

HOW TO VALUE STOCKS

Three valuation methods explained



Value Spreadsheet

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Foreword

October 2014



Dear investor,

My name is Nick Kraakman, founder of Value Spreadsheet. I teach investors how they can consistently earn above average returns on the stock market by using a simple, proven & low-risk strategy called value investing.

Estimating the intrinsic (or *real*) value of a company is the key to success on the stock market, because if you know what a stock *should* be worth you can take advantage of undervaluation.. and earn a handsome profit at a lower risk!

However, counter to popular belief, there is no such thing as an exact figure for the intrinsic value and there is no magical formula to calculate it. The intrinsic value is *always* an estimate based on numerous assumptions, for example about future growth rates.

Therefore we will cover three distinct methods to arrive at an intrinsic value estimate, which will provide you with the tools to make an educated approximation of the intrinsic value by comparing the results of the different models.

You might still be unfamiliar with some of the terminology used in this eBook, but this will be covered in more detail in later lessons of the course. Also, I included a glossary in the back of this eBook to help you out.

With kind regards,

A handwritten signature in black ink, consisting of stylized, overlapping loops and lines.

MSc. Nick Kraakman

Method 1: Price-Earnings multiple

This first method is also the most straightforward one. It involves determining a **five-year price target** based on a reasonable, historical P/E valuation. We will use Dolby Laboratories (DLB) to illustrate this method in practice.

Input 1: the median historical price-earnings multiple

Let us start by finding out what a reasonable P/E ratio is for Dolby. If we look at the past 5 years, we see that Dolby's average historical price-earnings multiple is **19.0**, which is quite common in the technology sector.

Source:

<http://financials.morningstar.com/valuation/price-ratio.html?t=DLB>

*See: DLB 5Y Avg**

Input 2: earnings per share (ttm)

We also need to find out how much Dolby earned in the most recent four quarters. Fortunately we do not have to manually add these quarters together, because most major financial websites like Google Finance, Yahoo Finance, and Morningstar have done this for us in the EPS value they report. Dolby's trailing twelve months earnings are **\$2.00** at the time of writing.

Source:

<http://finance.yahoo.com/q?s=dlb&q=1>

See: EPS (ttm)

Input 3: expected growth rate

The final piece of the puzzle is the rate at which Dolby is expected to grow its profit in the coming five years. You could make your own estimate based on past performance or other

metrics, but you can also look up how analysts expect the company to perform in the near future. Analysts predict that Dolby will grow at a rate of **10.00%** year-over-year for the coming five years.

However, predictions are hard to make, especially about the future, as the Nobel Prize winning physicist Niels Bohr once commented. Therefore it is crucial to apply Benjamin Graham's **Margin of Safety** principle to give our intrinsic value estimate some room for error. We suggest a margin of safety between 15% and 25%. In this example we will use 25% to arrive at a conservative growth rate of **7.50%** ($10.00 * 0.75$).

Source:

<http://finance.yahoo.com/q/ae?s=DLB+Analyst+Estimates>

See: Next 5 Years (per annum)

Let's put it all together!

Now that we have all the necessary inputs, we can calculate the five year price target for Google:

$$\$2.00 \times 1.075^5 \times 19.00 = \mathbf{\$54.55}$$

According to our calculation, Dolby is worth \$54.55 five years from now. However, what we really want to know is what Dolby is worth *today*, its intrinsic value. To arrive at this estimate we have to discount the five year price target, which will give us the net present value (NPV)*. We will use a 10% discount rate, which is approximately equal to the long term historical return of the stock market. This is the minimum rate of return you would have to earn to justify stock picking over investing in an index fund. Without further ado, let's do the math:

$$\$54.55 / 1.10^5 = \mathbf{\$33.87}$$

Awesome, we just calculated our first intrinsic value! Dolby is approximately worth \$33.87 according to the P/E valuation model. But please leave out the decimals, because remember: *this is only a rough estimate*. Dolby's stock price at the time of writing is \$39.30, which

means the company is currently overvalued and so we should skip this one and look for other opportunities in the market.

TIP

At what price should you consider buying if you want to earn 20% per year? Simply discount the five year price target with 20% to calculate your maximum buy price. In the case of Dolby, this means you should not consider buying until the price drops below \$21.92 ($\$54.55 / 1.2^5$).

* The value of a dollar *today* is higher than the value of that same dollar in the *future*, because that dollar could be earning an interest rate if you would invest it today. Therefore we use this imaginary interest rate to calculate how much the future value is worth in today's money. We call this *discounting*.

Method 2: Discounted Cash Flow (DCF) model

Superinvestor Warren Buffett defines intrinsic value as follows:

"[Intrinsic value is] the discounted value of the cash that can be taken out of a business during its remaining life." ~ Warren Buffett in Berkshire Hathaway Owner Manual

The definition above implies that we have to add up all the expected future cash flows and then take the NPV of that to calculate the intrinsic value in today's money. And this is exactly what the Discounted Cash Flow model, or DCF model, can do for you!

An important distinction

First, it is crucial to highlight the difference between *cash* versus *cash that can be taken out of a business*, or in accounting terms: **cash from operating activities** versus **free cash flow** respectively. Cash from operating activities is the amount of cash generated by a company's normal business operations. However, not all of this money can be taken out of the business, since some of it is required to keep the company operational. These expenses are called **capital expenditures** (CAPEX) and are often found on the balance sheet under *Investments in Property, Plant, and Equipment*. Free cash flow is the cash that a company is able to generate after spending the money required to stay in business. We calculate this by simply subtracting capital expenditures from the operating cash flow*. What remains is the cash that can be freely taken out of the business without disrupting it. This is the cash we are interested in.

* Actually, there are two types of capital expenditures, *maintenance capex* and *growth capex*, and only maintenance capex should be subtracted from operating cash flow to arrive at the correct free cash flow figure. Why? Because maintenance capex covers the expenditures required to stay in business, while growth capex is the money invested in property, plant & equipment for future growth. The problem is that companies do not report these two types of capex separately in their financial statements. So for ease of calculation, we simply subtract all capex from operating cash flow.

The DCF model

Now that you know how to calculate our most important input, free cash flow (FCF), we can take a look at the model. The DCF model takes the trailing twelve months FCF and projects this 10 years into the future by multiplying it with an expected growth rate. It then takes the NPV of the FCF from each of these 10 years and adds them up. The year 10 FCF is multiplied by a factor 12 and added to the previous calculation. Finally, the cash and cash equivalents which the company has on its balance sheet are added to arrive at an intrinsic value estimate for the entire company. All that remains is dividing this value by the number of shares outstanding and you will have an intrinsic value estimate for one share. Confusing? Let's make things a bit more concrete. I will show you how this model works in practice by looking at Apple (AAPL).

The data

We start by adding up Apple's latest four quarters of cash from operating activities, which amounts to **\$53.944.000**. Then we calculate the company's capital expenditures by adding up the latest four quarters, which equals **(\$7.207.000)**. If we subtract these capital expenditures from the cash from operating activities, we are left with a free cash flow of **\$46.737.000**. We do not want to project these free cash flows ad infinitum, but only ten years into the future. Therefore we will use a multiplier for the year 10 cash flows of **12** to simulate the value of these cash flows in the case that the company would sell off all its assets at the end of year 10. Again one of those necessary evils which leaves room for tinkering; use with care.

Source:

<http://finance.yahoo.com/q/cf?s=AAPL>

See: Total Cash Flow From Operating Activities and Capital Expenditures

While the cash flows are important, we should also take into account any cash and cash equivalents which the company has on its balance sheet. For Apple this balance sheet entry has a very respectable value of **\$41.350.000**.

Source:

<http://finance.yahoo.com/q/bs?s=AAPL>

See: Cash and Cash Equivalents and Short Term Investments

Besides cash, all debts a company has should be considered, because shareholders are last in line; debts have to be paid off first. Apple has so far managed to fund its own growth, but took on some debt to in order to pay dividends and buy back shares. Apple therefore has a long term debt balance of **\$16.962.000** on its balance sheet.

Source:

<http://finance.yahoo.com/q/bs?s=AAPL>

See: Long Term Debt

The growth rate which we apply to this free cash flow to project it ten years into the future is the same as the one we used in method 1 (see page 5). Analysts estimate that Apple will grow at 15,37% per annum for the coming five years. This yields a conservative growth rate of **11,53%** when we apply a 25% margin of safety. However, as a company grows in size it becomes more and more difficult to maintain a high growth rate. This phenomenon is called the **Law of Large Numbers**. Therefore we will let the conservative growth rate decline by **5%** each year. Just as in method 1, we will use a **10%** discount rate.

Source:

<http://finance.yahoo.com/q/ae?s=AAPL+Analyst+Estimates>

See: Next Five Years (per annum)

Ultimately, we want to know the per share intrinsic value., so we need to know the amount of shares outstanding. In the case of Apple there are **6.029.670.000** shares outstanding.

Source: <http://finance.yahoo.com/q/ks?s=AAPL+Key+Statistics>

See: *Shares Outstanding*

The math

It is time to run the numbers so we can find out what the intrinsic value estimate is for Apple.

The calculations of the DCF model look like this (all values * 1000):

Inputs	
Total cash (mil \$)	\$40.546,00
Total Debt (mil \$)	\$16.960,00
Free cash flow (mil \$)	\$46.737,00
Shares outstanding (mil)	6029,67
Expected growth rate	15,37%
Margin of Safety	25,00%
Conservative growth rate	11,53%
Growth decline rate	5,00%
Discount rate	10,00%
Valuation last FCF	12

Calculations			
	Year	FCF * Growth rate	NPV FCF
	1	\$ 52.124,61	\$ 52.124,61
	2	\$ 57.832,84	\$ 52.575,31
	3	\$ 63.849,52	\$ 52.768,20
	4	\$ 70.160,01	\$ 52.712,26
	5	\$ 76.747,49	\$ 52.419,57
	6	\$ 83.593,19	\$ 51.904,79
	7	\$ 90.676,68	\$ 51.184,62
	8	\$ 97.976,23	\$ 50.277,30
	9	\$ 105.469,04	\$ 49.202,09
	10	\$ 113.131,58	\$ 47.978,83

Total NPV FCF	\$ 513.147,57
Year 10 FCF value	\$ 575.745,98
Cash on Hand	\$ 40.546,00 +
Total Debt	\$ 16.960,00
Company value:	\$ 1.112.479,55

The **Total NPV FCF** is the sum of all the cash flows in the third column. **Year 10 FCF value** is the product of the year 10 FCF multiplier (12) and the NPV of the free cash flow in year 10 (\$47.978,83). Finally, the **Total Debt** is the amount of debt and **Cash on Hand** is the cash, cash equivalents, and short term investments on Apple's balance sheet.

According to this calculation you would need to pay a handsome **\$1.112.479.550.000** to buy Apple in its entirety. Fortunately we can buy 1/6.029.670.000th of that for around **\$185** per share. This is the intrinsic value estimate per share for Apple at the time of writing using the DCF model. The current stock price is currently *much* lower at **\$92**. This implies a potential upside of more than **100%!!** Definitely worth investigating some more, since you will not get many chances to buy a part of a great business like Apple at such an attractive discount.

Method 3: Return on Equity valuation

So far you have learned two ways to estimate the intrinsic value of a company; the *Price-Earnings multiple* and the *DCF model*. The third and final method we will explain uses one of Warren Buffett's favorite metrics of profitability: **Return on Equity (ROE)**. This ratio shows how profitable a company is able to deploy its equity. A consistently high ROE implies that the company has a durable competitive advantage, since otherwise competitors would have eaten away at their profitability over time. A ROE of 15% or higher can be seen as good. You simply divide net income with the company's shareholders' equity to arrive at the ROE figure. As an example we will use Joy Global (JOY), a producer of high-end mining equipment.

Assumptions

The ROE valuation model requires several assumptions to be made, so in this respect it does not differ from the other models. We assume that for the coming 10 years Joy Global (1) will pay out the same percentage of its profits as dividends, (2) is on average able to maintain its profitability, and (3) will pay out 100% of its net income as dividend in year 10. This final assumption is required because predicting the future ad infinitum is not really an option either.

New data inputs

Besides some inputs we already used in the previous two valuation models, like shares outstanding and a discount rate, the Return on Equity model requires some new inputs as well. And as you might have already guessed, ROE is a key data input. Since earnings can fluctuate over time, we take the average ROE of the last 5 years. This results in a solid **40.06%** for Joy Global. If there are major outliers, use the median instead. Also keep in mind that the future of a company with highly volatile earnings is much harder to predict. This in turn makes the estimated intrinsic value less reliable.

Source:

<http://financials.morningstar.com/ratios/r.html?t=JOY®ion=usa&culture=en-US>

See: Return on Equity %

The amount of shareholders' equity which Joy Global has on its balance sheet is **\$2.814.816**.

Source:

<http://finance.yahoo.com/q/bs?s=JOY>

See: Total Stockholder Equity

The final set of new inputs are related to dividends. We want to know the dividend payout ratio, which is **25.12%** for Joy Global, as well as the dividend yield, which is **1.30%**.

Source:

<http://finance.yahoo.com/q/ks?s=JOY+Key+Statistics>

See: Payout Ratio and Forward Annual Dividend Yield

We now have all the required data inputs, except for a growth rate. However, this time we will not use the expected growth rate as determined by analysts, but we will calculate the **sustainable growth rate** instead. According to *Investopedia*, the sustainable growth rate is "a measure of how much a firm can grow without borrowing more money." In such a case, a company cannot grow faster than its return on equity times the percentage of earnings it reinvests into the company, or **retained earnings**. Since a company either reinvests earnings or pays it out as dividend, we calculate this retained earnings percentage as 1 minus the dividend payout ratio. This means that the sustainable growth rate for Joy Global is $0.4006 \times (1 - 0.2512) = 30\%$. If we then apply a 25% margin of safety, the **conservative sustainable growth rate** is $0.75 \times 0.3 = 22.5\%$.

The model

Let us now calculate the intrinsic value estimate for Joy Global according to the ROE model. We take the **shareholders' equity per share** ($\$2.814.816 / 99.910 = \28.08) and let it grow at the conservative sustainable growth rate (22.5%). This gives a value of \$34.51 at the end of year 1, and a value of \$214.35 at the end of year 10. We let the **dividend** grow at the same rate, and then take the NPV of those dividends in each year by using the 10% discount rate.

Year 10 net income is the income per share which the shareholders' equity in year 10 will be able to generate ($\$214.35 \times 40.06\%$). The **required value** is the amount of shareholders' equity that would be required if the company merely earned the historical market return of 10% ($\$85.87 / 0.10$). In essence, this amount of \$858.68 is the *value* which we can assign to the profit generating income of \$85.87.

ROE valuation

\$348

Inputs	
Shareholders equity	\$2.814.816,00
Price	\$61,28
Return on Equity (avg)	40,06%
Shares outstanding	99910
Dividend Yield	1,30%
Dividend payout ratio	25,12%
Margin of Safety	25,00%
Conservative growth rate	22,50%
Discount rate	10,00%

Calculations (per share)			
Year	Shareholders equity	Dividend	NPV dividends
1	\$ 34,51	\$ 0,98	\$ 0,98
2	\$ 42,28	\$ 1,20	\$ 1,09
3	\$ 51,79	\$ 1,46	\$ 1,21
4	\$ 63,44	\$ 1,79	\$ 1,35
5	\$ 77,71	\$ 2,20	\$ 1,50
6	\$ 95,19	\$ 2,69	\$ 1,67
7	\$ 116,61	\$ 3,30	\$ 1,86
8	\$ 142,84	\$ 4,04	\$ 2,07
9	\$ 174,98	\$ 4,95	\$ 2,31
10	\$ 214,35	\$ 6,06	\$ 2,57

Year 10 net income	\$ 85,87
Required value	\$ 858,68
NPV required value	\$ 331,06
NPV dividends	\$ 16,61 +
Intrinsic value:	\$ 347,66

However, this is the value *in 10 years time*. So to calculate how much the company is worth *today*, we take the NPV of the required value ($\$858.68 / 1.10^{10}$) and add up the 10 years of discounted dividends ($\$16.61$). This gives us an intrinsic value estimate for Joy Global of **\$348**. The current share price is only \$61, which implies an upside of almost 600%!! WOW, I MUST BUY NOW!! ... hold your horses, please.

If something seems too good to be true, it probably is. Due diligence is always required, but especially when you encounter such an enormous undervaluation. For example, the P/E model assigns Joy Global an intrinsic value of \$20, while the DCF model suggests an intrinsic value of \$48. If we dive into the numbers a bit deeper, we can uncover the cause of this discrepancy. For example, we see that analysts expect the company to show negative growth rates for the coming five years, while Joy Global's return on equity and dividend payout ratio result in a 30% sustainable growth rate. That's why the ROE model shows a much higher intrinsic value estimate. The three estimates vary significantly for this particular company. This example was chosen to show you that calculating the intrinsic value of a company is not an exact science. It is impossible to say which of the three estimates, if any, is correct, or more correct than the other. Therefore it is crucial to take all three estimates into account and use your own common sense to determine that \$348 is probably not a very realistic estimate of the company's intrinsic value.

Wonderful companies

You have seen that all models make assumptions about future performance, and therefore none of them is perfect. However, despite the fact that historical performance is no guarantee for future performance, you will have a better shot at predicting the growth rate of a consistently well-performing company than that of one with highly volatile earnings. In addition, valuation is only one part of investing, the other part is thorough fundamental analysis. Therefore I will now shortly highlight some key points to consider about a company's fundamentals before you start buying its stocks, *no matter how undervalued the company is!* In the words of Warren Buffett:

"It is far better to buy a wonderful company at a fair price than a fair company at a wonderful price."

By analyzing his *Letters to Berkshire Shareholders*, we can deduce what Buffett means with a "wonderful company". The following list contains the characteristics of a solid investment in Buffett's own words:

1. Market price significantly below the estimated Intrinsic Value (Margin of Safety)

"...the key to successful investing [is] the purchase of shares in good businesses when market prices [are] at a large discount from underlying business values." Letter to Berkshire Shareholders (1985)

2. Cash generation

"Our preference would be to reach our goal by directly owning a diversified group of businesses that generate cash and consistently earn above-average returns on capital." Berkshire Hathaway Owner Manual

3. Low debt levels

"We prefer businesses earning good returns on equity while employing little or no debt." Letter to Berkshire Shareholders (1982)

4. Consistently high profitability

"We prefer demonstrated consistent earning power" Letter to Berkshire Shareholders (1982)

5. Strong and sustainable competitive advantage

"In business, I look for economic castles protected by unbreachable 'moats'." Letter to Berkshire Shareholders (1995)

6. Honest and competent management

"...we try to buy not only good businesses, but ones run by high-grade, talented and likable managers." Letter to Berkshire Shareholders (1987)

7. Within Circle of Competence

"...we just stick with what we understand." Letter to Berkshire Shareholders (1999)

Companies with the above mentioned criteria have in Buffett's opinion the highest likelihood of providing him and his shareholders with a good return on investment while simultaneously reducing downside risk. These "wonderful businesses" are the only ones he is interested in. This approach greatly reduces the spectrum of possible investments, but the ones that remain are strong performers who are likely to provide healthy cash flows in years to come.

The key takeaway here is to look for more than just an attractive valuation. Finding financially healthy companies should be the first priority in any successful investment strategy. The second step is to see whether any of these solid companies you have identified are selling for an attractive price relative to their intrinsic value. Only when both of these criteria are met should you consider investing.

Conclusion

This e-book explained three distinct methods to arrive at an intrinsic value estimate for a publicly listed company. However, all of them require several assumptions to be made about future performance, and therefore none of them is perfect. Nevertheless, the reliability of your estimate can be significantly enhanced by comparing the results of the three models and by focusing your efforts on companies with bullet proof financials which are run by competent management.

Precise numbers and elegant mathematics have the power to induce feelings of trust and confidence in their correctness. However, be wary of them and do not let them cloud your judgment and commonsense.

"...techniques shrouded in mystery clearly have value to the purveyor of investment advice. After all, what witch doctor has ever achieved fame and fortune by simply advising 'Take two aspirins'?" ~ Warren Buffett

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Click the link and **start beating the market today:**

www.valuespreadsheet.com/premium

Appendix: Formula's & definitions

Capital expenditures

A cash flow statement item which includes investments in property, plant and equipment, either for maintenance or growth purposes. Used to calculate *free cash flow* in the Discounted Cash Flow model.

Cash from operating activities

A cash flow statement item which indicates the amount of cash a company earns from its core, ongoing business activities.

Discount rate

An imaginary interest rate, most often equal to the long-term historical return of the stock market, which is used to calculate how much a dollar amount in the future is worth in today's money. This is the minimum return you would have to earn to justify stock picking over investing in an index fund.

Dividend payout ratio

The percentage of net income which is paid out to shareholders in the form of dividends, instead of being reinvested into the company.

Dividend yield

The return you earn from dividends paid out by a company. This percentage is calculated as follows:

$$\text{Dividend yield} = \text{Annual dividend per share} / \text{Current share price}$$

Earnings per share (EPS)

The amount of net income a company has earned in the last 12 months, divided by the amount of shares outstanding.

$$\text{Earnings per share} = \text{Net income} / \text{Shares outstanding}$$

Free cash flow (FCF)

The cash that can be freely taken out of the company after it has paid for maintenance of its property, plant and equipment. Many investors believe that this figure is a more reliable figure for profitability than net income, because it is less prone to tampering by management.

$$\text{Free cash flow} = \text{Cash from operating activities} - \text{Capital expenditures}$$

Intrinsic value

An estimate of the "true" value of a company, assuming that the market price does not always reflect this value correctly. This is the cornerstone of the *value investing* strategy. This book describes three methods to calculate the intrinsic value of a publicly listed company.

Law of Large Numbers

An economical law which states that growth rates will decline when companies become bigger. A high growth rate is unsustainable, simply because the company would otherwise become bigger than the entire world economy at one point. This law implies that investing in small-cap stocks offers more growth potential.

Margin of safety

A concept strongly emphasized by Benjamin Graham, which suggests to only buy a stock when the market price is significantly below the company's intrinsic value. By applying a margin of safety, you reduce the downside risk of subpar future performance, while increasing surprises on the upside when the company performs better than expected.

Net income

The amount of money a company earned after deducting all costs of doing business, often referred to as "the bottom line". Net income can be found on the income statement and is the most commonly used figure for assessing how profitable a company is. However, be wary of the fact that this figure is highly susceptible to manipulation by management.

Net present value (NPV)

The current value of an amount of money in the future, as if it existed today. A dollar today is worth more than a dollar in the future, since that dollar could be earning an interest rate when invested today. We calculate the present value of a future dollar by discounting it.

Net present value = Future value / (1 + Discount rate) ^ Number of years from today

Price-earnings ratio (P/E ratio)

A valuation metric of the company's earnings relative to its share price. A high P/E ratio means that investors are willing to pay more money per dollar of earnings. However, keep in mind that P/E ratio's differ greatly from industry to industry.

P/E ratio = Share price / Earnings per share

Retained earnings

The amount of earnings left after dividends have been paid to shareholders. This money can then be reinvested into the company.

Retained earnings = Net income - Dividends

Return on equity

The amount of net income returned as a percentage of shareholders' equity. It is a measure of how profitable a company is able to deploy its equity.

Return on equity = Net income / Shareholders' equity

Shareholders' equity

A balance sheet item which indicates the sum of the money originally invested in the firm and the retained earnings it has accumulated over time. It is equal to total assets minus total liabilities.

Sustainable growth rate

A measure of how much a firm can grow without borrowing more money.

Sustainable growth rate = Return on equity x (1 - Dividend payout ratio)

Value investing

An investment strategy aimed at buying financially healthy companies at a discount to intrinsic value.