value added at the expense of future growth can be punished. 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 over the next 3 or 4 years. The real costs of the growth trade off are unlikely to show up until much later. Second, while 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 growth. In the example, above, 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 not just a function of the dollar economic value added but also of the cost of capital. A firm can take actions that increase its economic value added, but still end up with a lower value, if these actions increase its operating risk and cost of capital.

Again, using the same firm used in illustration 1, assume that the firm is able to increase its return on capital on both assets in place and future investments from 15% to 16.25%. Simultaneously, assume that the cost of capital increases to 11%. The economic value added in each year for the next five years by this firm is contrasted with the original economic value added in each year in the following figure:



While the economic value added in each year is higher with the high risk strategy, the value of the firm is as follows:

Capital Invested in Assets in Place	$ 100
+ 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

Note that the risk effect dominates the higher excess dollar returns, and the value of the firm decreases.

The consequences of this are dangerous for firms that adopt economic value added based objective functions. When managers are judged based upon year-to-year economic value added changes, there will be a tendency to shift investments into riskier investments. This tendency will be exaggerated if the cost of capital does not reflect the changes in risk or lags[17] it.

In closing, economic value added is an approach that is skewed towards 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 upon 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

As we noted earlier, there is new group of converts to economic value added that numbers among it equity research analysts and portfolio managers. They want to use economic value added as a tool for finding undervalued assets and earning excess returns. In addition to all of the issues that we raised in the last section, there are additional problems that arise when economic value added is used as an investment tool.

Noise in Estimates

The estimates of economic value added made by "outsiders" (investors, analysts and portfolio managers) depend almost entirely on publicly available information. This is in contrast to estimates made by managers and their consultants, where internal information can be used to refine and better the estimate. Thus, the adjustments made to book value to

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[17] In fact, beta estimates that are based upon 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.

arrive at capital invested and to operating income to estimate return on capital tend to be fairly crude and the resulting estimates reflect this.

The Effect of Expectations

There is a second and far more serious problem with using economic value added as an investment tool. 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 because the market value has built into it expectations of 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 were 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.

Empirical Findings

We would therefore not expect there to be any correlation between the magnitude of the economic value added and stock returns, or even between the change in economic value added and stock returns. Stocks that report the biggest increases in economic value added would not necessarily be good investments[18]. These priors are confirmed by a study done by Richard Bernstein at Merrill Lynch, who examined investment strategies based on both measures:

· A portfolio of the 50 firms which had the highest absolute levels[19] 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[20] in economic value added over the previous year earned an annual return of 12.8% over the same time period.

While neither of these findings are surprising given our earlier discussion, they should give those who want to use economic value added as an investment tool pause. There are those who have criticized this study on measurement issues, i.e., on whether the economic value added at these companies was estimated correctly, but they are missing the point. As long as expected changes are not considered, this approach is doomed to failure. In contrast to earnings per share, however, there is no simple database like Zacks or IBES that can be used to generate expected values.

Is there a way in which economic value added could be used as an investment tool? The only way to do it, in my view, is to build up a model for estimating expected economic value added. This model would have a time-series component as well as measures of the fundamentals that we argued were responsible for firms being able to maintain excess returns over long periods. Of course, this would mean bringing in many of the subjective judgments that traditional valuation models claim to make that proponents of economic value added have found objectionable.

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[18] A study by Kramer and Pushner found that differences in operating income (NOPAT) explained differences in market value better than differences in EVA.

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

The Bottom Line on EVA

The evolution of EVA from a measure of performance to the magic bullet that can make a company's stock price go up is testimony to our capacity to take good products and oversell them. Fundamentally, economic value added is a sound measure. By focusing attention on "surplus" value, it does bring home the point out that it is not how much income a firm makes that marks its success, but how much it makes in excess of its dollar financing costs. By making this measure an absolute measure, rather than a percentage spread, it helps firms recognize that turning away projects that earn more than their cost of capital, just because they earn a smaller spread than do existing projects can be value destroying. In fact, with relatively few assumptions, we have shown that an objective of maximizing economic value added is equivalent to the traditional objective of maximizing firm value.

If the proponents of economic value added stopped at this point, I would have no disagreements with them. There are some, who in the process of selling the measure, go well beyond these claims. In the following section, I list out a series of claims about economic value added that are fundamentally false:

1. <u>EVA is a new and revolutionary way of thinking about financial decisions</u>: Claiming that economic value added is either new or revolutionary flies in the face of history and corporate financial theory. EVA is just net present value presented differently. There is little in the measure that can claim to be original other than its name.
2. <u>Economic value added is not an accounting measure</u>: Much of the selling of EVA has been built on the premise that unlike its competitors, such as earnings per share or return on equity, economic value added is not an accounting measure. In truth, economic value added is very dependent upon accounting measures of operating income and capital invested, though adjustments are made to both.

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[20] See Quantitative Viewpoint, Merrill Lynch, February 3, 1998

3. An investment with a positive economic value added is a good investment: This is clearly untrue, if economic value added is computed based upon capital invested in an asset rather than its current market value. To illustrate, assume that you bought a commercial building two years ago for $ 50 million, and that you are earning an after-tax operating income of $ 6 million on this building. If the cost of capital is 10%, this investment has a positive economic value added of $ 1 million.

$$EVA_{Building} = \$ 6 \text{ million} - \$ 50 \text{ million} (.10) = \$ 1 \text{ million}$$

   Now assume that the market value of this building has increased to $ 100 million. This building is a poor investment, since it earns less than its cost of capital and the firm would be better off selling it.
4. Firms make better investment decisions when they use EVA to analyze projects: This statement might be true if the only alternatives to using economic value added were accounting return measures and simple cash flow approaches (like payback). If the alternative is net present value, using EVA does not result in better investment decisions. In fact, since net present value is the more general approach, it is EVA that is likely to lead to errors on project choice.
5. Valuing a firm using its EVA provides a more precise estimate of value than traditional valuation models : As we illustrated in an earlier section, discounted cash flow valuation and economic value added should yield the same firm values, as long as the assumptions made are consistent across the approaches.
6. Valuing a firm using EVA requires less information than valuing it using traditional valuation models: This is clearly false. Valuing a firm using EVA requires more information than discounted cash flow models, not less. To the argument that users of discounted cash flow models have to make assumptions about terminal value, and those who use EVA do not, the response is that they both require that we make assumptions about reinvestment rates, return on capital and cost of capital in stable growth. In fact, the terminal value in a firm valuation model can be written as:

$$\text{Terminal Value} = \frac{\text{EBIT (1- t) (1 - Reinvestment Rate)}}{(k_c - \text{Reinvestment Rate *ROC})}$$

In the special case where the return on capital is equal to the cost of capital in stable growth, the terminal value calculation simplifies to the following:

$$\text{Terminal Value} = \frac{\text{EBIT (1- t)}}{k_c}$$

7. A firm with a positive EVA is, on average, allocating capital well since it is earning surplus value: The value of a firm's assets is the present value of the economic value added generated by them. Thus, a firm could be generating a positive economic value added in the current year from assets, but the expected economic value added in future years may be negative, making these assets poor investments. Conversely, you can have a firm generating negative economic value added in the current year, but the assets could still be value creating if the present value of expected future economic value added is positive.
8. The high correlation between EVA and MVA makes it a unique and powerful way of thinking about financial decisions: The MVA as shown earlier is nothing more than the present value of the surplus value. While EVA and MVA are highly correlated, so are market to book ratios and returns on capital and price to book ratios and returns on equity. In short, this is a truism that applies anytime you look at ratios of market value to book value.
9. If a firm increases its EVA this year relative to last year, it has become more valuable: A firm that increases its EVA relative to last year's EVA or even relative to expectations might have done so by trading off against future growth or increasing its riskiness. If it did so, the firm value can decrease even as EVA increases.
10. EVA is a risk adjusted measure: Since the economic value added is defined as the excess of earnings over the cost of capital, it is often argued that it is a risk adjusted measure. Thus, it is argued that a firm that increases EVA, even with higher risk,

should be more valuable. The problem with this argument is that while EVA may be risk-adjusted, it still has to be discounted back to the present to arrive at firm value. Consequently, a firm which posts higher EVA numbers while increasing its operating risk and cost of capital, may reduce its value.

11. In a rational market, a firm that increases its EVA will also increase its market value: For a firm to increase market value, the reported increase in EVA has to be greater than expected. Thus, a firm that was expected to increase EVA by 30% will see its market value go down if EVA increases by only 20%.
12. Increases in EVA are more highly correlated with increases in market value than other variables such as earnings per share or operating income: Though this statement is often backed up by empirical results by backers of EVA, the results are actually mixed. Even the studies that claim to show a correlation between increases in EVA and increases in stock prices find very low correlations, and there are several independent studies that indicate almost no correlation between EVA and stock returns[21].

Cash Flow Return on Investment

The cash flow return on investment attempts to measure the expected return on an investment, using its cash flows and considering the time value of money. In other words, it a modified version of internal rate of return, designed for investments that have already been made. In the form in which it is used by its proponents, the CFROI for a firm is compared to the cost of capital to pass judgments on whether a company's investments are good, neutral or poor investments. To enhance its value then, a firm should increase the spread between its CFROI and its cost of capital.

[21] See the Merrill study referred to earlier in the paper, as well as a paper by Bacidore et al. in the Financial Analysts Journal, May-June 1997.

Definition

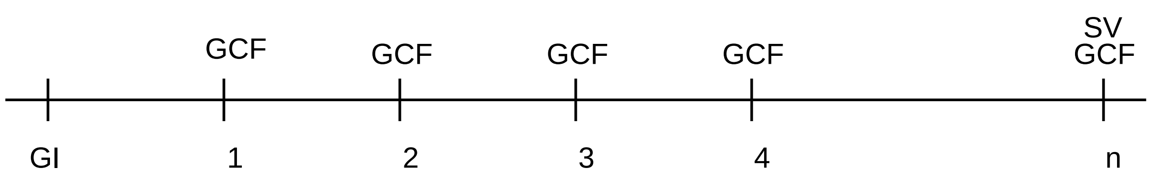
The cash flow return on investment for a firm is calculated using four inputs. The first is the gross investment (GI) that the firm has in its assets in place. This is computed by adding back depreciation to the net asset value to arrive at an estimate of the original investment it the asset. In addition, non-debt liabilities and intangible assets such as goodwill are netted out. Finally, the gross investment is converted into a current dollar value to reflect inflation that has occurred since the asset was purchased.

Gross Investment (GI) = Net Asset Value + Cumulated Depreciation on Asset + Current Dollar Adjustment

The second input is the gross cash flow (GCF) earned in the current year on that asset. This is usually defined as the sum of the after-tax operating income of a firm and the non-charges against earnings, such as depreciation and amortization. The operating income is adjusted for operating leases and any accounting effects, much the same way that it was adjusted for to compute economic value added.

Gross Cash Flow (GCF) = Adjusted EBIT (1-t) + Current year's Depreciation & 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 value of the assets (SV) 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 buildings, 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 can thus be viewed as a composite internal rate of return, in current dollar terms. This is compared to the firm's real cost of capital to pass judgment on whether assets in place are value creating or value destroying. The real cost of capital can be estimated using the real costs of debt and equity, and market value weights for debt and equity.

To illustrate, consider a firm with the following characteristics. The assets on its books are, on average, 3 years old and have a net value of \$ 1.6 billion; they have a remaining life of 7 years and 25% of the assets are non depreciable. The accumulated depreciation over the last 3 years is \$ 500 million, and the inflation over that period has averaged 5% a year. In the current year, the earnings before interest and taxes amount to \$ 400 million, the depreciation is \$ 150 million and the firm faces a marginal tax rate of 40%. To estimate the CFROI,

Gross Investment = (\$ 1.6 billion + \$ 0.5 billion) $(1.05)^3$ = \$ 2.431 billion

Gross Cash Flow = \$ 400 million (1-.4) + \$ 150 million = \$ 390 million

Expected Salvage Value = Gross Investment (0.25) = \$ 0.6078 billion

Asset Life = 10 years

The CFROI based upon these inputs is 11.71%. This can then be compared to the real cost of capital to evaluate whether the firm's asset are value creating.

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:

$$\text{Economic Depreciation} = \frac{\text{Replacement Cost in Current dollars } (k_c)}{((1+k_c)^n - 1)}$$

Where n is the expected life of the asset 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:

$$\text{CFROI} = \frac{\text{Gross Cash Flow - Economic Depreciation}}{\text{Gross Investment}}$$

In the example above, for instance, assuming a real cost of capital of 8%, the economic depreciation could be estimated as follows:

$$\text{Economic Depreciation} = \frac{(\$2.431 \text{ bil} - \$0.6078 \text{ bil})\ (.08)}{(1.08^{10} - 1)} = \$125.86 \text{ mil}$$

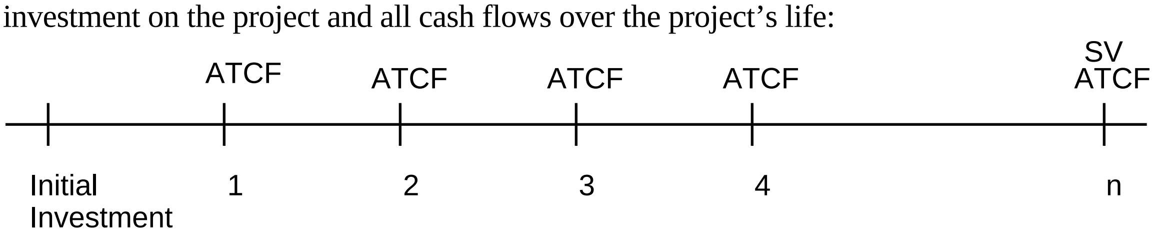
The CFROI can then be calculated as follows:

CFROI = ($390.00 mil - $125.86 mil) / $ 2,431 mil = 10.87%

The differences in reinvestment rate assumptions account 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%, the two approaches would yield identical results[22].

CFROI and IRR

If net present value provides for 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:



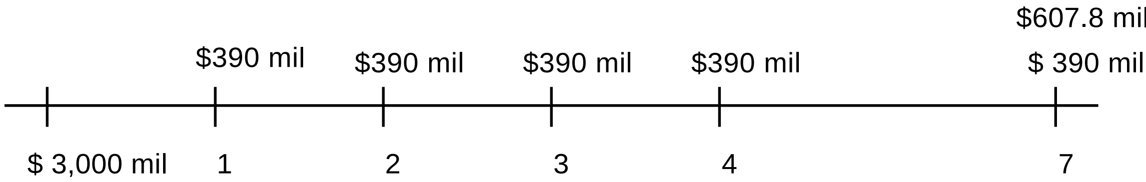
Where the ATCF is the after-tax cash flow on the project, and SV is the expected salvage value of the project assets. This analysis can be done entirely in nominal terms, in which

[22] With a 11.71% rate, the economic depreciation works out to $105.37 million, and the CFROI to 11.71%.

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 current dollars) in the project 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 reasonable for investments in mature markets, but will understate project returns if there is real growth. It should be noted, however, that the CFROI approach can be modified to allow for real growth.
- The second difference is that the internal rate of return on a project or asset is based upon incremental cash flows in the future. 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 cashflows 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%. The CFROI is, however, being computed three years into the project life and remains at 11.71%, since none of the original inputs have changed. The IRR of this project will change, though. It will now be based upon 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%.



Given the real cost of capital of 8%, this would mean that the CFROI is greater than the cost of capital, while the internal rate of return is lower. Why is there the difference between the two approaches and what are the implications? The reason for the difference between the CFROI and the IRR can be traced to the fact that IRR is always forward looking while CFROI is not. The implications are profound. A CFROI that exceeds the cost of capital is usually considered a sign that a firm is deploying its assets well, but that might not be true. If the IRR is less than the cost of capital, that interpretation is false, since the owners of the firm would be better off selling the asset and getting the market value for it rather than continue its operation.

CFROI and DCF Value

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:

$$\text{Firm Value} = \frac{\text{FCFF}_1}{(k_c - g_n)}$$

Note that this can be rewritten, approximately, in terms of the CFROI as follows:

$$\text{Firm Value} = \frac{(\text{CFROI*GI-DA})(1\text{ -t})\text{-}(\text{CX-DA})\text{ - }\Delta\text{WC})}{(k_c - g_n)}$$

where,

CFROI = Cash Flow Return on Investment

GI = Gross Investment

DA = Depreciation and Amortization

CX = Capital Expenditures

Δ WC = Change in Working Capital

k_c = Cost of Capital

g_n = Stable Growth rate

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% cost of capital, a 40% tax rate and a 5% stable growth rate, it would be valued as follows:

$$\text{Firm Value} = \frac{(.30*100-10)(1-.4)-(15-10)-0)}{(.10-.05)} = \$\ 140 \text{ million}$$

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 not just from the CFROI on assets in place but also on future investments. In fact, Holt Associates and BCG both allow for a fade factor in CFROI, where the current CFROI fades towards 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% and real cost of capital of 8% 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 $\sum_{t=1}^{t=n} \frac{CFROI_{aip} * GI_{aip}}{(1+k_c)^t}$, 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 $\sum_{t=1}^{t=\infty} \frac{CFROI_{t,NI} * \Delta GI_t}{(1+k_c)^t} - \Delta GI_t$, 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 upon the CFROI it earns on assets in place and both the abruptness and the speed with which this CFROI fades towards the cost of capital. Thus, a firm can potentially increase its value by doing any of the following:

- Increasing the CFROI from assets in place, for a given gross investment,
- Reducing the speed at which the CFROI fades towards the real cost of capital
- Reduce the abruptness with which CFROI fades towards the cost of capital

Note that this is no different from our earlier analysis of firm value in the discounted cash flow format in terms of cash flows from assets in place (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 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, the games that managers can play, when their performance is judged on the basis of the CFROI are similar to those noted in our discussion of economic value added.

1. *Reduce Gross Investment*: The first is the capital game, where the CFROI is increased while the gross investment is reduced. Since it is the product of the two that drives value, it is possible for a firm to increase CFROI and end up with a lower value. In the example above, for instance, raising the CFROI to 40% while reducing the gross investment to $ 70 million, keeping everything else constant will lower the value of the firm. Thus, managers of firms judged on the basis of CFROI will do everything in their power to keep the gross investment as small as possible.
2. *Sacrifice Future Growth*: CFROI, even more than EVA, is focused on assets in place 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. This is because the effects of the growth sacrifice are likely to be observed in the fade factor,

and unless this can be precisely estimated and compared to what it should have been, the growth game will continue to be paid.

3. *The Risk Trade Off*: While the CFROI is compared to the 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, by itself, does not indicate that the firm value has increases, since it might have come at the expense of lower growth and/or higher risk.

CFROI and Market Value

There is a relationship between CFROI and market value, with firms with high CFROI generally having high market value. This is not surprising, and mirrors what we noted about economic value added earlier. In investing, however, it is changes in market value that create returns, not market value per se. On this score, the relationship 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.

The Bottom Line on CFROI

There are some firms with significant capital rationing constraints, where it is critical that investments be directed to those projects where they earn the highest possible returns for the firm. For these firms, it can be argued that value added measures that focus on dollar value may lead to a misallocation of resources, since they implicitly assume that there is sufficient capital to take on all good projects. Using a percentage rate of return allows these firms to get the maximum return from limited capital. It is not clear, however, that CFROI is a significant advance over even traditional accounting measures such as ROE or ROC. Let us consider some of its stated advantages:

1. It is claimed that unlike accounting return measures and even EVA, CFROI focuses on cash flows. This is partially true, since non-cash charges are added back to arrive at the gross cash flow, but the cash flow used in CFROI calculations is not the cash flow available for claimholders in the firm because it is prior to capital expenditures and it is stated in real terms.

2. There are practitioners who argue that traditional accounting measures of return tend to be overstated because they look at the remaining book value of assets. Thus, as assets are depreciated, the return on equity and capital tend to increase. By focusing on the gross investment, rather than the net, and adjusting for current dollars, it is argued that CFROI provides a superior measure of return on an investment. This argument tends to work better for manufacturing firms but does not really hold up for firms that are not capital intensive.

3. Third, it is argued that by assuming a fixed life for an asset and computing an internal rate of return, the CFROI provides a better measure of return than traditional accounting measures which often divide current earnings by book value of investment. This, again, is a far better argument with capital intensive firms that invest in plant and equipment than it is for firms that invest in short term and intangible assets. Furthermore, if we assume that assets have infinite lives and that capital maintenance expenditures offset depreciation, the CFROI measure converges on the return on capital.

A Postscript on Value Enhancement

The value of a firm rests on three components. The first is its capacity to generate cash flows from assets in place, 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 of capital resulting in lower firm values. To create value then, a firm has to

6. Generate higher cash flows from assets in place, without affect its growth prospects or its risk profile
7. Reinvest more and with higher excess returns, without increasing the riskiness of its assets
8. 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 traditional valuation approaches. This simplicity comes at a cost, since these approaches make subtle assumptions about other components of value that are often not visible or recognized by many users. Approaches that emphasize economic value added, and reward managers for increasing the same, often assume that this increase is not being accomplished at the expense of future growth or by increasing risk. Practitioners who judge performance based upon the cash flow return on investment make similar assumptions.

Investors and portfolio managers who use short cuts to valuation face these problems and more, since they have to consider not just how well or badly firms performed on these measures but have to measure them against market expectations. It is only those firms that deliver results that are better than expected that can be expected to earn excess returns.

Is there a 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, as is the case with CFROI, may help us come up with 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 in terms of 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 project returns will continue forever.

Conclusion

Value enhancement is clearly on the minds of many managers today. As they look at various approaches to value enhancement, they 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 you have chosen to compensation, there is a down side. Managers, over time, will tend to focus their attention on making themselves look better on that measure even it 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 divisions.

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