Fundamental Equity Analysis (screen for quality)

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The Reasoning Behind Return On Capital in the Magic Formula

First published at Hurricane Capital

What You Will Learn

- *Why didn't Greenblatt just use ROE?*
- *A deeper explanation of how Return on Capital is calculated*
- *Example of ROC between KO, PEP and DPS*

"Businesses that earn a high return on capital are better than businesses that earn a low return on capital." —Joel Greenblatt

The Reasoning Behind Return On Capital in the Magic Formula

The magic formula was introduced in the [Little Book That Still Beats the Market](#) written by [Joel Greenblatt](#), and ranks companies based on two factors

1. return on capital
2. earnings yield

In this post we take at the first factor: **return on capital. (ROCE)**

This is what Greenblatt wrote in the little book:

The Magic Formula Version of Return on Capital

The formula used by Greenblatt is:

$$\text{EBIT/(Net Working Capital + Net Fixed Assets)}$$

Greenblatt chose this version ratio rather than the common version of [ROE or ROA](#) for several reasons.

Why EBIT? The Reason for the Numerator

EBIT (or earnings before interest and taxes) is used in place of reported earnings because companies operate with different levels of debt and differing tax rates. This allows you to view and compare the operating earnings of different companies without the distortions arising from differences in tax rates and debt levels.

For each company, it is then possible to compare actual earnings from operations (EBIT) to the cost of the assets used to produce those earnings (tangible capital employed).

For purposes of the study and in the interest of simplicity, it is assumed that depreciation and amortization expense (noncash charges against earnings) were roughly equal to maintenance capital spending requirements (cash expenses not charged against earnings).

Assumed that EBITDA − Maintenance Cap/Expenditures = EBIT.

The Reason Behind the Denominator

Here's a look at closer look at how and why the denominator was chosen.

Net Working Capital + Net Fixed Assets

Net Working Capital + Net Fixed Assets (or tangible capital employed) is used in place of total assets (used in an ROA calculation) or equity (used in an ROE calculation).

The idea here is to figure out how much capital is actually needed to conduct the company's business.

Net working capital is used because a company has to fund its receivables and inventory but does not have to lay out money for its payables, as these are effectively an interest-free loan (short-term interest-bearing debt is excluded from current liabilities for this calculation).

As a side note, in this calculation, excess cash not needed to run the business was excluded.

In addition to working capital requirements, a company must also fund the purchase of fixed assets necessary to conduct its business, such as real estate, plant, and equipment.

The depreciated net cost of these fixed assets is then added to the net working capital requirements already calculated to arrive at an estimate for tangible capital employed.

NOTE: Intangible assets, specifically goodwill, were excluded from the tangible capital employed calculations. Goodwill usually arises as a result of an acquisition of another company.

The cost of an acquisition in excess of the tangible assets acquired is usually assigned to a goodwill account. In order to conduct its future business, the acquiring company usually only has to replace tangible assets, such as plant and equipment.

Goodwill is a historical cost that does not have to be constantly replaced. Therefore, in most cases, return on tangible capital alone (excluding goodwill) will be a more accurate reflection of a business's return on capital going forward.

The ROE and ROA calculations used by many investment analysts are therefore often distorted by ignoring the difference between reported equity and assets and tangible equity and assets in addition to distortions due to differing tax rates and debt levels.

Return on Capital In Use: Comparing Coca-Cola, Pepsi & Dr Pepper

(note: the original article and numbers are from 2013 but the concepts and conclusions are the same)

With Greenblatt's formula I calculated the return on capital for three well-known companies.

I also added a breakdown to show the two drivers of return on capital

1. EBIT-margin (Operating income / Revenues)
2. Invested Capital (Net Fixed Assets + Net Working Capital) turnover.

Amounts in millions. Fiscal year 2013. Source: Annual reports.	Coca-Cola (KO)	PepsiCo. (PEP)	Dr Pepper Snapple Group (DPS)
Return on Capital	**277.8%**	**58.5%**	**82.9%**
EBIT	10,228	9,705	1,046
Net Fixed Assets	14,967	18,575	1,173
Net Working Capital	(11,285)	(1,993)	89
Current Assets	31,304	22,203	1,119
Current Liabilities	27,811	17,839	1,030
Excess Cash (>5%)	14,778	6,357	N/A
Drivers of Return on Capital			
EBIT-margin, %	21.8%	14.6%	17.4%
× Invested Capital, turns	12.73	4.01	4.75
= Return on Capital	**277.8%**	**58.5%**	**82,9%**

You can see why Coca Cola is the leader in the industry.

All three companies show great return on capital for fiscal year 2013 and if you look at the breakdown you can get deeper insight of how higher operating margin is driving the return on capital.

Try it out yourself for homework. It's not difficult. When performing competitor analysis, you'll be able to get deeper insight into which company is actually better.

I hope this helps you understand the true meaning behind Greenblatt's Return on Capital calculation and why it's used.

My Top 10 Stock Valuation Ratios and How to Use Them

September 21, 2015 Written by Jae Jun

Do you have photographic memory like Warren Buffett?

I don't.

I can't remember every accounting ratio, **stock valuation method** or detail about a company.

But I do have a set of favourite "go to" stock **valuation ratios** that I like to refine and improve. My top 10 tends to change over the years as I find better ideas to replace my existing one.

You see, the way you think and value stocks should be similar to how you run your portfolio.

If you find a better idea, replace the one that is inferior.

If you come across a valuation ratio, analysis technique or learning method that improves your investing, replace your outdated or inferior method.

Here are my 10 best stock valuation ratios. I use these on a daily basis with the **OSV Stock Analysis tool**. These ratios and metrics are the cornerstones of my fundamental analysis toolbox which allows me to quickly analyze and value stocks.

The valuation ratios are listed alphabetically.

#1. Cash Conversion Cycle

> **Cash Conversion Cycle = Days Inventory Outstanding + Days Sales Outstanding – Days Payables Outstanding**

Not a "valuation" ratio, but a crucial part of analyzing a company.

The **cash conversion cycle** gives you insight into how efficiently the business manages its cash.

Every company's goal is to turn cash over quickly and the entire cash conversion cycle is a measure of management effectiveness.

The lower the better, and a great way to compare competitors.

Here's an image that explains how the cash conversion cycle works.

The Cash Conversion Cycle
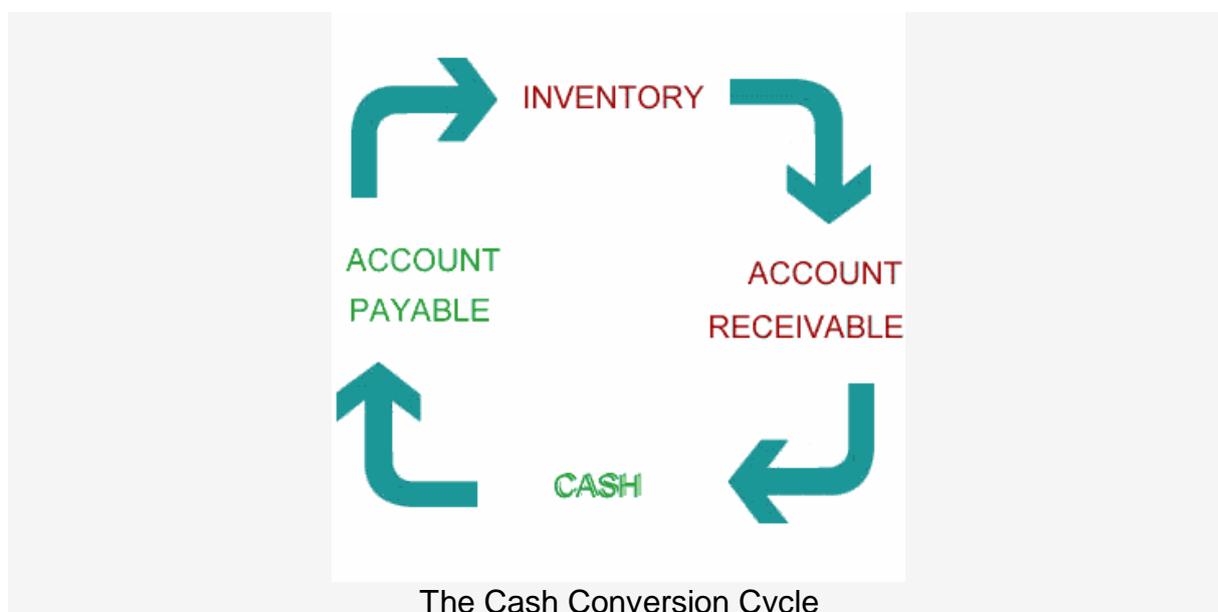
In a previous article, I showed how you can **use the cash conversion cycle to determine winners and losers**.

How to Use the Cash Conversion Cycle

The cash conversion number is a relative number. You can't look at a single cash conversion number and determine whether it's good or not.

You need a frame of reference.

And that reference is it's historical averages as well as the industry competitor cash conversion numbers.

E.g. compare Costco, Target, Wal-Mart and you can get some deep insight into how each business is run simply by comparing.

Look for trends where the cash conversion number is decreasing. Be cautious with big increases as it indicates possible cash shortage and inventory issues.

#2. Cash Return on Invested Capital – CROIC

CROIC = FCF/Invested Capital

CROIC is a variation of ROIC. CROIC focuses on the returns made with FCF instead of net income.

This lets you see how well management utilizes the cash that isn't part of the business. It's a great way to measure the skills of the managers.

On the numerator, I interchange FCF with owner earnings depending on the company and situation.

For many years, I used the Invested Capital formula taught by **F Wall Street** but recently switched to the following.

> **Invested Capital = Shareholders Equity + Interest Bearing Debt + Short Term Debt + Long Term Debt**

This is now in line with Morningstar's definition of [invested capital](#).

Invested capital is a very murky formula. It's totally non standard. There are lots of variations floating around.

Check out this **old school value thread** where a group of us try to understand which invested capital formula is correct. There are 5 different formula's you can use.

But a couple of reasons why I'm changing formulas.

- Finding excess cash is hard. It's a lot like trying to calculate maintenance capex. It's brutal.
- In some cases, CROIC came in much higher and totally unsustainable. I needed a balanced version after all these years.

How to Use CROIC in Your Analysis

I like to see CROIC growing or consistent above 13%. If a company exceeds a CROIC of 13% consistently, it's also a sign of a moat.

Companies with negative FCF will obviously show negative CROIC. By achieving 13+%, you can tell that FCF is positive and the business is a strong performer in the industry.

Look for some levels of consistency too. It's not going to be flat line consistent since FCF is a lumpy figure.

Check out AAPL's CROIC.

For all the critics out there saying how AAPL has lost its touch, it's becoming like IBM or other nonsense, the numbers don't tell the same story.

With these sorts of numbers, it doesn't matter what people are saying about China. It's noise.

Apple Inc. (AAPL)		2010	2011	2012	2013	2014	TTM	5YR Min	Median	5YR Max
ROE		29.3%	33.8%	35.3%	30.0%	35.4%	40.4%	29.3%	34.6%	40.4%
ROA		18.5%	22.3%	23.7%	17.9%	17.0%	18.6%	17.0%	18.6%	23.7%
ROIC		29.1%	33.4%	35.0%	25.8%	26.4%	27.3%	25.8%	20.2%	35.0%
CROIC		34.7%	43.4%	36.0%	32.4%	34.1%	38.1%	32.4%	35.4%	43.4%

AAPL CROIC Shows Excellent Performance

If this valuation metric sounds good to you, go get some free ideas based on companies with strong **increasing CROIC**.

#3. EV/EBIT Valuation Ratio

EV/EBIT = Enterprise Value / Earnings Before Interest and Tax

I've come to appreciate EV/EBIT more over the years. Greg Speicher has a good discussion on using EV/EBIT over PE. There are good thoughts in the comments too.

I've also read a lot that Buffett's rule of thumb is to pay 10x pretax when acquiring businesses.

And although Buffett is buying out the entire private company, that doesn't mean you can't apply it to public markets too. After all, if it's Buffett, you know he's going to stick to his methodology whether he is buying stocks or whole businesses.

Check out this post by Brooklyn Investor discussing Buffett's past purchases. Most fall in the 10x pretax earnings range.

Even when I run **EBIT valuations**, many companies trade around a multiple of 10.

How to Use the EV/EBIT Valuation Ratio

Since EBIT is not an after tax number, you can use it to compare across industries.

In the Cash Conversion example, you can't compare Costco to a company like AAPL, but by EV/EBIT, you can compare the valuation of each.

You still need to take a look at industry and historical averages though.

Here's AAPL again.

Apple Inc. (AAPL) September 21, 2015		2010	2011	2012	2013	2014	TTM	5YR Min	Median	5YR Max
EV/EBITDA		11.26	8.65	9.40	7.34	10.09	8.80	7.34	9.10	11.26
EV/EBIT		11.89	9.12	9.96	8.35	11.62	10.11	8.35	10.03	11.89
P/S		3.75	3.09	3.70	2.53	3.28	2.95	2.53	3.18	3.75
P/BV		5.11	4.36	4.90	3.50	5.38	5.27	3.50	5.01	5.38

EBIT at 10x for Quality Company is Cheap

Now if I apply that to the EBIT calculator from the **Value Analyzer** using a revenue of $176B and factor in all the cash it has, the 10x multiple gives AAPL a fair value close to the mid $700's.

Here's a link to the youtube video on **how the EBIT model works**.

Apple Inc. (AAPL) September 21, 2015	Normalized Rev Period 3YR	Projection Analyst Estimate	EPS $9.13	％old school value Figures in Millions except per share values Watch Tutorial
Enter Ticker / Refresh / CLEAR	Current Price $114.80 M.o.S	Conservative $126.94 9.6%	Normal $147.30 22.1%	Aggressive $166.43 31.0%

For Each Operating Segment (1)	Conservative	Normal Case	Aggressive	
Normalized Revenue Estimate (2)	224,337.0	$224,337.0	224,337.0	
Manual Input for Revenue				
Projected Normalized Operating Margin (3)	30.7%	30.7%	30.7%	
Manual Input for Margins				
Operating Income Estimate (EBIT)	68,926.2	68,926.2	68,926.2	
Valuation Multiple (4)	8.3x	10.0x	11.6x	side note: AAPL still cheap
Manual Input for EBIT Multiple				
Estimate Value of Operating Segment	575,481.7	691,592.8	800,688.4	
Cash & Equiv on Balance Sheet	202,848.0	202,848.0	202,848.0	
Manual Input for Cash & Equiv				
Total Value of business + cash	778,329.7	894,440.8	1,003,536.4	
Less Total Debt	54,418.0	54,418.0	54,418.0	
Manual Input for Total Debt				
Less Off Balance Sheet Debt (5)	0.0		0.0	
Less Net Pension/Retirement/Workers Comp	0.0		0.0	
Estimated Fair Value of Equity	723,911.7	840,022.8	949,118.4	
Shares Outstanding	5,702.72	5,702.72	5,702.72	
Current Price	$114.80	$114.80	$114.80	
Estimated Fair Value per Share	$126.94	$147.30	$166.43	
Margin of Safety	10%	22%	31%	
Price/Intrinsic Value Ratio (6)	0.9	0.8	0.7	

AAPL Still Cheap at EBIT Valuation of 10x

If Buffett ever gets comfortable with a tech stock after IBM, he should look into AAPL.

#4: FCF to Sales

FCF to sales is a simple metric that tells you what percentage of sales is converted directly to FCF. Instead of FCF, you can use your own variation of FCF or owner earnings.

The higher the better.

How to Interpret FCF/S

Any company that has a FCF/S ratio higher than 10% is a FCF generating machine.

It tells you that the company is very profitable, has strong operations and if you dig deeper, you'll find a moat.

Take a look at how strong CSCO is.

CSCO is a FCF Machine. Big moat shown through FCF/S > 20%

Any company that can generate FCF like CSCO does has the added benefit of being able to:

- hand out dividends with ease
- reinvest and seek other opportunities

#5: Free Cash Flow to Short Term Debt

> **FCF to Short Term Debt = Free Cash Flow / Short Term Debt**

Not every valuation stat I look at is related to what the upside is.

In fact, one of my key analysis requirements is to look at ratios that force **inverted thinking**.

Instead of looking at whether debt has increased, I ask myself whether debt can be easily covered even if it goes up.

The FCF to Short Term Debt ratio asks the question whether the company can cover it's short term debt with FCF. Not by borrowing or diluting, but with internally generated funds.

How to Use the FCF to Short Term Debt Ratio

Debt isn't always a bad thing.

And sometimes, a company may take on debt to cover short term difficulties. The key is identifying whether the debt is for a broken business model, or whether it is manageable and only a temporary set back.

If it's the later, you can take advantage of falling prices to make a nice entry point.

If FCF/Short Term Debt is below 1, the stock doesn't generate enough FCF to cover its debt.

If you zoom out and see that the ratio is consistently below 1, there is a high chance of trouble.

If the ratio is above 1, then debt can be covered without having to borrow more.

Take a look at Transocean (RIG).

Users of the **Stock Analysis Tool** need to go to the "**DCF Valuation**" section and scroll down to the "**Debt**" section to see these values.

Fiscal Year	Trend	2010	2011	2012	2013	2014	TTM
Debt Related							
FCF to Total Debt		8.3%	-42.5%	-1.8%	13.1%	-19.0%	-30.9%
FCF to Short Term Debt		46.0%	-263.1%	-16.0%	435.6%	-185.2%	-301.9%
FCF to Long Term Debt		10.1%	-50.7%	-2.0%	13.6%	-21.1%	-34.5%

lots of debt over the years compared to FCF

Lots of debt over the years. Shows difficult industry conditions.

Transocean is an example of a typical company with heavy capex, high fixed costs, and needs to borrow regularly.

Unless you know the oil drilling industry very well and keep up with oil and energy demands, RIG is not an easy company to invest in. The oil industry may look cheap, but unless you take the time to get to know the industry, there will be value traps as companies falter as they are burdened with debt and not enough cash.

Equally, when the Deepwater Horizon oil spill occurred, drillers were crushed and it was a good time to buy when the market was uncertain and scared.

However the FCF/Short Term Debt ratio shows RIG falling into dangerous levels since 2011.

Is it a coincidence that the stock has fallen on hard times since 2011 with all the debt and lack of cash?

Stock chart for RIG since 2011

Probably, but it's a good way to invert your thinking.

#6: Inventory Turnover

> **Inventory Turnover = Sales/Inventory**
> **or**
> **COGS/Average Inventory**

The inventory turnover ratio measures how quickly the company sells its inventory.

Remember the cash conversion cycle above?

The goal is to quickly turn inventory into cash, then reinvest the cash back into inventory, and then turn it to cash again for even more profits.

The more your company does this in a single year, the higher the efficiency and profitability.

How to Use Inventory Turnover

An inventory turnover of nine means that the company has gone through and sold all its inventory nine times during the period.

When you use inventory turnover, you need to make sure that you are comparing with similar companies.

A turnover of two is horrific in the retail industry, but for heavy machinery, it is excellent.

Make sure you are comparing apples to applies.

A high inventory turnover can be achieved via

1. tight inventory management (which is excellent)
2. or reducing prices to quickly sell (which is bad)

Don't just blindly accept a number. Always ask yourself why?

[More reading on inventory turnover](#).

#7: Magic Formula Yield

After I first read [The Little Book that Beats the Market](#), the idea and the presentation made sense, but I didn't believe the results.

I originally wrote about the **magic formula investing results** with the intent to disprove it, but the results took me by surprise and I appreciate it more.

Here's the Magic Formula Yield.

Magic Formula Yield = EBIT / Enterprise Value

It's just the earnings yield. The inverse of EV/EBIT.

How to Use the Magic Formula Yield

The earnings yield can be used to compare against earnings of another stock, sector or the whole market and even bond yields.

It's another relative valuation ratio to use with a reference.

I like to look for earnings yield averages of at least 10% to consider it undervalued.

In other words, the EV/EBIT multiple has to be 10x or less.

#8: Piotroski Score

This isn't a "valuation ratio" but it is a quality score that leads to an easier valuation.

Here's how the **Piotroski Score** works.

The first four criteria of the Piotroski Score count towards profitability.
1. Positive net income compared to last year
2. Positive operating cash flow in the current year
3. Higher return on assets (ROA) in the current period compared to the ROA in the previous year
4. Cash flow from operations greater than Net Income

Points 5-7 of the Piotroski Score, looks at the health of the balance sheet in terms of debt and the number of shares outstanding.
5. Lower ratio of long term debt to in the current period compared value in the previous year
6. Higher current ratio this year compared to the previous year
7. No new shares were issued in the last year

The last two factors of the Piotroski Score looks at operating efficiency.
8. A higher gross margin compared to the previous year
9. A higher asset turnover ratio compared to the previous year

I even took it a step further to narrow down the **best Piotroski scores**.

How to Use the Piotroski Score

Look for trends.

Is it increasing?

Is it decreasing?

What's great about the quality analysis metrics like the **Piotroski Score**, **Altman Z score**, **Beneish M score** and so on, is that it breaks it down for you.

A historical Piotroski Score breakdown puts everything into context versus a single number.

Piotroski Score											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	TTM
Piotroski F Scores	6	7	4	7	4	7	3	7	8	5	4
Piotroski 1: Net Income	1	1	1	1	1	1	0	0	1	0	0
Piotroski 2: Operating Cash Fl	1	1	1	1	1	1	1	1	1	1	1
Piotroski 3: Return on Assets	1	1	0	1	0	0	0	1	1	0	0
Piotroski 4: Quality of Earning	1	0	0	1	1	1	1	1	1	1	1
Piotroski 5: LT Debt vs Assets	1	0	0	0	1	1	0	1	1	1	0
Piotroski 6: Current Ratio	1	1	0	1	0	1	0	1	1	0	1
Piotroski 7: Shares Outstandin	0	1	1	0	0	1	0	0	0	0	0
Piotroski 8: Gross Margin	0	1	1	1	0	1	0	1	1	1	1
Piotroski 9: Asset Turnover	0	1	0	1	0	0	1	1	1	1	0

#9: Price to Intrinsic Value

Price/Intrinsic Value

This one is tricky.

Simply because you have to know **how to value stocks** to get the intrinsic value.

Here's a condensed version on the **best stock valuation methods** that you can check out.

How to Use the Price to Intrinsic Value

The idea behind using a price to intrinsic value ratio is to invest in the most undervalued stock.

If you have 10 stocks that are undervalued and only want to buy two of the stocks, how do you know which one to buy?

Using the Price to Intrinsic Value ratio helps you compare between your selections.

All the valuation ratios above focused on comparing against industry competitors to see whether a stock is cheap or not.

Here, it boils down to which of the cheap stocks do you want to invest in?

Here's the image of the EBIT valuation for AAPL model again.

Price to Intrinsic Value Ratio
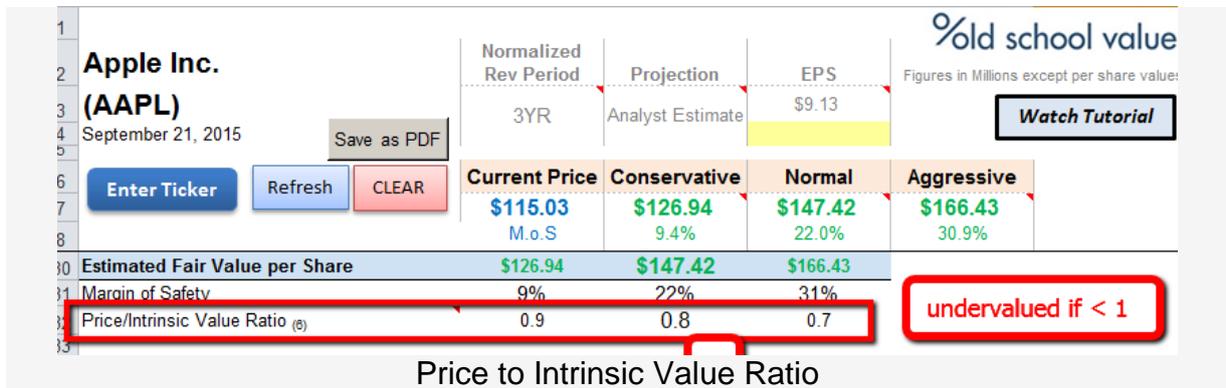
If the intrinsic value is below the stock price (i.e. overvalued), the ratio is greater than 1.

If the intrinsic value is higher than the stock price (i.e. undervalued), the ratio is less than 1.

Now you can see how this will help you when you've got a list of stocks you want to buy.

Go for the one with the lowest ratio.

#10: DuPont Model for ROE

Understanding numbers in context is vital.

ROE is one of those numbers that gets thrown around so often without thought or explanation.

It's a gimme that a ROE is good and low ROE is bad.

Wrong.

The standard ROE = Net Income / Shareholders Equity

At face value, it looks good, but not when you can break it down further and get deep insight into how the company achieves its ROE.

> **The DuPont ROE = (Net Profit Margin x (Asset Turnover) x (Equity Multiplier)**
>
> **ROE = (Net Income/Sales) x (Sales/Total Assets) x (Total Assets/Shareholders Equity)**

Who knew you could get so much juicy info from ROE alone.

To get the full analysis and explanation, be sure to check out the **DuPont Analysis** article.

How to Use the DuPont Model

There two variations you can use for the DuPont model.

A 3 step version (shown above) and a **5 step version**.

Use the worksheet in the OSV **stock spreadsheet** to get both versions analyzed automatically.

ROE is a way to measure the effectiveness of management. Now you can see in which area management is exceeding or lacking.

Here's a snapshot of the DuPont analysis for AAPL.

3 Step and 5 Step DuPont Analysis of AAPL | Click to Enlarge

If you look at 2013, ROE dropped to 30% from 35%.

The 3 Step DuPont analysis shows you that the main culprit is a big drop in net profit margins. Increase in debt is also a small part of the drop.

The 5 step DuPont analysis takes it further and shows you that operating margins is really to blame.

Then in 2014 and TTM, you can see how an increase in leverage (Equity Multiplier) is causing the increase in ROE because the net and operating margins are similar since 2013.

Cool huh?

If I couldn't get all this data easily, I'm sure I wouldn't be using the DuPont Model. But the DuPont now earns a strong spot in my top 10 list.

Work Smarter Not Harder

That's a philosophy that I've always taken. It's why I started writing this blog and why I started creating tools to make my investment analysis faster.

I'm what Ben Graham would classify as an enterprising investor, I take pride in knowing that I can go through stocks 3x faster than other investors and understanding what a stock is worth and what price I should pay.

I used to waste a TON of time doing everything manually.

If I tried to gather all this data by hand, crunch it and then write this article, it would take days.

The other huge benefit I've experienced over the years is that I have more time to think and process the information because I'm not drowning in a sea of information.

The element of thinking is sadly overlooked by a lot of investors.

I know what I like and what to look for and by doing things quickly, I have more time to dedicate to thinking about the investment.