How to Value Stocks using DCF...and the Dangers of Doing So

Warren Buffett wrote in his 1992 letter to shareholders of Berkshire Hathaway...

> *In the Theory of Investment Value, written over 50 years ago, John Burr Williams set forth the equation for value, which we condense here: The value of any stock, bond or business today is determined by the cash inflows and outflows – discounted at an appropriate interest rate – that can be expected to occur during the remaining life of the asset.*

What Buffett defines here is essentially what we know as the discounted cash flow or DCF, a key method to calculate intrinsic value of companies.

The interesting thing to note here is that no one knows whether Buffett has ever used DCF himself!

Even Buffett's business partner and alter ego Charlie Munger has occasionally said that he has never seen Buffett doing any DCF calculations.

In fact, this is what Buffett wrote in his 2002 letter...

> *Despite our policy of candor, we will discuss our activities in marketable securities only to the extent legally required. Good investments are rare, valuable and subject to competitive appropriation just as good product or business acquisition ideas are. Therefore we normally will not talk about our investment ideas.*

Anyways, despite his secretiveness, Buffett has been vocal about the importance of DCF several times in the past.

But if you were to believe a majority of security analysts out there, they will tell you to simply avoid DCF. The reason they give is that DCF is dependent on 5-10 years of future cash flows, predicting which is highly uncertain.

So they use relative valuation multiples like price to earnings, price to book value, or EV/EBITDA (which are also based on predictions!).

But you must recognize the simple fact that multiples are not valuation. In fact, multiples are simply shorthand for the intrinsic valuation process, which must generally be based on the DCF method.

You must never confuse the two – multiple based valuation and intrinsic valuation.

Of course, doing a P/E based valuation of stock can save you a lot of time and hard work (and that's why most analysts use this). But it will be merely a case of garbage in-garbage out.

In fact, the simplicity of such ratios is a sign of inaccuracy, not accuracy. As Keynes said, "It is better to be vaguely right than precisely wrong."

DCF: Problems and solutions

If you were to go through the DCF calculation excel, there are three key variables you need to calculate the DCF value of a company:

1. **Estimates of growth in future free cash flows (FCF):** Growth in FCF over say the next 10 years, using last 3 years average FCF as the starting point. (Click here to see the calculation of FCF from a company's cash flow statement)
2. **Terminal growth rate:** Rate of growth in FCF after the 10th year and till infinity.
3. **Discount rate:** Rate at which the future cash flows must be discounted to bring them to present value.

Colgate's 2-Stage DCF Calculation

(All figures, except per share numbers, are in Rs million)

3-Year Avg. FCF	3,09,00,00,000	
Years:	1-5	6-10
Growth Rate:	10%	8%
Terminal Growth Rate:	2%	
Discount Rate:	10%	
Shares Outstanding:	13,59,92,817	
Net Debt Level:	(2,85,00,00,000)	

Year	FCF	Growth	Present Value (PV)
1	3,39,90,00,000	10%	3,09,00,00,000
2	3,73,89,00,000	10%	3,09,00,00,000
3	4,11,27,90,000	10%	3,09,00,00,000
4	4,52,40,69,000	10%	3,09,00,00,000
5	4,97,64,75,900	10%	3,09,00,00,000
6	5,37,45,93,972	8%	3,03,38,18,182
7	5,80,45,61,490	8%	2,97,86,57,851
8	6,26,89,26,409	8%	2,92,45,00,436
9	6,77,04,40,522	8%	2,87,13,27,701
10	7,31,20,75,763	8%	2,81,91,21,742

Terminal Year CF:	7,45,83,17,279
PV of Year 1-10 Cash Flows:	30,07,74,25,912
Terminal Value:	35,94,38,02,215
Total PV of Cash Flows:	66,02,12,28,127
Number of Shares:	13,59,92,817
Intrinsic Value per Share (IV):	506

Now there are three key issues that arise with these variables:

1. What growth rate to assume for future FCF estimates?
2. What discount rate to assume?
3. What terminal growth rate to assume?

Let me help you with how do I answer these questions for calculating DCF valuations myself.

1. How do I predict future FCF?
As an analyst, I always found it difficult to predict growth rate in volumes, sales and profits. But I still tried to do that – after all, I was paid to predict the future!

However, as I've realised over the years, trying to find a perfect answer to the question "What growth rate to assume?" is like trying to find a "perfect couple". None exist!

Given this limitation of trying to predict the future, I've changed my way of analysis to value stocks based on the present data rather than what will happen in the future.

That's why I now don't try be accurate with my FCF growth estimates. I just try to be reasonable and use common sense.

For most stocks, I generally perform a 10-year 2-stage DCF analysis. What this means is that I assume a particular growth rate for the first five years of my FCF calculations (as you can see in my DCF excel), and then another number for the next five years.

I rarely go above 10-12% annual growth rate for the first five years, and 6-8% for the next five.

The best practice is to keep growth rates as low as possible.

If the company looks undervalued with just 5% annual growth in FCF over the next 10 years, you have more upside than downside.

The higher you set the growth rate, the higher you set up the downside potential.

To repeat, while assuming FCF growth rate for the future, just be reasonable and use common sense.

A caveat – don't take cues from the past as the past performance is rarely repeated in the future.

2. How much discount rate do I assume?
In simple words, discount rate is the rate at which you must discount the future cash flows (as estimated using above growth assumptions) to the present value.

Why present value? Because we are trying to compare the company's intrinsic value with its stock price "now"....in the present.

Just to help with an example, what price would you pay for an investment today if company ABC's future cash flow is worth Rs 1,000 after 1 year?

- If the discount rate is 5%, you must pay Rs 952 now (1000/1.05).
- If the discount rate is 10%, you must pay Rs 909 now (1000/1.1).
- If the discount rate is 15%, you must pay Rs 870 now (1000/1.15).

In other words, the higher the discount rate you assume, the lower you must pay for the stock as of now.

Finance textbooks and experts would tell you to use Capital Asset Pricing Model (CAPM) to calculate discount rate. I used CAPM myself to arrive at discount rates in the past.

However, if you are worried what CAPM is, don't be because you can avoid knowing about it and still live happily ever after....like I am living.

Look at discount rate as the "annual rate of return" you want to earn from the stock.

In other words, if you are looking to invest in a business that has comparatively higher (business) risk than other businesses (like in case of most mid and small cap stocks), you may want to earn a 15% annual return from it.

For valuing such businesses, take 15% as the discount rate.

In case of relatively safer businesses (think Infosys, HUL, Colgate), earning around 10-12% annual return over the long term is a good expectation (because these businesses will also provide some stability to your portfolio during bad times).

For valuing such businesses, take 10-12% as the discount rate.

Better still, assume a constant discount rate for all companies. I am gradually turning to this model – of taking a constant 15% discount rate for all kind of businesses (safe or risky).

"But this way, how would you adjust for the risk in each business?" you may ask.

Simple – adjust the risk in FCF growth estimates. That is where the real risk lies, right?

3. How much terminal growth rate do I assume?
As I mentioned above, I do a 10-year FCF calculation for arriving at a stock's DCF valuation.

But the companies I'm valuing won't cease to exist after 10 year. Some will survive for 10 more years, some for 20 years, and very few for 50 years.

That is where the concept of "terminal value" (or the value after 10th year and till eternity) comes into picture.

The terminal value I generally assume lies between 0% and 2%. Assuming higher terminal value (>3-4%) is like assuming the company to grow bigger than the world economy in the infinity, which isn't possible.

So the idea is to keep it as low as possible. Best to keep it at 0%.

Voila, I got a perfect intrinsic value!
No sir! Even after being reasonable and using common sense in assuming FCF growth rate, terminal growth rate and discount rate, there is 0% guarantee that you will arrive at a "perfect" intrinsic value using DCF (or for that matter, using any intrinsic value method).

Believe me, however reasonable, realistic, rational (whatever you may want to call it) you get in calculating intrinsic values, you are bound to go wrong.

This is for the simple reason that you are still trying to predict the future...which is unpredictable.

Now what to do?

Hey, you forgot "margin of safety"?
Valuation is an imprecise art (yes, however smart you may think you are!). Also, the future is inherently unpredictable.

Thus, it's important to bring in the most-important investing concept of "margin of safety" into the picture.

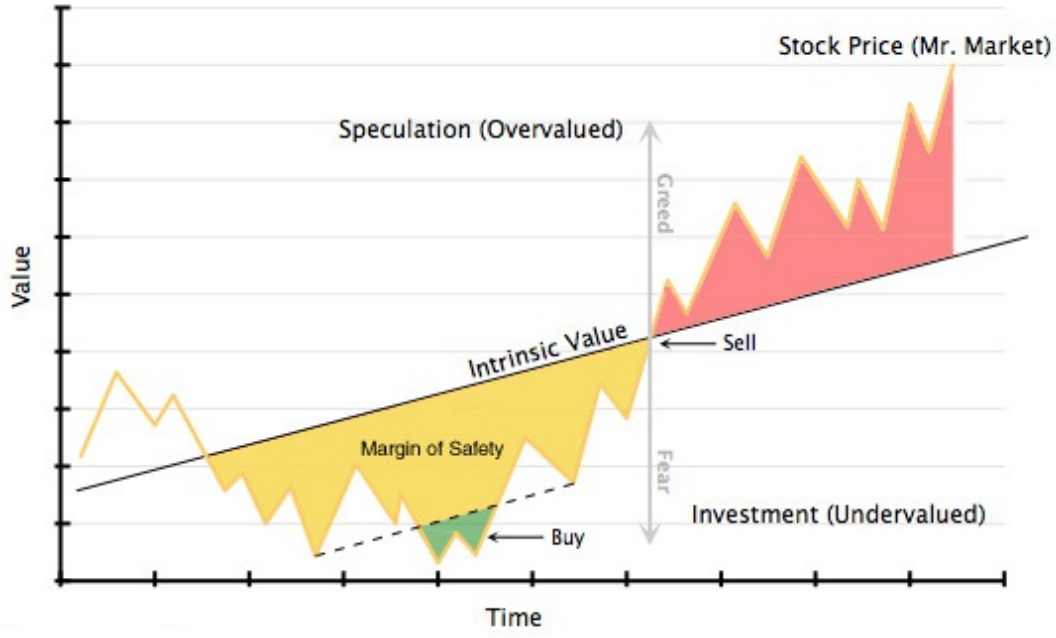
This is what Graham wrote about margin of safety in *The Intelligent Investor*...

> *Confronted with the challenge to distill the secret of sound investment into three words, we venture the motto, MARGIN OF SAFETY.*

Margin of safety is simply the discount factor that you use with your intrinsic value calculation. So if you arrive at an intrinsic value of Rs 100 for a stock that trades at Rs 80, you might think that you have found a bargain.

But what if your intrinsic value calculation is wrong? Yes, it will be wrong, at least 100% of the times!

Thus, you will do yourself a world of good by buying the stock only at say 50% discount to your intrinsic value calculation, or around Rs 50.



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Now when you bring your intrinsic value assumption down to Rs 50 – by giving a 50% discount to the original calculated value of Rs 100, don't think that you are trying to be ultra-conservative.

What you are doing is providing yourself protection against:

1. Bad luck
2. Bad timing, and
3. Bad judgment.

As simple as that!

Margin of safety was, and will always be, the bedrock of value investing.

You can't ignore this at any cost...or it will turn out to be a costly affair!

So, never ignore the power of DCF...
The DCF model can provide a useful valuation estimate if you follows these simple principles:

- Invest in companies with business certainty – financial stability, business

predictability.

- Invest in companies with sustainable competitive advantage.
- Do the hard work of analyzing past financial statements (over at least a 10-year period).
- Use conservative assumptions of FCF growth of around 8-10%, terminal growth rate of 0-2%, and discount rate of 10-15%.
- Use margin of safety to protect against bad luck, bad timing, and bad judgment.
- Be honest by not modifying your original assumptions just because you "like' the stock but DCF is saying otherwise.

That's about it!

Or is it?

Let's do "Reverse DCF"
Most of you must have not heard of the concept of "reverse DCF".

Don't worry, it's not that complex a subject that the name might suggest! You do a "reverse DCF" by *reversing* just one assumption in your original DCF calculation – the FCF growth rates.

The aim of reverse DCF is to get the intrinsic value to match the stock's current price – to find out what's the FCF growth estimates the stock market is pricing in the stock.

Let's understand this with an example. Colgate's current stock price is around Rs 1,230. However, assuming FCF growth rates of 10% (for 1-5 years) and 8% (for 6-10 years), we arrive at an intrinsic value of Rs 398.

Now, we need to tweak the FCF growth rates in such a way, that this Rs 398 rises to around the current stock price of Rs 1,230.

Just try that on your own – calculations will show that when you raise the FCF growth rate to 26% for both the 5-year periods, the stock's intrinsic value will rise to Rs 1,233... or almost near the current price.

What this indicates is that the stock market is currently pricing Colgate at a level that is justified only when the company can grow its next 10-years' FCF at an average annual rate of 26%!

Now you need to answer whether such a long-term growth rate is realistic and achievable. Or whether the market has irrational expectations from Colgate's business.

Just for your information, Colgate has grown its FCF at an average annual rate of 16% over the past 8 years. So a 26% growth rate over the next 10 years really looks on the higher side.

But as an investor, you must take a call on that!

That's all I have to discuss on the subject of DCF as of now. I would like to leave you with the link to a very good resource – The Dangers of DCF – written by James Montier in 2008.

Finally, an important quote from a noted statistics professor, George E P Box – *"All models are wrong; some are useful."*

So learn about DCF, use it, but expect to be wrong!

All the best!