THE MECHANICS OF THE ECONOMIC MODEL

ROIC, WACC, EVA, MVA & CAP Defined

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"To quietly persevere in storing up what is learned, to continue studying without respite, to instruct others without growing weary – is this not me?"

- Confucius

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INTRODUCTION

Prior to 2001 so-called momentum investors, tech investors and Internet investors have enjoyed enormous gains and many received some very good press about their performances. Now that the bubble has burst, many portfolio managers, analysts and individual investors have been asked to question themselves about their beliefs about the market and the fundamentals of Security Analysis. Ironically, the one who has received the worst press during that period, Warren Buffett, is yet again the one left standing and having the last laugh. Investors who have barely survived the dot.com era have three choices:

1. Capitulate (for individual investors, that would mean switch to index funds, fixed income securities or invest in mutual funds)
2. Stick to your beliefs, remain in denial, and continue hoping for another comeback, which would be either very courageous or very stupid, depending on who you ask
3. Change your investment philosophy and continue to learn

Personally, I don't like the first one, that'd be the easy way out. The second one would be… well let's put it that way, the worst thing that an investor can do at this point would be to show that s/he has learned nothing from his/her mistakes, an attitude that we wouldn't call a sign of intelligence. The last one, which seems to be the hardest, is in fact the simplest one: "Get Back to Basics: How Do You Value a Stock?" For those who want an answer to this question, this is what this report outlines.

There are two classic ways to value a stock. The most commonly used model is probably the one in which investors project next year's EPS (or cash flows, EBITDA, free cash flow, or sales) and assign a multiple to that number. The second one is the good old Discounted Cash Flow (DCF) model. Finally, there is a more recent one, the Economic Model or Economic Value Added model (EVA™ (EVA™ and MVA™ are trademarks of the consulting firm Stern Stewart)).

After studying the practicality of each model, we've come to the conclusion that the Economic Model is the valuation model that provides the best answers. Using multiples to value stocks is tricky since multiples are the consequence (as oppose to being a value driver or the measure of a value driver) of a sum of factors that affect the intrinsic value of a stock. It is an indirect way to perform a DCF or and EVA model, without actually evaluating each value drivers. This method can be applied quite successfully, however it takes a great deal of knowledge and experience to be good at it.

As for the DCF model, we should point that both EVA and DCF will yield the same answer if performed properly. The reason why we choose the EVA model over the DCF is because the value drivers are much easier to identify. For example, using a DCF alone is hard to evaluate whether or not a company creates value. In addition, there is more value attributed to the terminal value in a DCF model than in an EVA model, which is one of the most criticized aspects of the DCF model. It should be pointed out that the Economic Model (and DCF) takes into account three of the most basic concepts of Security Analysis:

1. **Risk**: The opportunity cost of an investor and/or a company adjusted for risk.
2. **Capital Requirements**: The capital requirements represent how much capital must be invested in order to generate profits.
3. **Time Value of Money**: The time value of money simply states that one dollar today is worth more than one dollar tomorrow because of investment opportunities.

None of these concepts are explicitly taken into account in EPS, P/E ratio, PEG ratio or growth. In the Economic Model however, risk is taken into account by the cost of capital, capital requirements are accounted for in the denominator of the ROIC formula, and the time value of money is considered when economic profits are discounted to calculate the market value added (MVA).

In this report, we will outline the basic concepts of the Economic Model: ROIC, WACC, EVA, MVA and CAP. We believe that knowing how to calculate these figures is just as important as knowing how to calculate the P/E ratio of a company.

THE MECHANICS OF ROIC

Return on invested capital (ROIC) is one of the most fundamental financial metrics. But despite its importance, it does not receive the same kind of press coverage as earnings per share (EPS), return on equity (ROE), and EBITDA, or operating margin. One reason is probably because you cannot obtain ROIC straight out of financial statements. When coupled with the weighed average cost of capital (WACC), ROIC becomes one of the most important drivers to value creation. The cost of capital represents the minimum rate of return (adjusted for risk) that a company must earn to create value for shareholders and debt holders. ROIC is measured against the cost of capital, which is what makes it such an important concept.

Definition: ROIC shows a company's cash rate of return on capital (regardless of the capital structure of the company) it has put to work.[1] It is the true metric to measure the cash-on-cash return of a firm.

Formula:

$$\text{ROIC} = \frac{\text{NOPAT}}{\text{AVG Invested Capital}} \quad \text{or} \quad \text{ROIC} = \frac{\text{NOPAT}}{\text{Beg. Invested Capital}}$$

Where NOPAT: Net Operating Profits After-Taxes

Interpretation: When compared to the weighted average cost of capital (WACC), ROIC can help determine whether or not a company creates value for its shareholders. If the ROIC of a company is higher than its WACC, it means that the company is a value creator. The ROIC-WACC spread is one of the most important metrics to assess the quality of a company. A higher spread also explains why a company like Coca-Cola will trade at a "premium" multiple over the rest of the market. In today's market, everybody talks about growth, but the fact is that growth is good only if a company is a value creator. Because if a company destroys value, growing will only make things worse.

Mechanics: There are two components in the ROIC formula. The first one is net operating profits after-tax (NOPAT) and the second one is invested capital (IC). The difficulty in calculating ROIC is that it requires adjustments to be made from the financial statements. More important than knowing how to make adjustments is to know why they are being made. The following section addresses these issues.

[1] Michael Mauboussin, *Plus Ça Change, Plus C'est Pareil*, CS First Boston, pp 6.

NOPAT (Net Operating Profits After-Tax)

NOPAT is operating profit free from any effects of the capital structure. NOPAT is one of the best ways to measure the cash generated by a company's operations as it takes away the effects of non-operating items such as investment income, non-recurring charges and goodwill amortization. There are two ways to calculate NOPAT: the operating and the financing approach. In this report, we will focus on the operating approach because we believe it is the best perspective for investors to appreciate the factors that affect operating profits.

NOPAT:

1. Calculate Net Operating Profit Before Taxes (NOPBT)

Start with:

+ Sales

Minus:

- Cost of goods sold
- Selling and marketing expenses
- General and administrative expenses
- R&D
- Depreciation
- Other operating expenses
- *(Ignore expenses such as non-recurring charges, amortization of goodwill, stock options, non-cash items, acquired in-process R&D…)*

Add back:

- Amortization of goodwill (if included in depreciation)

2. Subtract Operating Taxes

There are two ways to charge NOBPT with operating taxes:

- NOPAT = NOPBT x (1-CTR)

  Make an assumption: establish a cash tax rate (CTR) equal to the effective tax rate as reported on the income statement and if the effective tax rate is artificially low, establish a tax rate somewhere between 35%-40%.

- NOPAT = NOPBT – Cash Operating Taxes

  Cash operating taxes can be calculated as follows:

  + Provision for income taxes
  + Add change in deferred tax assets
  + Add tax shield from interest expense (Interest Expense x Tax Rate)
  - Subtract change in deferred tax liabilities
  - Subtract tax paid on investment income (Investment Income x Tax Rate)

  = Cash operating taxes

  With cash operating taxes, you can calculate the effective CTR:

  Cash operating tax paid/NOPBT = Cash tax rate

  This cash tax rate can be used as the effective CTR, unless it is too low compared to the effective tax rate under GAAP.

Justifications and Calculations:

Non-recurring Costs (or Gains): Non-recurring costs were ignored from the calculation of NOPAT because they do not represent operating costs. Non-recurring costs include: merger and acquisition related costs, litigation costs, and costs from extraordinary events. Non-recurring gains are also subtracted from the equation.

Amortization of Goodwill: Goodwill arises from the accounting for acquisitions. Goodwill amortization is non-cash, non-tax deductible and non-operating item, therefore a non-factor when it comes to business operations. To cancel this effect, goodwill amortization is ignored in the NOPAT calculation or added back to NOPBT if it is included in the same line as depreciation.

Cash Tax Rate: By establishing a cash tax rate or by calculating the actual cash operating taxes, we have removed from the equation all taxes that were paid on investment income and the tax shield that was provided by the interest expenses. In some cases, companies may be charged with a cash operating tax while they have actually never paid taxes under GAAP due to the tax shield provided by interest expense. However, with NOPAT, our goal is to de-leverage the company and make no discrimination as to whether or not the company is debt financed or not. Therefore we charge all companies with positive NOPBT with taxes. The tax shield from debt financing is incorporated in the weighted average cost of capital as it uses the *after-tax cost of debt*.

Beware, sometimes the cash operating tax paid may be lower than usual (due to timing of deferred taxes). If it is the case, we suggest that investors choose the most conservative approach (highest tax rate).

Interest Expenses and Tax Shield from Debt: *read above (Cash Tax Rate)*

Investment Income and Tax Paid on Investment Income: Investment income (and the related taxes) was ignored in our NOPAT calculation simply because it does not represent an operating item. We do not buy a company for its ability to generate income on its cash balance. This assumption allows us to remove all cash balances from Invested Capital and keep cash value neutral in the equation.

Conclusion on NOPAT

We are now able to calculate the numerator in the ROIC formula. It is very important to mention that the adjustments made in calculating NOPAT are not limited to those we've listed; not included here are: LIFO reserve and full-cost reserve among others, for a more in-depth analysis, we recommend that you read *The Quest for Value*. The reason why some adjustments were not included is because we found them to be very counterproductive and it beats the purpose of the exercise.

It is important to understand that NOPAT calculates the profits generated from the operations of a company. This is why we've taken any debt-related issues, investment income as well as non-recurring costs and goodwill amortization out of the equation. However, we did not remove depreciation from the picture since it represents a true *economic* expense whereby firms have to replenish their PP&E over time.

INVESTED CAPITAL (IC)

Invested capital is the amount of all cash that has been invested in the company's business since its inception. It is important to note that many of the adjustments we've made to calculate NOPAT will affect invested capital as well. IC can be calculated in two ways: with the operating approach or the financing approach. Here we use the operating approach for the same reason as for NOPAT:

Invested Capital equals:

+ Net working capital
+ Net property, plant & equipment
+ Other operating assets
+ Operating L-T investments (unless they are long-term low-risk income securities)
+ Gross goodwill
+ Unrecorded goodwill
+ Cumulative non-recurring costs

Justifications and Calculations

Net Working Capital (NWC): NWC is defined as operating assets minus operating liabilities (a.k.a. non-interest bearing current liabilities or NIBCLs). Note that cash and equivalents and S-T investments are not operating assets. Any interest bearing debt is not considered operating liabilities either.

This item should be studied with greater attention as it is directly related to balance sheet management. In today's income statement centric world, investors tend to underestimate the importance of managing operating assets and liabilities.

NWC will affect ROIC as it is a major component of IC. If operating assets increase, invested capital increases as well, which in turn lowers the ROIC. However, if operating liabilities increase, ROIC increases because NWC is lower. As you can see, investors must overcome the myth that assets are a good thing and that liabilities are bad. That's why it is important for firms to control their inventories and receivables and to keep them as low as possible.

These things can only be observed when investors focus on the balance sheet (and the cash flow statement). Tools such as the flow ratio and the cash conversion cycle measure working capital management. Changes in NWC also affect cash flows in the same way that it affects ROIC. When operating liabilities increase, it creates a cash inflow. When operating assets increase, there is a cash outflow.

Gross Goodwill

In NOPAT, we've ignored amortization of goodwill, however a company can not get away with this so easily. Therefore, we are *penalizing* the company by keeping goodwill amortization in the books by using gross goodwill instead of net goodwill in Invested Capital. Anyway, as companies start applying the new goodwill rule, companies will start reporting goodwill on the balance sheet on a gross basis, as goodwill amortization will not be required anymore.

In the past, we've had several discussions about whether or not we should include goodwill in Invested Capital or not. Mathematically, it doesn't make a difference from valuation standpoint. However, if goodwill is not included in Invested Capital, ROIC will be artificially high, making your initial assessment of the value creation capability of the company flawed. We want to be conservative in our approach. If a company overpaid for a company, it has to be reflected in ROIC.

Unrecorded Goodwill: This item is a bit more complicated. Unrecorded goodwill arises when companies use the pooling of interests method to account for mergers and acquisitions. Under this method, the cost recognized to acquire a company is merely its book value. Any premium paid vanishes from the balance sheet. However, the true cost of the buying company equals the market value of the securities issued at the time of the transaction date.

For instance, company B is being acquired by company A. Company B has a book value of $100,000,000 and is being acquired by company A in a stock transaction valued at $150,000,000. Under pooling of interests, Company A's book value would increase by $100,000,000, leaving any premium paid off the balance sheet. Under the purchase method, the $50,000,000 premium would be recorded as goodwill. Therefore, we can see that pooling of interests understates the price of the acquisition, artificially increasing future rates of return on the transaction. From a shareholder's point of view, the real price tag is $150,000,000 and it must appear in IC. (For more information on unrecorded goodwill, please read this very interesting report by Ian McDonald http://www.geocities.com/andrewychan/UnrecordedGoodwilllast.pdf)

Cumulative Non-recurring Costs: To calculate NOPAT, we've ignored non-recurring charges because they were non-operating and non-repetitive charges. However, a company should not benefit from those non-recurring charges. How do we "penalize" the firm? We add those charges to the balance sheet in an account called "Cumulative Non-recurring Charges." In so doing, we are increasing invested capital, thereby decreasing the ROIC.

Cash and S-T & L-T Investments: Some companies are facing a happy problem: excess cash. These companies have been accumulating cash in a way that far exceed their needs to fund working capital and to finance growth opportunities. The decision to include cash in invested capital or not will have a dramatic impact on ROIC.

Excess cash is usually invested in S-T and L-T risk-free assets such as government bonds and CDs. By definition, cash does not create nor destroy value. Therefore, it would be inappropriate to incur a capital charge on cash that has yet to be invested in operating assets.

We've already removed the interest income from cash accounts in NOPAT. To be consistent, we are removing all cash from Invested Capital. Some will argue that cash is needed to fund working capital needs, which is true. However, to quantify how much is needed looking only at the balance sheet or using metrics such as the cash conversion cycle or the flow ratio is more art than a science. To keep things simple, we are removing all cash from Invested Capital.

Beginning or Average Invested Capital?

Now that we know how to calculate NOPAT and IC, we are almost ready to calculate ROIC. There is one last thing that we have to decide: "Should we use beginning or average invested capital when calculating ROIC?" For valuation modeling, it is imperative that investors use beginning invested capital in their EVA model. However, when it comes to evaluate the value creation capability of a firm, using average Invested Capital is more appropriate because beginning Invested Capital will overstate ROIC for a fast growing company. Standard return measures such as ROE and ROA also uses the average equity or assets in the denominator.

CONCLUSION ON ROIC

The ROIC of a company is a fundamental metric to measure the value creation capability of a company. We believe that this measure is more important than the P/E ratio, growth rates and EPS. As we've mentioned earlier, there are many adjustments that must be made in order to come up with ROIC. In this part, we've covered a portion of those. We recommend that all investors read Bennett Stewart's book *The Quest for Value*.

THE MECHANICS OF WACC

INTRODUCTION TO WACC

The weighted average cost of capital (WACC) comes from the economic concept of opportunity cost. The WACC is used in nearly every segment of Finance. In capital budgeting, it is the require rate of return for a project to have a break-even NPV (Net Present Value). In the Miller Modigliani discounted cash flow model (DCF), it is the rate by which all future free cash flows are being discounted to the present. The WACC dictates the minimum rate of return that a company must earn in order to create value for shareholders. Knowing how to calculate the WACC is just as important as knowing how to calculate ROIC. When these two concepts are combined, they form one of the best valuation tools in securities analysis.

There is some controversy in the calculation of the WACC. The reason is that in order to calculate the cost of equity, many rely on the Capital Asset Pricing Model (CAPM). The CAPM uses *beta* as a measure of market risk of a company. We will see later why it is a hot topic in the academia.

Weighted Average Cost of Capital (WACC)

Definition: The WACC reflects the opportunity cost for debt and equity holders, weighted for their relative contribution to a company's capital structure. It is the minimum economic return a company must generate to compensate its debt and equity security holders for their assumed risk.[2]

Formula:

$$WACC = r_D(1 - t_c)\frac{D}{(D + E_L)} + r_E^L \frac{E_L}{(D + E_L)}$$

Where: r_D : Cost of debt

t_c : Corporate tax rate

D : Total debt

E_L : Total equity

r_E^L : Cost of equity

$D/(E_L + D)$ and $E_L/(E_L + D)$: The proportion of debt and equity composing the firm's capital structure.

Cost of Debt (Interest Rate): The appropriate cost of debt to use is the market value. Using the market value cost of debt is more representative of the cost a company would have to pay if it were to raise debt today. To find the cost of debt, investors can use the yield-to-maturity (YTM) of the company's bonds, the coupon rate (assuming that bonds were issued at market) or the interest rate on its credit facility.

Cost of Equity: This is a more complicated element of the equation. While the cost of debt is clearly stated on the income statement as interest expense, the cost of equity doesn't appear anywhere. Nonetheless, equity has a (implied) cost; shareholders must get an appropriate rate of return to compensate for the risk of their investments. Most textbooks teach how to calculate the cost of equity using the Capital Asset Pricing Model (CAPM). Under this model, the risk of the company is measured by the *beta* of its stock. This model has always been criticized, and rightly so, when we consider that the *beta* of a stock doesn't necessarily have anything to do with the operations of the company. But what exactly is the beta?

The beta is a measure of risk relative to the market. If a stock has a beta of 1.5 and that the market is expected to increase by 10%, the stock is then expected to increase by 15%. Beta is obtained by performing a linear regression

[2] Michael Mauboussin, *Plus Ça Change, Plus C'est Pareil*, CS First Boston, pp 6.

analysis between a stock and the market (S&P 500, Wilshire 5000, World Market Index…). A regression analysis requires that we use past data, dating back from 3 to 60 months. Using past numbers is one of the reasons against using beta, since we are trying to predict the future using past data.

What many investors and analyst will do is instead of using CAPM, they will use the risk free rate of long-term T-bonds (10 or 30 years) and add an equity risk premium (varying from 6% to as much as 12%), depending on the type of company they are analyzing. An appropriate benchmark for most equities is the historical market risk premium, which is 6.32%.

Cost of Equity

$$r_E^L = r_f + \beta(E(r_M) - r_f)$$

Where: $\beta = \frac{Cov(R_A, R_M)}{\sigma_M^2}$

r_f : Long-term risk free rate, usually the 30-year bond yield

$E(r_M)$: Expected return of the market (historically the S&P 500 returned 11.21%)

β : Beta of the stock (Betas of stocks can be obtained on sites such as Yahoo! Finance, in company profiles)

$Cov(R_A, R_M)$: Covariance between the return of the stock price and the market

σ_M^2 : Variance of the market's return

$E(r_M) - r_f$: This is also known as the Market Risk Premium (MRP), which historically has been 6.32% (1926-1998)

Capital Structure: The other part of the WACC equation deals with the capital structure of the company. The capital structure of a firm is the mixture of debt and equity it uses to finance its capital. One question that arises is whether to use the market value or the book value of debt and equity. The choice of one or the other will considerably affect the WACC of the company.

In capital budgeting, projects are valued using the target capital structure of a firm. Book value capital structure will be much more representative of the target structure than the market value capital structure. In addition, the advantage of financial leverage is totally dissipated if we use the market value capital structure since equity tends to appreciate much faster than the market value of debt.

HOWEVER, an empirical research (Bowman 1980) has shown that market betas (the centerpiece of the CAPM) are more correlated with market value capital structures. In theory, a higher debt-to-equity ratio (market value) should result in a higher beta for the firm. Bowman tested four measures of debt-to-equity ratio: D^B/E^B, D^B/E^M, D^M/E^B, and D^M/E^M (where M and B refers to market and book value) against a firm's beta to find out which one was most closely associated to it. The results showed that beta was most correlated with D^B/E^M and D^M/E^M. Because the market value of equity is most of the time far greater than debt, whether we use book or market value of debt makes little difference (especially when market interest rates are stable). Therefore, in light of these findings, we believe that using the market value capital structure to calculate the WACC is most appropriate for comparison with the ROIC. In many cases, especially for technology companies, the WACC will be equal to the cost of equity.

THE MECHANICS OF EVA & MVA

INTRODUCTION TO EVA & MVA

In the fourth part of our report on the economic model, we will discuss the mechanics of calculating EVA and MVA. The terms EVA and MVA are trademarks of the firm Stern Stewart and contrary to what many people think, these concepts are nothing new in the world of Finance. In fact, theoretically, whether you use the DCF (Discounted Cash Flow), NPV (Net Present Value) or MVA to calculate the value of a firm, you should arrive at the same value. The EVA framework is a model that managers use to find ways to improve their company and that investors use to better appreciate how companies are valued.

EVA (ECONOMIC VALUE ADDED)

Definition: EVA is equivalent to economic profits. It is the residual income of a company by charging NOPAT (Net Operating Profits After Tax) with a capital charge.[3] A company that generates a positive EVA is said to be a value creator. A company that has a negative EVA is said to be a value destroyer.

Formulas:

$$EVA = NOPAT - WACC \times IC$$

Alternatively EVA can be calculated by:

$$EVA = (ROIC - WACC) \times IC$$

Where: NOPAT: Net Operating Profits After Tax
WACC: Weighted Average Cost of Capital
ROIC: Return on Invested Capital
IC: Invested Capital

Interpretation: Every firm has an implicit required rate of return to its shareholders and debt holders. This required rate of return represents the opportunity cost (adjusted for risk) that investors bear when they invest in a particular company. This risk is measured by the WACC. Mathematically, what we are saying is that a company with a cost of capital of 10%, which invested $10,000 in capital, must generate a NOPAT equal to $1,000 in order to compensate investors for their risk. If the company earned more than $1,000, it has created an economic profit. If its NOPAT is below that benchmark, it incurred an economic loss. Please note that this is different than accounting profits or losses. As you will see, it's not because a company shows an accounting profit on its income statement that it creates value.

In a nutshell, if a company has a positive ROIC-WACC spread or alternatively has a positive EVA; it is a **value creator**. If the ROIC-WACC spread is negative or that the firm has a negative EVA, it is a **value destroyer**.

[3] Michael Mauboussin, *Plus Ça Change, Plus C'est Pareil*, CS First Boston, pp 6.

Example:

Company A has a NOPAT of $10,000,000. In order to generate that return, it needed to invest $50,000,000 in capital. The implied required rate of return adjusted for risk for the company is 10%. How much value has the company created to equity and debt holders?

Given:
NOPAT: $10,000,000
Invested Capital: $50,000,000
WACC: 10%

Solution #1:

$$EVA = (ROIC - WACC) \times \text{Invested Capital}$$

ROIC = (10,000,000 / 50,000,000)
ROIC = 20%
EVA = (20% - 10%) x $50,000,000
EVA = $5,000,000

Solution #2

$$EVA = NOPAT - WACC \times \text{Invested Capital}$$

EVA = $10,000,000 x (10% x 50,000,000)
EVA = $5,000,000

Company A is thus a value creator as it generated a NOPAT greater than what the WACC. Economic profits were $5,000,000.

MVA (MARKET VALUE ADDED)

Definition: MVA is the difference between a company's market value and its invested capital. Generally, if MVA is positive the market believes a company will generate returns above its cost of capital.[4]

Formulas:

$$MVA = \text{PV of all Future } EVA = \sum \frac{EVA_t}{(1+WACC)^t}$$

$$\text{Enterprise Value} = \text{Invested Capital} + MVA$$

Interpretation: MVA is exactly like NPV. As mentioned earlier, whether you use the EVA framework or the DCF model, you will arrive at the same answer (theoretically). MVA represents the stock market's assessment at a particular time of the NPV of all the company's past and projected capital projects. It reflects how successful a company has invested capital in the past and how successful it is likely to be at investing new capital in the future. [5]

With this formula, it is not surprising to see why some companies will trade below the book value of their assets. If a company has been a value destroyer and is expected to remain so, the MVA of the company will be negative and therefore the market value of a firm will be less than its invested capital.

Please note that Enterprise Value (EV) is different than market capitalization. EV is the value of the firm including both equity and debt (market values). EV is equal to market capitalization when a company is all-equity financed.

[4] Michael Mauboussin, *Plus Ça Change, Plus C'est Pareil*, CS First Boston, pp. 6
[5] Bennett G. Stewart, *The Quest for Value*, Harper Business 1990, pp. 153

EXAMPLES

With ROIC, WACC, EVA and MVA demystified, our understanding of the Economic Model is mostly complete (the only concept missing is CAP: Competitive Advantage Period). We are now ready to go through some examples that tie the Economic Model together for firm valuation. These examples were adapted from Michael Mauboussin's *Plus Ça Change Plus C'est Pareil* (http://www.capatcolumbia.com/Articles/Reports/Plus_Cha.pdf). If you look at these examples attentively, you will see the subtleties that affect the value of a firm. In these examples, we look at how the valuation of a firm changes as the ROIC and the WACC change (which implicitly affect EVA and MVA as well). Note that in these examples, we assume that the firm is mature and that there is no growth in invested capital and NOPAT.

Enterprise Value When ROIC = WACC

	Periods					
	1	**2**	**3**	**4**	**5**	**Terminal Value**
Invested Capital	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
NOPAT	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
ROIC	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
WACC	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EVA	$0	$0	$0	$0	$0	$0
PV EVA	$0	$0	$0	$0	$0	$0
MVA	$0					
Invested Capital	$100,000					
Enterprise Value	$100,000					
EV/IC Ratio	1.00					
EV-to-NOPAT Ratio	10					
ROIC-WACC Spread	0.0%					
ROIC-to-WACC Ratio	1.00					

In this example, the ROIC-WACC spread is zero, the company is neither a value creator nor a value destroyer. Its value (total market value of debt + equity) is equal to its invested capital (i.e. EV/IC ratio = 1.0).

Enterprise Value When ROIC < WACC

Company A	Periods					
	1	2	3	4	5	Terminal Value
Invested Capital	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
NOPAT	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
ROIC	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
WACC	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EVA	-$2,000	-$2,000	-$2,000	-$2,000	-$2,000	-$2,000
PV EVA	-$1,818	-$1,653	-$1,503	-$1,366	-$1,242	-$12,418
MVA	-$20,000					
Invested Capital	$100,000					
Enterprise Value	$80,000					
EV/IC Ratio	0.80					
EV-to-NOPAT Ratio	10					
ROIC-WACC Spread	-2.0%					
ROIC-to-WACC Ratio	0.80					

Company B	Periods					
	1	2	3	4	5	Terminal Value
Invested Capital	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
NOPAT	$6,000	$6,000	$6,000	$6,000	$6,000	$6,000
ROIC	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
WACC	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
EVA	-$2,000	-$2,000	-$2,000	-$2,000	-$2,000	-$2,000
PV EVA	-$1,852	-$1,715	-$1,588	-$1,470	-$1,361	-$17,015
MVA	-$25,000					
Invested Capital	$100,000					
Enterprise Value	$75,000					
EV/IC Ratio	0.75					
EV-to-NOPAT Ratio	12.5					
ROIC-WACC Spread	-2.0%					
ROIC-to-WACC Ratio	0.75					

In this example, the ROIC-WACC spreads are negative. Unsurprisingly, the values of the firms are smaller than their book values since they destroy value (i.e. EV/IC Ratio < 1.0). Notice that despite the fact that the two companies have the same ROIC-WACC spread, Company A enjoys a higher valuation than company B. What this example says is that it is not only the ROIC-WACC spread that defines value, but also the ROIC-to-WACC ratio. The ROIC-to-WACC ratio of Company A is greater than Company B's which explains why A has a higher valuation.

Enterprise Value When ROIC > WACC

Company A	Periods					
	1	2	3	4	5	Terminal Value
Invested Capital	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
NOPAT	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000
ROIC	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
WACC	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EVA	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
PV EVA	$4,545	$4,132	$3,757	$3,415	$3,105	$31,046
MVA	$50,000					
Invested Capital	$100,000					
Enterprise Value	$150,000					
EV/IC Ratio	1.50					
EV-to-NOPAT Ratio	10					
ROIC-WACC Spread	5.0%					
ROIC-to-WACC Ratio	1.50					

Company B	Periods					
	1	2	3	4	5	Terminal Value
Invested Capital	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
NOPAT	$13,000	$13,000	$13,000	$13,000	$13,000	$13,000
ROIC	13.0%	13.0%	13.0%	13.0%	13.0%	13.0%
WACC	8.0%	8.0%	8.0%	8.0%	8.0%	8.0%
EVA	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
PV EVA	$4,630	$4,287	$3,969	$3,675	$3,403	$42,536
MVA	$62,500					
Invested Capital	$100,000					
Enterprise Value	$162,500					
EV/IC Ratio	1.63					
EV-to-NOPAT Ratio	12.5					
ROIC-WACC Spread	5.0%					
ROIC-to-WACC Ratio	1.63					

In this situation, the ROIC-WACC spreads are positive and identical. Therefore, the values of the firms are greater than their book values since they create value. Company B enjoys a higher valuation because its ROIC-to-WACC ratio is higher than Company A's. Notice that the price-to-NOPAT ratio is higher for company B. Try to see the price-to-NOPAT as the P/E of the company and you will understand why some companies have higher P/E ratios. In fact, all multiples are higher because of higher value creation.

There is one last thing to cover that will increase the market value of a firm: **investment opportunities**. In capital budgeting, all projects that have positive NPVs, regardless of the rate of return should be accepted. Similarly, in the Economic Model, the ROIC-WACC spread is not critical as long as it is positive, the number of value creating investment opportunities is more important.

Company X	**Periods**					
	1	**2**	**3**	**4**	**5**	**Terminal Value**
Invested Capital	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
NOPAT	$17,000	$17,000	$17,000	$17,000	$17,000	$17,000
ROIC	14.2%	14.2%	14.2%	14.2%	14.2%	14.2%
WACC	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
EVA	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
PV EVA	$4,545	$4,132	$3,757	$3,415	$3,105	$31,046
MVA	$50,000					
Invested Capital	$120,000					
Enterprise Value	$170,000					
EV/IC Ratio	1.42					
EV-to-NOPAT Ratio	10					
ROIC-WACC Spread	4.2%					
ROIC-to-WACC Ratio	1.42					

If you compare this company with Company B from the previous example, you will notice that despite X having a smaller ROIC-WACC spread and ratio, it still trades at a higher enterprise value than Company B. If a company invests in projects with lower positive ROIC-WACC spreads but has a greater window of opportunities, it will create more value than other companies with higher ROIC-WACC spreads but with less investment opportunities. In this case, Company X had investment opportunities of $120,000 compared to $100,000 for Company B.

COMPETITIVE ADVANTAGE PERIOD

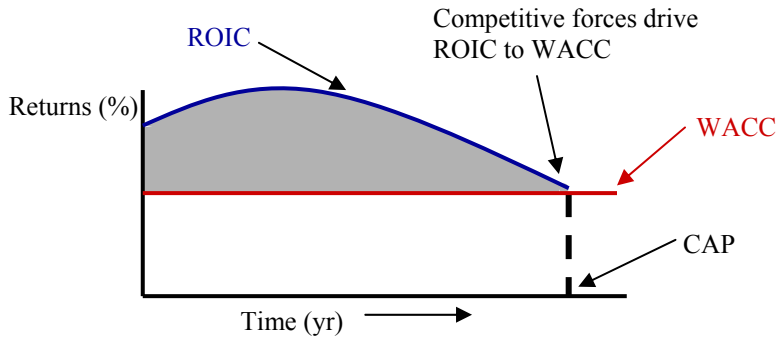
INTRODUCTION TO CAP

In order to introduce the concept of Competitive Advantage Period (CAP), let's make an analogy to one of baseball's hottest debate: "Who is the homerun king in the history of baseball?" The debate is not over who hit the most homeruns because we all know that Hank Aaron hit 755 four-baggers while Babe Ruth hit 714. The debate is over the fact that the Babe hit 714 HRs in a career where he played 2,503 games while Aaron did it over 3,298 games. Some people will say that the Babe should be considered as the HR king since he achieved his record in fewer games than Hank Aaron did. I don't think you can downplay Aaron's accomplishment on the basis that he played more games than the Babe. Playing in 3,298 games on a regular basis is an exploit on its own! It is indisputable that the Babe hit more homeruns per game than Aaron did, but Aaron hit homeruns for a longer period of time and because of time, he was able to become the record holder for most career homeruns.

How does that relate to the Economic Model? Just like some baseball fans do, Wall Street and Bay Street tend to underestimate the factor of time when it comes to evaluating a company. The lesson we should get from the debate over the homerun king of baseball is that it's not just the number of homeruns you hit per season that matters, but also the period of time you can do it for. In the Economic Model, we would say: "It's not just how much value you create today, but for how long you can remain a value creator." CAP measures that period over which a company is expected to create value. We can say that Aaron's CAP was longer than the Babe's, which allowed him to surpass the Babe in career homeruns. CAP is often neglected as a value driver, but as we will see, CAP explains why the leaders trade at higher multiples than other companies.

Unlike our previous parts on ROIC, WACC, EVA and MVA, we will not go over the mechanics of CAP. However, we feel it is important for investors to understand how CAP can be conceptualised in valuing stocks.

Definition: Formally, CAP is defined as the time during which a company is expected to generate returns on incremental investments that exceed its cost of capital.[6]



*Shaded Area = Value Creation

Interpretation: Economic theory suggests that competitive forces will drive returns down to the cost of capital over time (and perhaps below it for a period).[7] CAP measures that period of time in terms of years and the longer the CAP for a company, the higher the valuation a company will have in comparison to its competitors.

The important thing for investors to understand how the market recognises the difference in the duration of value creation periods between companies. Usually, companies with higher CAPs will enjoy higher valuations translated into higher multiples (EV/IC, P/E ratio, Price-to-NOPAT…). We must understand that CAP is a number that is

[6] Michael Mauboussin, Paul Johnson, *Competitive Advantage Period – The Neglected Value Driver*, CS First Boston, PP 3.

[7] Michael Mauboussin, Paul Johnson, *CAP The Neglected Value Driver*, CS First Boston, pp. 3

implied (or attributed by the market). The role of the investor is to judge whether the market implied CAP (MICAP) is reasonable. Additionally, investors must know what factors determine the CAP of a company:

1. **ROIC**: In general, companies with higher ROIC within an industry will have higher implied CAPs factored in their valuation. This is because these firms are best positioned competitively, reflecting their strong business fundamentals.

2. **The Rate of Change of the Industry**: The more change there is in an industry, the lower the CAP. Rapid changes in an industry mean that there are a greater number of competitors entering and exiting the environment, which drives down ROICs.

3. **Barriers to Entry**: The last determinant of CAP is barriers to entry. A company with strong barriers to entry is unlikely to see a lot of competitors successfully grab market share from it making high ROICs sustainable. Key barriers to entry include (but are not limited to): strong brand name, stronger business model, economies of scale, established distribution networks, network effect, pricing power and high switching costs.

As you can see, all these determinants of CAP are characteristics that most industry leaders possess. In turn, this explains why leaders, in general, trade at higher multiples.

Formulas:

$$\text{Value} = \frac{\text{NOPAT}}{\text{WACC}} + \frac{\text{I}(\text{ROIC} - \text{WACC})\text{CAP}}{(\text{WACC})(1 + \text{WACC})}$$

Where: NOPAT: Net Operating Profit After Tax
WACC: Weighted Average Cost of Capital
I: Annualized New Investments in Working and Fixed Assets
R: Return on Invested Capital
CAP: Competitive Advantage Period

Stated otherwise:

$$\text{CAP} = \frac{(\text{Value} \times \text{WACC} - \text{NOPAT})(1 + \text{WACC})}{\text{I}(\text{ROIC} - \text{WACC})}$$

Conclusion on CAP

CAP is a concept that is often overlooked by investors. We believe this concept is a stepping stone in understanding why companies have higher valuation than others, and it should play a major role in understanding the business fundamentals of a company. In this article, we have only scratched the surface of Competitive Advantage Period. We invite investors who want to learn more about CAP to read: *Competitive Advantage Period "CAP", The Neglected Value Driver* (http://www.capatcolumbia.com/Articles/FoFinance/Fof1.pdf), by Mauboussin and Johnson. Remember, it is not only how much value you create, but for how long!

SUMMARY

How Can a Firm Create More Value?:

1. By investing in higher return projects.
2. By being more efficient with its capital. (higher asset turnover, better net working capital management)
3. By decreasing its weighted average cost of capital. (By issuing debt instead of equity)
4. By investing in more value creating projects.
5. By getting rid of value destroying projects.

MYTHS

The Economic Model, as mentioned before, takes another perspective in valuing the fundamentals of a company. This model helps elucidate some of the most common myths in firm valuation. Here are a few that we believe are important for investors to recognize.

Myth #1: Growth Is Good

Growth is not always good. It all depends on how the company managed to fuel its growth. Companies will most often invest more capital in order to expand. However, if the growth in EPS were the result of projects with ROICs that were below the company's cost of capital, it destroyed value rather than created wealth. It is very common to see companies grow their earnings while their ROIC decrease year-after-year into value destruction territory; this is not the kind of growth that is good.

Here is an example comparing two companies with identical first-year conditions. However, for the second year, Company A invested only $1,000,000 to grow its NOPAT by 25% to $1,250,000 as opposed to Company B which grew its NOPAT by 50% by investing $10,000,000 in capital.

Company A

	Year 1	Year 2
Invested Capital	$10,000,000	$11,000,000
WACC	10.00%	10.00%
NOPAT	$1,000,000	$1,250,000
ROIC	10.00%	11.36%
EVA	$0	$150,000
NOPAT Growth	25.00%	
Capital Growth	10.00%	

Company B

	Year 1	Year 2
Invested Capital	$10,000,000	$20,000,000
WACC	10.00%	10.00%
NOPAT	$1,000,000	$1,500,000
ROIC	10.00%	7.50%
EVA	$0	-$500,000
NOPAT Growth	50.00%	
Capital Growth	100.00%	

While Company B grew its NOPAT by an impressive 50%, it nonetheless destroyed value in year 2 because its ROIC has gone below its cost of capital. As for Company A, its NOPAT growth (25%) was financed by a growth in capital of only 10%. Despite its impressive growth rate, Company B destroyed value and that's something you can't see by simply looking at EPS growth. Growth is good under one condition: that it creates value. Therefore, the myth that growth is good is not always true. There is something fundamentally more important than growth: value creation.

Myth #2: High Net Profit Margin Equals High Profitability

People tend to think that a high net profit margin means high profitability, but that line of thought is far from being an absolute truth. How do you explain that Dell Computer, which has a net profit margin of 8.0% has a ROIC (based on average invested capital) of 159% while Microsoft, which has a net profit margin 40.2%, has a ROIC of 65.5%? The answer lies in invested capital and asset turnover. For every $100 of net operating profits, Dell only needs $63 of capital while Microsoft needs $153. Because Dell can turn its assets very rapidly, it creates more value than Microsoft per dollar of invested capital. The invested capital should not be overlooked in your valuation model. Another way to look at it is through the following formula:

$$\text{ROA} = \frac{\text{Net Income}}{\text{Assets}} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}}$$

The first part of the equation is the net profit margin and the second part is the asset turnover of the company. Here is an example to illustrate how this equation works:

Company A		**Company B**	
Net Profit Margin	10.0%	Net Profit Margin	40.0%
Sales	$10,000.00	Sales	$10,000.00
Net Income	$1,000.00	Net Income	$4,000.00
Asset Turnover	1.00	Asset Turnover	0.25
Sales	$10,000.00	Sales	$10,000.00
Assets	$10,000.00	Assets	$40,000.00
ROA	10.0%	ROA	10.0%

As you can see, Company A has a lower net profit margin than B, but turns its assets more rapidly. This is why the two companies have the exact same return on asset. It is also why a company like Wal-Mart, with a net profit margin of 3.4%, can still create a lot of value by turning its assets very rapidly. Adapted to the Economic Model, the formula goes like this:

$$\text{ROIC} = \frac{\text{NOPAT}}{\text{Invested Capital}} = \frac{\text{NOPAT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Invested Capital}}$$

The first part being net operating profit margin and the second part representing invested capital turnover. Low margins do not always mean lower value creation. The Economic Model makes it easier for investors to see how high capital turnover can lead to high value creation by showing the importance of invested capital.

Myth #3: ROE Is a Good Indicator of the Performance of a Company

Many investors use the ROE as a measure of operating performance for a firm. However, as we will see in the next example, ROE can be manipulated by changing the capital structure of a company.

Company:	A	B
	All Equity	$5,000 Debt
Sales	$20,000	$20,000
Operating Expenses	$18,000	$18,000
Net Operating Profit	$2,000	$2,000
Interest Expense	$0	$300
Net Profit Before Taxes	$2,000	$1,700
Taxes @ 40%	$800	$680
Net Profit after Taxes (NPAT)	$1,200	$1,020
Debt (6%)	$0	$5,000
Equity	$10,000	$5,000
Capital	$10,000	$10,000
NPAT	$1,200	$1,020
Equity	$10,000	$5,000
ROE	**12.0%**	**20.4%**
NPAT	$1,200	$1,020
Interest Expense (Add)	$0	$300
Tax Shield (Subtract)	$0	$120
NOPAT	$1,200	$1,200
Capital	$10,000	$10,000
ROIC	**12.0%**	**12.0%**

Had an investor looked only at ROE, he/she would have opted for Company B as a potential investment. However, the ROIC for both companies are equal, demonstrating that ROIC focuses only on operations, regardless of the capital structure. In many instances, some companies will show a very high ROEs while their ROICs are far from being stellar. What we wanted to point out is that ROE, when assessing the operating activities of a company, can easily be distorted by the capital structure of a firm. The ROIC is a better measure of the operational performance of a company since it cannot be affected by financial leverage.

Myth #4: What the Market Wants Is Profits

Many unsophisticated investors think that what the market wants are: accounting profits and EPS. There is nothing more false than this myth and unfortunately too many investors rely on these measures. EVA, discounted free cash flow and NPV are models that all boils down to the same results. They are simply different ways of calculating the value of a firm. In this report, never have we talked about accounting profits, growth or EPS as ways to value a firm. What the market really wants to see are sustainable economic profits.

For those of you who still believe that the market look at accounting profits, here is an example that should make you rethink your position on this matter. Does the market follow cash flows or accounting profits? A very well documented study showed that the market follows cash flows and not accounting profits. To prove it, we only need to find a situation where cash flows increase while accounting profits decrease, everything else being equal. The most used example is when a company switches its inventory accounting policy from FIFO to LIFO in a period of rising prices. By switching to LIFO, your earnings decrease because you increase your reported cost of goods sold (COGS). However, your cash flows increase because you pay fewer taxes (your increased COGS serves as a tax shield). How would a stock price react to this? Studies showed that the stock price goes up. In fact, it was shown that the value of a firm announcing such a change in accounting policies increased by the present value of the tax shield that LIFO provided.

Throughout this report, we've shown that accounting profits alone does not tell us a great deal about how good a company creates value. That's because it does not take into account capital requirements. If you remember from the introduction, one of the reason why the Economic Model is good, is that capital requirement is part of the equation.

SHORTCOMINGS

We are proponents of the Economic Model, however we recognize that there are several shortcomings to it. In order to calculate the value of a firm using the Economic Model, investors are required to estimate future ROICs, WACCs, NOPATs, and invested capital over time. Projecting numbers over an extended period of time with accuracy is impossible, which makes the model just as arbitrary as any other valuation models. Therefore, trying to calculate the market value of a firm using any valuation method can only give you a slight idea of how much a company can be worth. The trick is to be conservative enough and to buy stocks with enough margin of safety so that investors would not lose money based on the shortcomings of projecting economic profits or free cash flows.

Another shortcoming to the Economic Model involves the calculation of the cost of equity in the WACC formula. Many investors have argued that the Capital Asset Pricing Model is inadequate to calculate the cost of equity because the beta is not a good proxy to evaluate the risk of a company. Considering the importance of the WACC in the EVA framework, this issue has an important impact on the entire model.

Why did we introduce the Economic Model when the model is confronted with these shortcomings? By introducing the Economic Model, we never had the intention of providing our readers with a method to calculate the exact value of a firm. Our intention was to provide investors with tools to evaluate the quality of a company's business fundamentals. By understanding the Economic Model, investors can better appreciate how companies like Dell, Coca-Cola and Microsoft create value more than any other companies in the world and how this is being factored into their valuation.

CONCLUSION

This report introduced the Economic Model in Security Analysis. Our experience tells us that when investors are introduced with something new, they are reluctant to adopt it. For those who are new to the Economic Model, remember that it is nothing new. In fact, performing a firm valuation exercise using the EVA framework will yield the same result as a Discounted Cash Flow model. The Economic Model is simply another perspective to evaluate a company.

The purpose of this report was to provide investors with tools to evaluate the quality of a company and how to value a stock. Note that we barely talked about the P/E ratio, EPS, ROE as value drivers. It is not that they are irrelevant, it's just that we believe that ROIC, WACC, EVA, MVA and CAP are the fundamental drivers that affect stock prices.

The Economic Model is superior because it takes into account risk, capital requirements and the time value of money. Other valuation tools only implicitly take into account these fundamental concepts of Finance, which does not help investors understand what drives stock prices in the first place. We believe that using the Economic Model is essential in assessing the quality and valuation of a company.

Our report on the Economic Model focused on the mechanics of calculations of ROIC, WACC, EVA, MVA and CAP. While we tried our best to introduce all aspects of this model, we certainly don't pretend that we've covered it all. We strongly recommend that advanced investors read Bennett Stewart's *Quest for Value* as well as the articles listed below. We believe that these readings are essential if you are serious about making a living out of securities analysis.

Andrew Chan

Research Analyst, Small-Cap U.S. Equities
Co-Founder, Co-President (1999-2000), McGill Investment Club

About Andrew Chan

Andrew Chan, along with his partner and friend Jonathan Gagnon, co-founded the McGill Investment Club in April 1999. Its mission statement is to educate, provide students with an opportunity to share their knowledge, to learn from each other and to benefit from a real-life experience in Investment. Andrew graduated from McGill University in December 2000 with a Bachelor of Commerce (Major in Finance, Concentration in Strategic Management).

As an investor, Andrew was born right before the beginning of the Internet bubble, buying Cisco Systems as his first stock in April 1997 at $5.42… His story is no different than the fate of millions of momentum and tech investors. He has since further improved his investment philosophy to become a value growth investor as he now works as research analyst for a reputable Small-Cap investment management firm in Montreal, Québec, Canada.

FAVORITE QUOTES

"The most important quality in order to be successful in this business is humility."

- Sebastian Van Berkom, Founder and President of Van Berkom & Associates

""To quietly persevere in storing up what is learned, to continue studying without respite, to instruct others without growing weary – is this not me?"

- Confucius

Warren Buffett:

"To invest successfully, you need not understand beta, efficient markets, modern portfolio theory, option pricing, or emerging markets. You may, in fact, be better off knowing nothing of these. That, of course, is not the prevailing view at most business schools, whose finance curriculum tends to be dominated by such subjects. In our view, though, investment students need only two well-taught courses: How to Value a Business, and How to Think About Market Prices.

Your goal as an investor should simply be to purchase, at a rational price, a part interest in an easily understandable business whose earnings are virtually certain to be materially higher 5, 10, and 20 years from now. Over time, you will find only a few companies that meet these standards -- so when you see one that qualifies, you should buy a meaningful amount of stock. You must also resist the temptation to stray from your guidelines: If you aren't willing to own a stock for 10 years, don't even think about owning it for 10 minutes. Put together a portfolio of companies whose aggregate earnings march upward over the years, and so also will the portfolio's market value."

"We try to *price,* rather than *time,* purchases. In our view, it is folly to forego buying shares in an outstanding business whose long-term future is predictable, because of short-term worries about an economy or a stock market that we know to be unpredictable. Why scrap an informed decision because of an uninformed guess?"

"The price you pay determines your rate of return."

RECOMMENDED READINGS

Bennett G. Stewart, *The Quest for Value,* Harper Business, 1990.

Paul Johnson, Paul Sylverstein, *Does Valuation Matter?*.
http://www.capatcolumbia.com/Articles/Reports/Val_Mat.pdf

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Dale Wettlaufer, *A Look at ROIC.*
http://www.fool.com/specials/1999/sp990420roic.htm

Ian McDonald, *Unrecorded Goodwill.*
http://www.geocities.com/andrewychan/UnrecordedGoodwilllast.pdf

Andrew Chan, *Fool on the Hill: A Look at ROIC*
http://www.fool.com/news/foth/2000/foth000927.htm

LINKS

Andrew Chan's Personal Web Page
http://www.geocities.com/andrewychan/index.html

McGill Investment Club
http://www.management.mcgill.ca/mic/

APPENDIX

RETURN ON INVESTED CAPITAL CALCULATIONS

NOPAT Operating Approach

	Forecast 2002	Forecast 2003	Forecast 2004	Forecast 2005	Forecast 2006
Net Revenues	**159,381.0**	**199,226.3**	**234,090.8**	**275,056.7**	**323,191.7**
COGS	36,378.7	42,335.6	47,286.4	52,673.4	58,497.7
R&D	25,501.0	31,477.7	36,986.4	43,459.0	51,064.3
Sales & Marketing	70,127.6	82,678.9	95,977.2	112,773.3	129,276.7
General & Administration	14,344.3	16,934.2	19,897.7	23,379.8	27,471.3
Total operating expenses	**146,351.6**	**173,426.5**	**200,147.7**	**232,285.4**	**266,309.9**
NOPBT	**13,029.4**	**25,799.8**	**33,943.2**	**42,771.3**	**56,881.7**
Operating Margin	8.2%	13.0%	14.5%	15.6%	17.6%
Cash operating taxes	4,169.4	8,255.9	10,861.8	13,686.8	18,202.2
NOPAT	**8,860.0**	**17,543.9**	**23,081.4**	**29,084.5**	**38,679.6**
Net operating profit margin	5.6%	8.8%	9.9%	10.6%	12.0%

Cash Tax Calculations

Provision for income taxes					
Add change in deferred tax assets					
Subtract change in deferred tax liabilities					
Subtract tax paid on investment income					
Cash operating taxes					
Cash operating tax rate (CTR)	**32.0%**	**32.0%**	**32.0%**	**32.0%**	**32.0%**

(Cash Tax Rate was assumed)

Invested Capital Operating Approach

	Forecast 2002	Forecast 2003	Forecast 2004	Forecast 2005	Forecast 2006	
Operating assets	36,351.1	44,409.4	51,701.9	59,905.4	69,378.2	
NIBCLs	71,830.1	79,499.4	89,039.6	98,991.8	109,667.7	
Net working capital	-35,479.0	-35,090.0	-37,337.7	-39,086.3	-40,289.5	=Operating assets - NIBCLs
PP&E, net	16,988.0	20,191.9	23,383.3	26,560.1	29,719.8	
Gross Goodwill	52,884.0	52,884.0	52,884.0	52,884.0	52,884.0	
Cumulative non-recurring costs	2,337.0	2,337.0	2,337.0	2,337.0	2,337.0	
Total Invested Capital	**36,730.0**	**40,322.9**	**41,266.7**	**42,694.8**	**44,651.2**	
Beginning IC	43,709.0	36,730.0	40,322.9	41,266.7	42,694.8	
Average IC	40,219.5	38,526.4	40,794.8	41,980.7	43,673.0	
Change in IC	-6,979.0	3,592.9	943.7	1,428.1	1,956.4	

ROIC

	2002	2003	2004	2005	2006
AVG Capital	40,219.5	38,526.4	40,794.8	41,980.7	43,673.0
NOPAT	8,860.0	17,543.9	23,081.4	29,084.5	38,679.6
ROIC	**22.0%**	**45.5%**	**56.6%**	**69.3%**	**88.6%**

	2002	2003	2004	2005	2006
Marginal Capital	-3,220.0	-1,693.0	2,268.3	1,185.9	1,692.3
Marginal NOPAT	-15,050.2	8,683.9	5,537.5	6,003.1	9,595.1
ROMIC	467.4%	-512.9%	244.1%	506.2%	567.0%

EVA Model

					12/31/2006						
Period	1	2	3	4	5	6	7	8	9	10	
Year	**2002E**	**2003E**	**2004E**	**2005E**	**2006E**	**2007E**	**2008E**	**2009E**	**2010E**	**2011E**	**TV**
Sales	159,381.0	199,226.3	234,090.8	275,056.7	323,191.7	363,590.6	399,949.7	429,945.9	457,892.4	480,787.0	480,787.0
Sales Growth		25.0%	17.5%	17.5%	17.5%	12.5%	10.0%	7.5%	6.5%	5.0%	0.0%
Operating Profit Margin	8.2%	13.0%	14.5%	15.6%	17.6%	17.6%	17.6%	17.6%	17.6%	17.6%	17.6%
NOPBT	13,029.4	25,799.8	33,943.2	42,771.3	56,881.7	63,992.0	70,391.1	75,670.5	80,589.1	84,618.5	84,618.5
Cash Tax Rate	32.0%	32.0%	32.0%	32.0%	32.0%	32.0%	32.0%	32.0%	32.0%	32.0%	32.0%
NOPAT	8,860.0	17,543.9	23,081.4	29,084.5	38,679.6	43,514.5	47,866.0	51,455.9	54,800.6	57,540.6	57,540.6
NOPAT Growth		98.0%	31.6%	26.0%	33.0%	12.5%	10.0%	7.5%	6.5%	5.0%	0.0%
Net Operating Profit Margin	5.6%	8.8%	9.9%	10.6%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%	12.0%
Sales/Beg Capital	3.65	5.42	5.81	6.67	7.57	7.57	7.57	7.57	7.57	7.57	7.57
Beg Capital	43,709.0	36,730.0	40,322.9	41,266.7	42,694.8	48,031.7	52,834.8	56,797.4	60,489.3	63,513.7	63,513.7
Invested Capital Growth		-16.0%	9.8%	2.3%	3.5%	12.5%	10.0%	7.5%	6.5%	5.0%	0.0%
ROIC	20.3%	47.8%	57.2%	70.5%	90.6%	90.6%	90.6%	90.6%	90.6%	90.6%	90.6%
WACC	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Incremental Capital		-6,979.0	3,592.9	943.7	1,428.1	5,336.9	4,803.2	3,962.6	3,691.8	3,024.5	0.0
Incremental NOPAT		8,683.9	5,537.5	6,003.1	9,595.1	4,834.9	4,351.5	3,589.9	3,344.6	2,740.0	0.0
ROMIC		-124.4%	154.1%	636.1%	671.9%	90.6%	90.6%	90.6%	90.6%	90.6%	
EVA	2,303.6	12,034.4	17,032.9	22,894.5	32,275.4	36,309.8	39,940.8	42,936.3	45,727.2	48,013.5	320,090.2
Discount Factor	0.870	0.756	0.658	0.572	0.497	0.432	0.376	0.327	0.284	0.247	0.247
PV of EVA	2,003.2	9,099.7	11,199.4	13,090.0	16,046.6	15,697.7	15,015.2	14,036.0	12,998.5	11,868.2	79,121.4
% of Entreprise Value	0.81%	3.68%	4.53%	5.30%	6.50%	6.35%	6.08%	5.68%	5.26%	4.80%	32.03%
Cumulative % of EV	19.8%	23.47%	28.00%	33.30%	39.79%	46.15%	52.23%	57.91%	63.17%	67.97%	100.00%

MVA	200,175.9
Invested Capital (Grossed-up)	46,872.7
Enterprise Value	**247,048.6**
Cash	175,581.0
Total Debt + Leases	0.0
Market Cap	422,629.6
Shares Outstanding	40,000
Stock Price	**$10.57**

Formulas

Discount Factor	=1/(1+WACC)^n
PV of EVA at TV (n=10)	=((ROIC-WACC)*Beg Capital)/(WACC-TV Growth Rate)
PV of Terminal Value	=EVA_{TV} / (1+WACC)^n n=10

Assumptions

Implied Multiples

EV/EBITDA	6.26
P/E	14.68
P/CF	10.90
EV / FCF	11.47
EV/Sales	1.16
Date	01-Jan-02
5 Yr Target	$21.25
Today	$15.00
CAR	7.22%
DCF - EVA Spread	0.66%

DCF - (Under EVA Framework)

					12/31/2006						
Period	1	2	3	4	5	6	7	8	9	10	
Year	**2002E**	**2003E**	**2004E**	**2005E**	**2006E**	**2007E**	**2008E**	**2009E**	**2010E**	**2011E**	**TV**
NOPAT	8,860.0	17,543.9	23,081.4	29,084.5	38,679.6	43,514.5	47,866.0	51,455.9	54,800.6	57,540.6	
Change in Invested Capital	-539.0	6,979.0	-3,592.9	-943.7	-1,428.1	-5,336.9	-4,803.2	-3,962.6	-3,691.8	-3,024.5	
FCF	8,321.0	24,522.9	19,488.4	28,140.8	37,251.4	38,177.7	43,062.8	47,493.3	51,108.7	54,516.1	57,540.6
FCF	8,321.0	24,522.9	19,488.4	28,140.8	37,251.4	38,177.7	43,062.8	47,493.3	51,108.7	54,516.1	383,603.9
WACC	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Discount Factor	0.870	0.756	0.658	0.572	0.497	0.432	0.376	0.327	0.284	0.247	
PV of FCF	7,235.6	18,542.8	12,814.0	16,089.6	18,520.5	16,505.3	16,188.9	15,525.6	14,528.3	13,475.6	94,821.0
% of EV	3.0%	7.6%	5.2%	6.6%	7.6%	6.8%	6.6%	6.4%	5.9%	5.5%	38.8%
Cumulative % of EV	3.0%	10.6%	15.8%	22.4%	30.0%	36.7%	43.4%	49.7%	55.7%	61.2%	100.0%
Enterprise Value	**244,247.2**										
Cash	175,581.0										
Total Debt + Leases	0.0										
Market Cap	419,828.2										
Shares Outstanding	40,000										
Stock Price	**$10.50**										

Implied multiples

EV/EBITDA (LTM)	6.19
EV/FCF	29.35
P/E	14.58
P/S	1.98
P/CF	10.82
5-Yr Price	$21.11
Today's Price	$15.00
CAGR	7.07%
Difference with EVA	-0.67%