Value-Based Metrics: Foundations and Practice
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CHAPTER

ECONOMIC MARGIN: THE LINK BETWEEN EVA AND CFROI

DANIEL J. OBRYCKI
CO-FOUNDER
THE APPLIED FINANCE GROUP, LTD.

RAFAEL RESENDES
CO-FOUNDER
THE APPLIED FINANCE GROUP, LTD.

ECONOMIC MARGIN: THE LINK BETWEEN EVA AND CFROI

During the past ten years, great strides have been made to educate corporate executives and institutional investors regarding the benefits of value-based metrics. In general, Economic Value Added (EVA) has emerged as the standard for corporate governance, while Cash Flow Return on Investment (CFROI) has been the most popular value-based management (VBM) metric among institutional investors. Given that each of these metrics attempts to accomplish the same goal, which is to convert accounting data into economic information, the questions each VBM user should ask are:

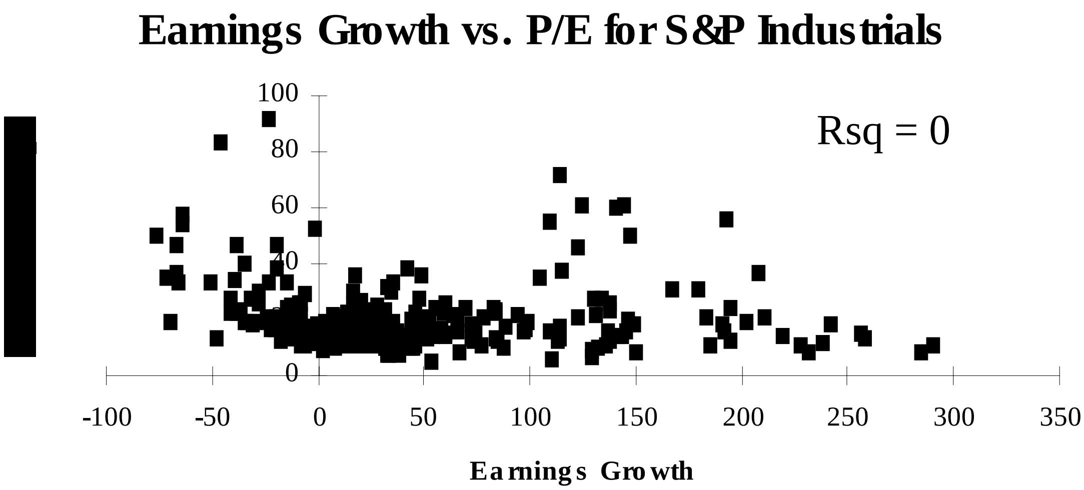
1. Why have corporations and money managers needed to utilize different metrics?
2. What strengths and weaknesses are inherent in each framework?
3. Most importantly, is there a single measure that can satisfy the needs of all VBM users?

This chapter introduces a new performance measurement and valuation system called the Economic Margin Framework. This value-based measurement system is designed by The Applied Finance Group, Ltd. (AFG) to develop an economic profit measure that is comparable across companies, industries, and time. The Economic Margin Framework is more than just a performance metric as it encompasses a valuation system that explicitly addresses the four main drivers of enterprise value: profitability, competition, growth and cost of capital. This chapter concentrates on the first two drivers of firm value, profitability and competition

THE NEED FOR VALUE BASED METRICS

Since the motivation for value-based metrics has been well documented, we will not dwell on the subject beyond a few paragraphs. In short, value-based metrics have become popular for two reasons. First, capital markets have forced money managers and corporations to have a renewed focus on the balance sheet. In other words, corporations are not only expected to generate positive earnings and sales growth, they also must provide an adequate return on the money they have invested. Second, accounting information, although necessary, does not by itself adequately explain market valuations nor provide comparability between firms. Exhibit 1 examines the link between earnings growth and P/E multiples for the industrial companies within the S&P 500.

Exhibit 1: No Correlation Between EPS Growth and P/E



Ideally, a corporate performance metric (earnings growth) should provide insights into what a firm is worth (P/E multiple). In this case we would expect that higher earnings growth rates would correspond to higher P/E multiples. In Exhibit 1, however, there is only a very weak correlation. Indeed, notice that regardless of how well a firm performs as measured by earnings growth, the market appears indifferent to such growth in assigning a firm's P/E.

This lack of relation between earnings growth (performance) and P/Es (valuation) raises the question as to why are accounting measures inadequate? Exhibit 2 provides an overview of the common accounting distortions that prevent accounting data from reliably capturing a firm's true economic performance.

Exhibit 2: Common U.S. GAAP Distortions

Earnings as a proxy of economic profitability does not account for:

Investment to Generate the Earnings
Cost of Capital
Inflation
Cash Flow

Accounting ratios/multiples are not comparable because each company has a different:

Asset Life
Asset Mix
Asset Age
Capital Structure
Growth Potential

Accounting rules distort economic reality due to:

Off Balance Sheet Assets/Liabilities such as:

- Operating Leases
- Research & Development

Pooling versus Purchase Accounting
Inventory Policies

In the end the goal of any value-based metric is to remove these and other accounting distortions to provide comparability over time, firms, and industries; plus help answer the following questions:

- How well is this firm/project managed? (corporate performance)
- What is this firm/project worth? (valuation)

MONEY MANAGERS VERSUS CORPORATE EXECUTIVES

You may ask, "If all value-based metrics have similar goals, then why are there different metrics?" A cynic might answer that it gives all the consultants something to argue about. Although this hypothesis definitely has merit, the reality is that different metrics serve different purposes.

The principal users of value-based metrics are money managers/analysts and corporate executives. Each party has unique needs and access to information when carrying out their daily activities. For instance, money managers need a metric that allows them to quickly evaluate hundreds and even thousands of companies on the basis of publicly available information. They evaluate management's skill by looking at management's historic and forecasted track record relative to peers, and then determine whether the firm is over or undervalued based on their expectations. Once they complete their analyses, money managers purchase the stock(s) and the market tells them if their assumptions were wrong or right.

Contrast this to corporate executives who have almost limitless information on a single firm. The firm, however, is made up of several business units, hundreds of projects and thousands of employees. Corporate executives must not only make strategic decisions to help the firm create shareholder value, they must also promote and instill value-based management principles throughout the organization down to the lowest levels. In addition, they must design and maintain internal management systems to ensure that the firm does not stray from the designated path. Although always aware of the external demands of the market and pressure from competition, the corporate executive's predominate focus is internal, with a primary emphasis on managing the operational details of running a business.

In short, money managers want a performance metric that is comparable across a large number of firms and a valuation system that objectively sets target values. Corporate executives want the same properties, but are much more interested in a simple measure that is easy to communicate and administer throughout the firm. Can one framework meet the needs of both parties?

THE ECONOMIC MARGIN

Exhibit 3 contains the basic Economic Margin (EM) calculation and its three components - Cash Flow, Invested Capital, and a Capital Charge. We have included only the most common adjustments, although more are available if a firm requires special consideration. Sharing similarities individually with both EVA and CFROI, Economic Margin is a unique mixture of the two metrics designed to capture the best qualities of each measurement. Similar to EVA and CFROI, the Economic Margin Cash Flow component is meant to capture all the cash generated by a firm's capital base. From an investment perspective, EVA, CFROI, and Economic Margins all seek to measure the total capital investors have entrusted to a company's managers. In general, the metrics have more in common than not.

Beyond the pure mechanical nature of any equation, several things should stand out when viewing the Economic Margin calculation. First, the numerator of the Economic Margin, like EVA, is based on economic profit, which helps focus managers on value creation. Unlike EVA, however, Economic Margin adds depreciation and amortization to cash flow and instead incorporates the return of capital explicitly in the capital charge. Second, like CFROI, Economic Margin is based on gross assets, which helps to avoid the growth "disincentive" typically associated with net asset based measures. Unlike CFROI, however, the Economic Margin's cash flows are unlevered (.i.e. all equity financed) and do not mix operating and financing decisions. These similarities and differences will be expanded on later within the chapter.

Exhibit 3: Economic Margin Calculation

$$EM = \frac{\text{Operating Cash Flow} - \text{Capital Charge}}{\text{Invested Capital}}$$

Operations Based Cash Flow:
- \+ Net Income
- \+ Depreciation and Amort.
- \+ After Tax Interest Expense
- \+ Rental Expense Net Int. Adj.
- \+ R & D Expense
- ± Non-Recurring Items

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Capital Charge:
- \+ Return on Capital
- \+ Return of Capital

Inflation Adjusted Invested Capital:
- \+ Total Assets
- \+ Accumulated Depreciation
- \+ Gross Plant Inflation Adjustment
- \+ Capitalized Operating Rentals
- \+ Capitalized R & D
- \- Non Debt Current Liabilities

Exhibits 4 through 7 step through the Economic Margin calculation for IBM in 1998[1]. Exhibit 4 provides the numeric detail to calculate cash flow, invested capital, and non-depreciating assets. Exhibit 5 graphically lays out the logic behind calculating the capital charge embedded in an Economic Margin. In principle, the capital charge is identical to a mortgage payment. The key difference between an Economic Margin capital charge and a mortgage payment is that when calculating a mortgage payment, the entire investment amount due to the bank is treated as a depreciating asset. For most companies, however, part of their assets are non-depreciating (such as working capital) and can be returned to investors if the company were liquidated when its existing assets wear out. Exhibit 6 provides a capital charge sensitivity based on asset life and non-depreciating assets and finally, Exhibit 7 brings everything together by calculating IBM's 1998 Economic Margin.

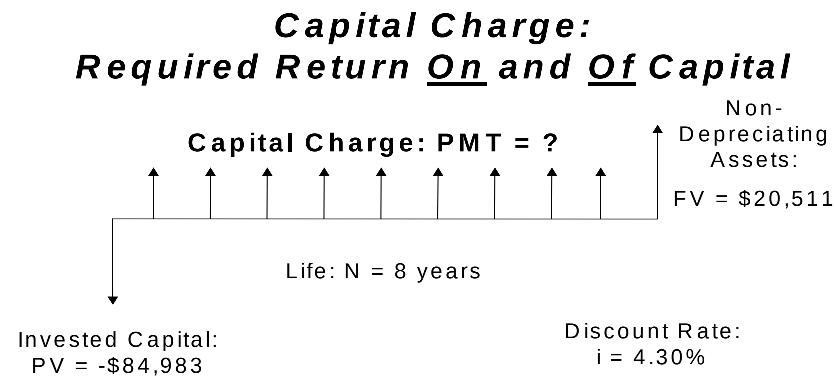
Exhibit 4: Calculating IBM's 1998 Operating Cash Flow and Invested Capital

Operations Cash Flow Calculation		**Invested Capital Calculation**	
Inc. Before Pref.,Extraord.,& Disc. Ops.	$6,329	Total Assets	$50,269
+ Total DD&A Expense	$2,224	+ Accumulated Depreciation	$17,958
+ Interest Expense AFIT	$25	+ Inflation Adjustment	$4,219
+ Normalized Rental Exp. Net Interest Adj	$1,290	+ Capitalized Rentals	$9,194
+ Normalized R&D Exp.	$4,411	+ Capitalized R&D	$18,188
+/- Non-Recurring Items	$0	- Non-Debt Current Liabilities	$14,845
+/- Monetary Gain/Loss	-$221		
= Operations Cash Flow	**$14,059**	**= Invested Capital**	**$84,983**

Non-Depreciating Assets Calculation	
Current Assets	$31,007
+ Other Assets	$4,349
- Non-Debt Current Liabilities	$14,845
= Non-Depreciating Assets	**$20,511**

[1] For this example, we have restated IBM's financial subsidiary on an equity basis.

Exhibit 5: Calculating IBM's 1998 Capital Charge



Annual Capital Charge = PMT(.043, 8, -$84,983, $20,511) = $10,577

Return On Capital = 0.043 * $84,983 = $3,654

Return Of Capital = $10,577 - $3,654 = $6,923

Exhibit 6 overviews how important it is to understand asset characteristics. For example, given two firms with identical investment bases and cash flows, whether they create or destroy value will depend on their economic make-up. As the proportion of non-depreciating assets and viable asset lives change, so does the minimum cash flow hurdle to create value. By making this capital sensitivity an explicit aspect of the Economic Margin calculation, our experience has demonstrated that managers become much more aware of the economic ramifications of alternative project choices. Furthermore, it allows accurate comparisons across companies in different industries, or business units with different operating characteristics.

Exhibit 6: Calculating IBM's 1998 Capital Charge Sensitivity

Capital Charge: Sensitivity

Non-Depreciating Assets/Invested Capital (%)

		0%	24%	48%
Life	6	$16,370	$13,301	$10,232
	8	$12,779	$10,577	$8,375
	10	$10,635	$8,950	$7,265

Exhibit 7: Calculating IBM's 1998 Economic Margin

Economic Margin	
Operations Cash Flow	$14,059
- Capital Charge	$10,577
= Economic Profit	$3,482
Economic Profit	$3,482
/ Invested Capital	$84,983
= Economic Margin	**4.10%**

ECONOMIC MARGIN AND EVA

As discussed earlier, a primary goal of value-based metrics is to eliminate the numerous distortions in accounting data to provide comparability across time, firms and industries. Once we have "cleaned" up the accounting data, we can evaluate if companies are creating or destroying shareholder wealth, and provide more insightful valuations. An issue that arises with basic EVA calculations, is the use of historic net plant in its invested capital base and depreciation expense in its NOPAT calculation. Utilizing these items in a performance metric can cause many difficulties for a money manager who is trying to compare firms across time and industries to determine the best investment opportunity. For example, how does a manager compare EVA for two firms when one firm uses accelerated depreciation and the other straight-line? Or what about firms having similar fixed assets that were purchased at different times? In addition, the manager must determine if the net asset base adequately accounts for the money the firm has invested to generate its cash flows (e.g. the firm may have fully depreciated, but not retired fixed plant) and whether GAAP depreciation expense is sufficient to replace the existing fixed assets. These issues have additional implications for the corporate executive. Exhibit 8 and Exhibit 9 demonstrate how the basic EVA calculation's reliance on Net Plant can lead corporations to confusing conclusions regarding wealth creation and optimal strategy. We call this effect "The Old Plant Trap". Exhibit 8 contains the assumptions for a simple project that will form the basis for many of the following discussions. Exhibit 9 presents the basic EVA calculation for this project.

Exhibit 8: Simple Project Assumptions

Capital	$100	Deprec./Year	$10
Working Cap.	$0	NOPAT/Year	$9
Life	10 yr.	Cash Flow/Year	$19
No Inflation		Discount Rate	10%

Exhibit 9: Basic EVA Falls into "The Old Plant Trap"

YEARS	*1*	*2*	*3*	*…*	*9*	*10*
Gross Plant	100	100	100		100	100
Acc. Dep.	10	20	30		90	100
Net Plant	90	80	70		10	0
Net Income	9	9	9		9	9
B.O.Y. Net Inv. Cap.	100	90	80		20	10
C.O.C.	10	10	10		10	10
EVA Cap. Chrg.	10	9	8		2	1
EVA	**-1**	**0**	**1**		**7**	**8**
EVA/B.O.Y. Net Inv. Cap.	-1%	0%	3%		35%	80%

Compare the project's EVA in year 1 against year 10. As the project gets older, EVA increases from negative $1 to positive $8. Why? Has the project's economics changed? No, the basic EVA calculation increased only because the plant was depreciated, which decreased the capital charge each year. In addition, which EVA is the "correct" EVA, and how does a manager know whether to accept or reject the project?

While it is easy to dismiss such a problem as a "calculation issue", its implications are much more serious. For example, if a company has adopted a compensation system that rewards improvement in EVA, the manager of the above project is likely to resist growing since each new project will incrementally decrease his EVA, while doing nothing increases it. Inflation makes the problem even worse. Adding new plant at current costs increases the manager's invested capital base (relative to older plant at historic costs) and decreases NOPAT via a larger depreciation expense.

This disincentive to grow was made painfully clear in a discussion we had with the CEO of a Midwestern manufacturing firm who was an early implementer of EVA. As part of the EVA system, the CEO gave out two types of awards, one for increasing EVA and the other for growth. The CEO said that while the system was in place, he never gave an award for growth.

Can EVA deal with the "Old Plant Trap"? Yes. By replacing the accounting depreciation used to calculate NOPAT in a basic EVA calculation with sinking fund depreciation, the "Old Plant Trap" problem can be eliminated. Obviously, a corporate manager must determine whether the added complexity is worth the additional benefit. For institutional investors, however, such a solution is not as easy. Calculating sinking fund depreciation using only publicly available information is difficult since you must consider how old the assets are and how long they will last to reasonably estimate the current year's sinking fund depreciation.

The natural question is, "How does Economic Margin handle the old plant trap?" Exhibit 10 illustrates the Economic Margins generated by our simple project.

Exhibit 10: Economic Margins Solve "The Old Plant Trap"

YEARS	*1*	*2*	*3*	*…*	*9*	*10*
Net Income	9	9	9		9	9
Depreciation	10	10	10		10	10
Cash Flow	19	19	19		19	19
Gross Investment	100	100	100		100	100
C.O.C.	10	10	10		10	10
EM Cap. Chrg.	16.27	16.27	16.27		16.27	16.27
Economic Profit	**$2.73**	**$2.73**	**$2.73**		**$2.73**	**$2.73**
Economic Margin	2.73%	2.73%	2.73%		2.73%	2.73%

Economic Margin, defined as:

(Operating Cash Flow – Capital Charge)/Gross Invested Capital

avoids the pitfalls inherent to the basic EVA calculation and solves "The Old Plant Trap". Based on cash flow and gross plant, EM yields a consistent answer of 2.73% (or $2.73 measured in dollar amounts) and does not change with time. A project manager rewarded on EM has no conflict regarding growth since new projects are added to the capital base at gross costs, like the other investments, and depreciation is added to net income to obtain cash flow. A corporate executive/money manager clearly knows this project/firm increases shareholder value and because the economic profit has been standardized by invested capital, the metric has no size bias. EM is a consistent, reliable measure that a value-based manager can compare across time, companies and industries.

AutoZone is an excellent illustration of the different insights obtained from basic EVA calculation and EM. For the period between 1994 and 1997, EVA improved from $18 million to $75 million, and EVA/Net Invested Capital increased from 3% to 6%. EM, however, declined from 12.8% to 9.6%. Over the period, AutoZone's share price remained flat at $29/share, underperforming the market by nearly 50%. It is important to note that this is only one company out of over 6,000 publicly traded U.S. firms and all VBM metrics in theory should provide the exact same answers given identical assumptions. When applied to real companies, however, each measure must fall back on its internal assumptions, often leading to very different conclusions. Therefore, it is important to understand the assumptions each measure imposes on the company data, since actual data often does not provide the ideal conditions required for each VBM metric to generate identical DCF/NPV answers.

ECONOMIC MARGIN AND CFROI

CFROI takes a very different approach relative to EM and EVA. Instead of being a measure of economic profit, CFROI is an internal rate of return. As a rate of return, it provides a consistent basis from which to evaluate companies regardless of their size, which a dollar based measure of economic profit cannot do. This characteristic of CFROI has made it very popular in the money management community, as investors need to compare many companies against each another to make investment decisions.

It is, however, important to understand the limitation that ratios have when used to measure wealth creation. First, IRRs by themselves do not provide any indication as to whether a firm is destroying or creating shareholder value. Is an IRR of 8% good or bad? How much shareholder value has the firm created or destroyed? Without reference to a company's cost of capital, it is impossible to answer these questions. Second, an IRR is a non-linear measure, which creates communication issues among non-financial managers. For instance, how much would a manager need to improve cash flow to obtain a 10% increase in IRR? As a form of an IRR, CFROI faces these issues. For example, using our simple project the CFROI, which we calculate later in Exhibit 12, is 13.77%. A 10% increase in CFROI implies a CFROI of 15.15% (13.77%*1.1). To determine the incremental cash flow, you must first solve the following payment function, PMT (0.1515, 10, -100, 0) where 0.1515 = return, 10 = life, -100 = invested capital, 0 = working capital, and then subtract the previous cash flow from the result. The answer is irrelevant, but what is relevant is that this concept must be explained and made meaningful to all levels of an organization.

Beyond any difficulties in managing to an internal rate of return, the CFROI also mixes operating and financing decisions exactly like a Return on Equity (ROE) calculation. Let's remember that the primary goal of a value-based metric is to provide comparability over time, firms, and industries. Given that, what is undesirable about mixing operating and financing decisions? The answer is that by mixing operating and financing, CFROIs can change when there has been no change in a firm's underlying operating performance. This is identical to the behavior of a ROE. Exhibit 11 and Exhibit 12 illustrate the similarity between the two measures.

Exhibit 11: Unlevered and Levered Financial Statements for Our Simple Project

Company	Unlevered	Levered		Unlevered	Levered
Sales	95	95	Gross Plant	100	100
Operating Expenses	70	70	Acc. Dep.	10	10
Depreciation	10	10	Net Plant	90	90
Operating Income	15	15			
			Total Assets	90	90
Interest Expense	0	5.6			
PreTax Income	15	9.4	Debt	0	80
			Equity	90	10
Income Tax (40%)	6	3.76			
Net Income	9	5.64	Total Liab & Equity	90	90

Exhibit 12: CFROI and ROE Change Due to Leverage

Company	Unlevered	Levered
Net Income	9	5.64
DDA	10	10
Interest Expense	0	5.6
Cash Flow	19	21.24
Gross Investment	100	100
Life	10	10
CFROI	13.77%	16.71%
ROE	10.0%	56.4%

Exhibit 11 contains balance sheets and income statements for our simple project assuming two cases, all equity financing and 89% debt financing. We have also assumed a 40% tax rate. Exhibit 12 calculates each firm's CFROI and ROE. Notice that for each firm the assets and operating income are identical. Yet the CFROI and ROE for the levered firm are dramatically higher than for the unlevered firm. This is a very important point and worth repeating. There has been no change in operating performance, but CFROI and ROE have increased as a result of financing.

Why does this happen? Because CFROI adds the entire interest expense, including the tax benefit ($5.6*40% = $2.24), back to cash flow. Consequently, a levered firm will always show higher cash flows and CFROIs compared to an unlevered firm. A portfolio manager or corporate executive, therefore, cannot compare CFROIs across time, companies or industries, and cannot forecast CFROIs without explicitly addressing leverage.

Kroger demonstrates how CFROI and leverage can combine to provide ambiguous information to a portfolio manager. In 1990 Kroger had leverage at market of 83% and a CFROI of 13.4%. By 1998, the company had cut its leverage to 30%, while its CFROI declined to 11.5%, nearly 2%. Was Kroger's operating performance truly down for this period? Or had CFROI missed the improvement in operating performance as the benefit from the interest tax shield decreased with leverage? In the end, the market is the true judge of performance, and from 1990 to 1998, Kroger outperformed the market by 58%. (Note: Kroger's Economic Margins over the period increased from 1.3% to 3.8%).

How does Economic Margin improve upon IRR type metrics? First, since an EM incorporates the investors required return on capital within its capital charge, an EM is a direct measure of shareholder wealth creation. A company with a positive EM creates wealth, a zero EM maintains wealth, and a negative EM destroys wealth. Second, since the EM concept is derived from economic profit, it is easier to communicate and set goals. If a money manager or corporate executive wants to know the incremental cash flow required to obtain a 10% increase in the EM for our simple project (see Exhibit 10), he does the following multiplication: EM * Percent Increase * Gross Investment (2.73% * 10% * $100 = $0.27). Finally, EM does not mix operating and financing decisions in its cash flows. As shown in Exhibit 13, EM tax adjusts interest expense before adding it to cash flow. While the tax deductibility of interest expense is a valuable asset, the Economic Margin framework incorporates it in the valuation process within the weighted average cost of capital. This leaves the EM cash flow as a true measure of the cash generated by the firm's operating assets, undistorted by financing choices.

Exhibit 13: EM Cash Flow's are Unaffected by Leverage

Company	*Unlevered*	*Levered*
Net Income	9	5.64
DDA	10	10
After Tax Interest Expense	0	3.36
Cash Flow	19	19
Gross Investment	100	100
Capital Charge	16.27	16.27
EM	2.73%	2.73%

VALUATION ISSUES

Similar to VBM metrics attempting to correct the distortions in accounting data for performance measurement purposes, EM, EVA and CFROI also attempt to make traditional DCF models more useful. The problem with most DCF valuations is that the majority of a firm's value is embedded within the perpetuity attached to the end of the forecast period. How can VBM frameworks solve the perpetuity problem? The answer is by focusing on forecasting economic profits (i.e. the amount of cash a firm earns in excess of the cash required by investors for using their money)!

In general, the advantages of Value-Based Frameworks, relative to Free Cash Flow and Dividend Discount Models, are that they explicitly:

1 Link how well a company is performing to what it is worth,

2 Distinguish between the value of a firm's existing assets and future investments, and

3 Incorporate a decay concept that recognizes competition will eliminate returns above/below the cost of capital over time.

Together these advantages form the basis for developing valuation models that provide true insights into what a company is worth.

BASIC EVA VALUATIONS AND "T"

EVA has made a tremendous impression in boardrooms and is just now starting to enter into the equity analyst's toolbox. For example, CS First Boston utilizes EVA concepts in its analyst reports. As a result, this type of framework will gain increasing attention in the market, and its valuation strengths and weaknesses should be clearly understood. Exhibit 14 contains the generic EVA valuation formula.

Exhibit 14: EVA Valuation Formula

$$\text{Firm Value} = \underbrace{\frac{\text{NOPAT}}{c^*}}_{\text{Existing Assets}} + \underbrace{\frac{\text{Avg. EVA Fut.}}{c^*} * \frac{1}{(1 + c^*)} * T}_{\text{Future Investments}}$$

C* **= Company Weighted Average Cost of Capital**
T = Time Period Over Which Mgmt Can Initiate Positive EVA Projects

In English, this model says a firm will:

1. Earn its NOPAT on its existing assets forever (i.e. NOPAT/c*),
2. Earn positive EVA forever on new investments made over period "T" (i.e. Avg. EVA Fut./c*), and
3. Earn zero EVA on any new investments made after period "T".

The EVA model is very compact and mathematically elegant leading to the ability to generate quick insights into a valuation problem. This can be useful when communicating a particular point of view, or getting agreement from a diverse group of people. The price paid for immediate insights and computational ease, however, is the potential to oversimplify.

For example, the basic EVA model assumes that competition has no effect on the existing assets or the new investments made through period "T", but competition does effect investments made after "T". In other words, if Wal-Mart has 1000 existing stores, these stores will generate their existing level of profitability forever; plus any new stores added during the first "T" years will also generate economic profits into perpetuity. All stores added after "T", however, will generate zero economic profits. Unfortunately, this is a very unrealistic model of how business works. Competition reduces the earning power of all assets, existing and future.

The basic EVA model's other shortfall is that it does not provide guidance regarding "T". Instead, the model tries to find insight into competition by using a firm's market value to solve for "T" and asking if the number is reasonable. The first thing that should strike you as odd is that the model uses its own set of perpetuities to solve for "T", whose purpose is to get us away from the perpetuity assumptions inherent in a DCF valuation. Putting this aside, let's examine the potential results. Exhibit 15 rearranges the EVA valuation formula to solve for "T".

Exhibit 15: EVA's "T" Calculation

$$T = \left(\text{Firm Value} - \frac{\text{NOPAT}}{c^*} \right) * \frac{c^* \left(1 + c^* \right)}{\text{Avg. EVA Fut.}}$$

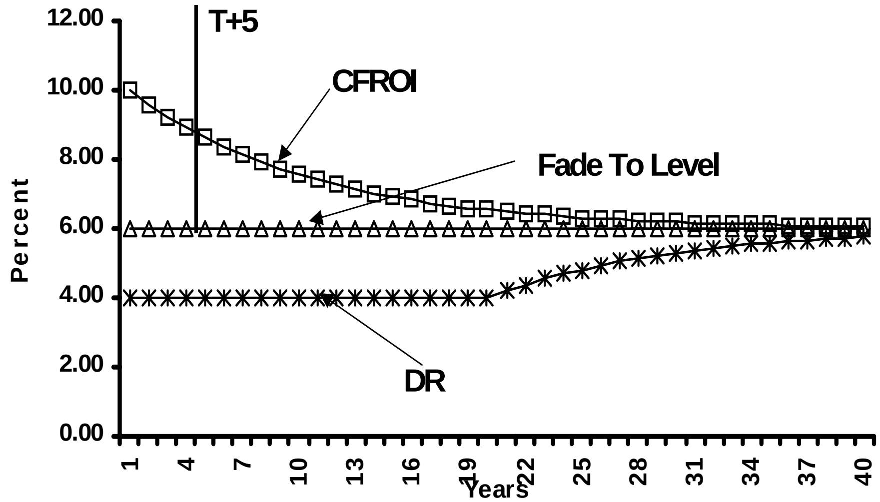
Looking at the equation, notice that as NOPAT/c* becomes large, “T” approaches zero or goes negative. In addition, if NOPAT/c* or the Average EVA Future is small, “T” becomes extremely large. Finally, if we can calculate “T” and it is a reasonable number, what do we compare it to? Is a “T” of 5 good or bad? A portfolio manager or corporate executive cannot use “T” to make a decision without having some guidance as to a reasonable value for “T”.

In summary, the basic EVA valuation model provides an easy and quick approach to valuing a company and provides some insights into competition. However, because the approach relies heavily on perpetuity assumptions and gives little to no guidance on “T”, it has limited application when trying to systematically and objectively value companies.

CFROI VALUATIONS, FADE, AND FADE TO LEVELS

Like the basic EVA model’s “T”, the CFROI valuation model provides insights into competition through a concept called fade. In general, fade refers to the notion that all firms’ levels of performance will over time converge to the same economy wide value. Where the CFROI valuation model improves over the basic EVA valuation model is that it utilizes the fade to avoid the perpetuity problem by explicitly forecasting out returns and discount rates. Exhibit 16 illustrates one of many CFROI fade patterns.

Exhibit 16: CFROI Fade Pattern – CFROI > Fade To, DR < Fade To



To understand Exhibit 16, it is helpful to understand what the CFROI valuation model and fade concepts are trying to accomplish. Simply put, the key to avoiding perpetuity problems is to determine when a company's return on capital is equal to its cost of capital (i.e. discount rate). Afterward, no matter how much a firm grows, the net present value of future investments is zero. This is the model's objective.

Looking at Exhibit 16, there are many pieces to the CFROI fade concept to examine. To begin, the CFROI model utilizes one level of return (in general 6%) that all firms will fade to by year 40. As shown in Exhibit 16 and later exhibits, we will call this the "Fade to Level". Once the "Fade to Level" is set, the next issue is how to make the CFROI and discount rate (DR) converge to this value. On or before year 40, the CFROI and discount rate must be equal or the company would still be making excess profits/losses. The CFROI is brought to the "Fade to Level" in two stages, an initial five year window where CFROI fade rate research (based on CFROI level, CFROI variability, and growth) is applied and the remaining period where a 10% exponential decline is used. The discount rate is held constant for 20 years and afterward also faded to the "Fade to Level" at a 10% exponential rate. In essence, we have two converging fades, one for the CFROI and another for the discount rate.[2]

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[2] Bartley J. Madden, *CFROI Valuation: A Total System Approach to Valuing the Firm* (Woburn, MA: Butterworth-Heinemann, 1999), pp. 173-175 provided the background for the explanation of Exhibit 16.

The main driver of the CFROI model is that over time a company's performance regresses towards an average level. Historically, this value is relatively stable at approximately 6% and appears to be a reasonable rate to forecast as a long-term, company profitability level. Upon further inspection, however, fixing the "Fade to Level" can lead to some unintuitive valuation assumptions. Exhibits 17, 18 and 19 capture a few of the issues associated with fixing a "Fade to Level".

Exhibit 17: CFROI Fade Pattern – Forecasting No Competition & Positive Spread

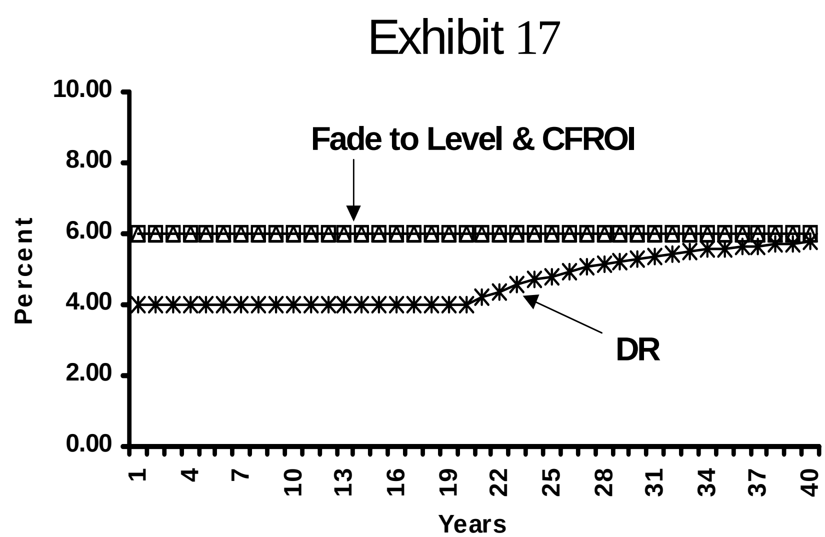
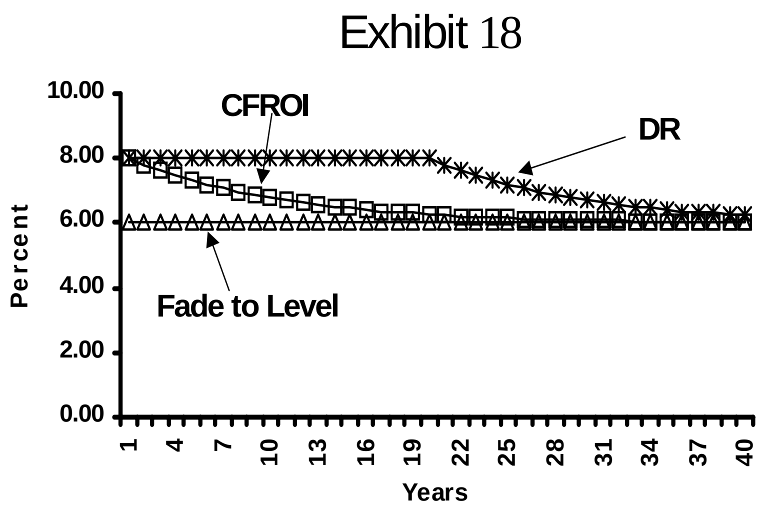


Exhibit 17 is a simple example of the CFROI fade concept. It assumes that the CFROI equals the "Fade to Level" which equals 6%. The current discount rate, however, is at 4%. Since the CFROI equals the "Fade to Level", it remains unchanged over the next 40 years. The discount rate also remains unchanged until year 21 when it begins fading to the "Fade to Level".

How has fade captured competition in this example? For the first 20 years it does not. When the spread between the CFROI and discount rate remains steady, there is no competition and economic profits remain constant. In fact, in year 21 and beyond, the spread only dissipates because the firm's discount rate begins fading up to the "Fade to Level". This behavior implies that cash flows are becoming more risky. The question, however, is "Why?" Why is the firm's discount rate changing starting in year 21? Why do all firms fade to the same discount rate? Specifically, why should Coca-Cola have the same discount rate as a start-up biotech?[3]

Exhibit 18: CFROI Fade Pattern – Destroying Value from a Zero Spread

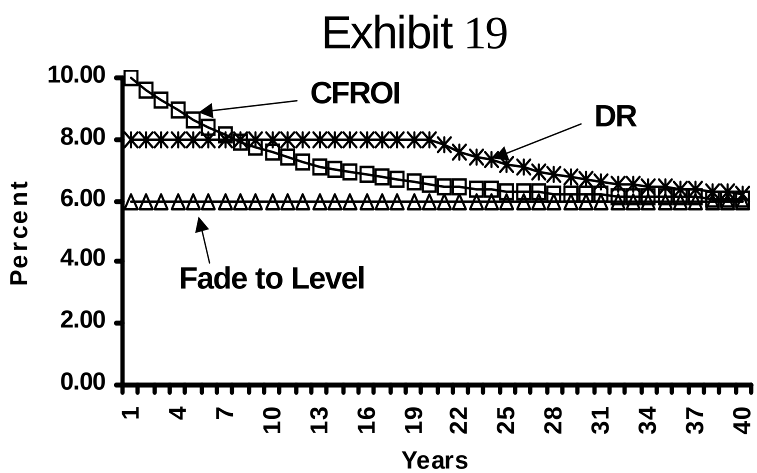


With the initial discount rate above the "Fade to Level", Exhibit 18 is nearly the mirror image of Exhibit 17. The significant difference, however, is that here the initial CFROI is equal to the discount rate and not the "Fade to Level". Afterward, the CFROI and discount rate take their own path to the "Fade to Level" (utilizing the CFROI standard methodology) until they are equal once again in year 40. As previously discussed, the key to avoiding perpetuity problems is to determine when a company's return on capital is equal to its discount rate. Afterward, no matter how much a firm grows, the net present value of future investments is zero. In Exhibit 18, however, this is not the case. The CFROI and discount rate start out equal, but as a result of the "Fade to Level" assumption, the CFROI falls below the discount rate destroying value with future investment. In EVA terms, the "Fade to Level" basically forces all firms to have a "T" of 40 years It also

[3] Note that fading the discount rate towards the 6% average creates a valuation model that literally incorporates over 20 company specific costs of capital.

forecasts all firms with zero economic profits to destroy future value if their CFROI/discount rate start above the “Fade to Level”.

Exhibit 19: CFROI Fade Pattern – Creating then Destroying Value



Finally, Exhibit 19 is an extension of Exhibit 18 with the initial CFROI > discount rate > “Fade to Level”. In this case, the firm first creates (CFROI > discount rate) then destroys (CFROI < discount rate) value as the CFROI and discount rate follow their separate paths to the “Fade to Level”. Although this is a feasible outcome, most firms do not systematically forecast destroying value. Instead, a more intuitive assumption is that once the CFROI and discount rate are equal, future investments neither create nor destroy value.

To summarize, just as the basic EVA valuation model is very valuable to analysts that understand it, so is the CFROI valuation model valuable to its proponents. Utilizing fade rates to forecast CFROIs and discount rates to converge to a “Fade to Level” will eliminate the perpetuity problem inherent in most DCF valuations. It is important, however, not to focus solely on the “Fade to Level”, but rather to adhere to the basic VBM principle that firms continuously face competition forcing excess profits to zero and once at zero, future investments add no incremental value. Otherwise, the portfolio manager or corporate executive must look at each company/business unit individually to understand the "Fade to Level" valuation implications

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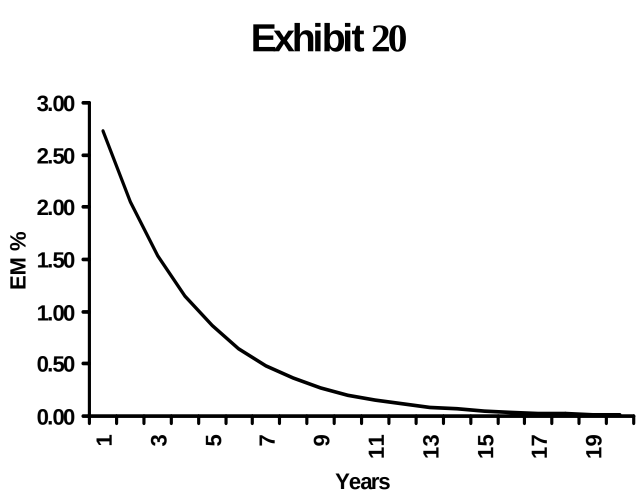
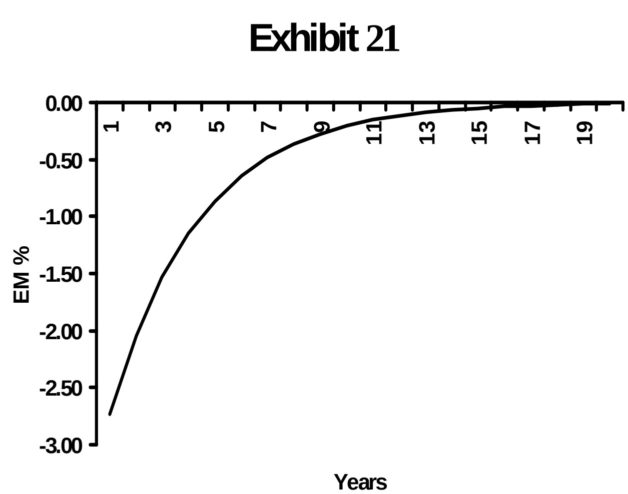
ECONOMIC MARGIN VALUATION AND DECAY

The Economic Margin framework contains the advantages of an economic profit measure and incorporates the insights gained from understanding fade. Like EVA, the numerator of the Economic Margin consists of economic profit. In addition, similar to the CFROI valuation model's fade, the EM framework utilizes a concept called decay. The key difference, however, is that instead of decaying IRRs (i.e. returns), the EM framework decays economic profits (positive or negative) to zero over time. These discreet economic profit forecasts can be converted to cash flows from existing assets and future investments to value the company/business unit without the "perpetuity" problem associated with traditional DCF models.

Decay is defined as the percent per year of Economic Margin that is lost (positive margins) or gained (negative margins) due to competition. For example, the EM for our previous simple project (see Exhibit 10) was constant at 2.73%/year. If the project began with a 2.73% EM and afterward had a 25% decay/year, the EM profile would look like Exhibit 20. Similarly, Exhibit 21 illustrates the EM profile if the EM began with a –2.73%.

Exhibit 20: Positive EM Decaying to Zero Economic Profit
Exhibit 21: Negative EM Decaying to Zero Economic Profit





The EM Framework utilizes decay rates derived from empirical research that related EM level, EM variability, EM trend and firm size to the decay rate. In general, a company has a high decay if its:

1. EMs are very positive or negative,
2. EMs vary greatly from year to year,
3. EM change is negative, and
4. Size (defined by invested capital) is small.

The intuition behind the four factors is straightforward. First, firms with very high (positive) EMs face stiffer competition than firms with EMs near zero, while firms with very low (negative) EMs must fix their businesses quickly or be forced out of business. Therefore, firms with “extreme” EMs (i.e. very positive or very negative) have greater decay rates than those with EMs closer to zero. Second, if a firm has had a very unstable/cyclical EM pattern and is at a peak or valley, the investor will be unwilling to assume that the peak or valley will persist very long and will assign the firm a high decay rate. If the company has a very steady EM history, however, the investor is more likely to believe that management can maintain this EM level over a longer period and will assign it a low decay rate. Third, if there are two firms, the first with EMs going from 6 to 4 and the second with EMs moving from 2 to 4, the second firm has “momentum” in its favor and will have a lower decay rate. Finally, it is more difficult to turn an ocean liner than a speedboat. Similarly, a small firm can see its profitability increase or decrease rapidly relative to a larger firm that has either built up a) barriers to entry that enhance profitability or b) large fixed costs that are hard to restructure in difficult times. Consequently, larger firms have lower decay rates than smaller firms.

Given an initial EM level, investment, discount and decay rate, it is very simple to value a future investment or existing asset. For our previous simple project having an initial EM of 2.73%, investment of $100 lasting 10 years, and discount rate of 10%, let's assume a decay rate of 25% as in Exhibit 20. To calculate the net present value of this future investment, you simply discount the forecasted economic profits. Exhibit 22 illustrates how easy it is to calculate the net present value for this future investment. It also illustrates another point that we have been repeating throughout the text. When the EM (or economic profit) equals zero, the contribution of any future investments to value is zero and the perpetuity problem associated with typical DCF forecasts is eliminated. This is why it is so important to understand decay.

Exhibit 22: Using EMs and Decay Rates to Value Future Investments

Year	*EM*	*Investment*	*Econ. Profit*	*Disc. Factor @ 10%*	*Disc. Cash Flow*
1	2.73%	100	$2.73	1.10	$2.48
2	2.04%	100	$2.04	1.21	$1.69
3	1.53%	100	$1.53	1.33	$1.15
4	1.15%	100	$1.15	1.46	$0.79
5	0.86%	100	$0.86	1.61	$0.54
6	0.65%	100	$0.65	1.77	$0.37
7	0.49%	100	$0.49	1.95	$0.25
8	0.36%	100	$0.36	2.14	$0.17
9	0.27%	100	$0.27	2.36	$0.12
10	0.20%	100	$0.20	2.59	$0.08
				NPV	$7.62

A firm, however, consists of future investments and existing assets. We value existing assets similar to future investments except that we add back the capital charge to the economic profits to obtain the cash flow from the existing assets. Since the existing assets have already been purchased, the initial investment is a sunk cost and only the cash flow from the investment is relevant. Exhibit 23 illustrates how we would value our previous simple project if we had just spent the $100. Notice that the PV is $107.62, exactly $100 more that the future investment case in Exhibit 22. This means that the PV of the capital charge exactly equals the investment, which in turn is why the discounted value of the economic profits on future investments provides the correct NPV. The capital charge holds management accountable for their investments!

Exhibit 23: Using EMs and Decay Rates to Value Existing Assets

Year	EM	Investment	Econ. Profit	Cap. Charge	Cash Flow	Disc. Factor @ 10%	Disc. Cash Flow
1	2.73%	100	$2.73	$16.27	$19.00	1.10	$17.27
2	2.04%	100	$2.04	$16.27	$18.32	1.21	$15.14
3	1.53%	100	$1.53	$16.27	$17.81	1.33	$13.38
4	1.15%	100	$1.15	$16.27	$17.42	1.46	$11.90
5	0.86%	100	$0.86	$16.27	$17.14	1.61	$10.64
6	0.65%	100	$0.65	$16.27	$16.92	1.77	$9.55
7	0.49%	100	$0.49	$16.27	$16.76	1.95	$8.60
8	0.36%	100	$0.36	$16.27	$16.64	2.14	$7.76
9	0.27%	100	$0.27	$16.27	$16.55	2.36	$7.02
10	0.20%	100	$0.20	$16.27	$16.48	2.59	$6.35
						PV	$107.62

How would the EM framework handle the cases discussed in the CFROI valuation section (see Exhibit 17 through 19)? For Exhibit 17, rather that assuming no competition for 20 years, the EM framework would begin decaying the spread immediately (see Exhibit 20) since competition continuously works to eliminate excess profits or losses. For Exhibit 18, the CFROI model has the firm destroying value with future investments despite it having an initial zero spread business. In the EM framework, the future investment value for a zero spread business is zero. There simply is no economic profit to decay! Finally, in Exhibit 19, the CFROI valuation concepts have an initially positive spread firm later destroying value. The EM framework does not follow this pattern. Instead, once the spread (whether positive or negative) reaches zero, future investments add no value.

CONCLUSION

Corporate executives and portfolio managers have increasingly utilized value-based metrics, such as EVA and CFROI, to help them understand a firm’s performance and determine its value. Each measure provides unique advantages over traditional non-economic metrics such as EPS and ROE. Economic

Margin is a new metric that links the two VBM metrics, combining their strengths and minimizing their weaknesses.

The EVA framework, as a subset of economic profit measures, provides managers a single metric that summarizes wealth creation, and avoids the goal setting problems found with ratio based and IRR measures. For example, with ratio and IRR based measurement systems managers often struggle with taking on new profitable projects because they may have a lower IRR than their existing projects and make their divisions look bad in the eyes of the CEO. Economic profit measures fix this problem, by measuring wealth creation. Thus any project that generates positive economic profits will be accepted as it will raise the division's overall economic profits and make a manager look good in the CEO's eyes.

The CFROI framework's core strength is its fade concept that gives it a strong link to market values. This allows portfolio managers the ability to understand the performance expectations built into a company's market valuation. Armed with such information, money managers can ask managers more intelligent questions than just what will be next quarter's EPS. Instead, money managers and analysts can engage management about strategic issues and more thoughtfully evaluate how those strategies link back to wealth creation.

The Economic Margin Framework is unique in that it marries the advancements in VBM made by economic profit and IRR based metrics. The Economic Margin is a cash flow based economic profit measure. Unlike most economic profit metrics, Economic Margins use gross assets to avoid the "old plant" accounting distortions inherent in most economic profit measures. Since the metric begins as a dollar measure of profit, it ensures that managers always pursue opportunities that create wealth. This eliminates the conflicts created by IRR based frameworks that put managers in the awkward position of accepting opportunities that reduce the average IRR of their division.

Similar to CFROI and other IRR based frameworks; the Economic Margin framework directly incorporates a decay/fade concept that provides guidance as to how to systematically eliminate economic profits. This feature allows the measure to create a valuation framework that directly avoids the perpetuity assumptions embedded in most basic economic profit valuation models. Similarly, by decaying/fading the economic profit, the Economic Margin framework avoids the need to force all company's to the same "Fade to Level", which characterizes IRR based frameworks.

Because the Economic Margin framework combines these powerful features, it represents a unique tool that is useable for both corporate managers and investment professionals. Corporate managers can use the tool knowing that conflicts inherent to ratio and IRR based systems do not exists and the disincentives to grow often found with economic profit systems have also been handled. Investment managers can use the system knowing that they will not have to rely on the perpetuities embedded in traditional DCF and the basic economic profit valuation models or force every company to an identical cost capital and return level required in IRR valuation frameworks.

Finally, an obvious question that arises when evaluating different VBM frameworks is what are their inherent limitations. The simple answer is that no VBM tool is a panacea, or a substitute for good business judgment. This means that while these measures can provide the tools for a manager or analyst to get an answer consistent with value creation, these metrics say nothing about the quality of the assumptions going into the calculations. In addition, it is critical to really understand the assumptions behind each metric to avoid conclusions driven by a model's assumptions rather than the economic facts of the problem. Although every correct VBM framework yields the same answer with "laboratory data", each framework will generate very different answers when applied to real world information.