

# HOW TO VALUE STOCKS

3 valuation models explained



Value Spreadsheet

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## FOREWORD



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

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 Apple (AAPL) to illustrate this method in practice.

### Input 1: earnings per share (ttm)

Bid	260.29 x 800	PE Ratio (TTM)	22.03
Ask	261.09 x 1100	EPS (TTM)	11.89
Day's Range	260.92 - 262.79	Earnings Date	Jan 27, 2020 - Jan 31, 2020

Let us start by finding out how much Apple 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. Apple's trailing twelve months earnings per share are **\$11.89** at the time of writing.

Source: <https://finance.yahoo.com/quote/aapl>

### Input 2: the median historical price-earnings multiple

	AAPL	Industry Avg	S&P 500	AAPL 5Y Avg*
Price/Earnings	22.0	—	20.9	15.4
Price/Book	12.9	—	3.2	5.6
Price/Sales	4.7	—	2.2	3.3

We also need to find out what a reasonable P/E ratio is for Apple. If we look at the past 5 years, we see that Apple's 5-year average historical price-earnings multiple is **15.4**, which is quite common in the technology sector, and even a bit on the low end.

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

### Input 3: expected growth rate

The final piece of the puzzle is the rate at which Apple is expected to grow its profit in the coming five years. Coming up with a realistic growth rate for a stock is tricky, so I recommend [clicking here to read my elaborate article on this topic](#).

If you don't feel like determining your own growth rate, you can also look up how analysts expect the company will perform in the near future. Analysts polled by Yahoo Finance predict that Apple will grow at a rate of **9.86%** year-over-year for the coming five years.

Growth Estimates	AAPL
Current Qtr.	7.90%
Next Qtr.	13.80%
Current Year	9.40%
Next Year	14.10%
Next 5 Years (per annum)	9.86%
Past 5 Years (per annum)	8.42%

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 of 25%. We apply this margin of safety to the 9.86% growth rate, to arrive at a conservative growth rate of  $9.86 * (1 - 0.25) = 7.395\%$

Source: <https://finance.yahoo.com/quote/AAPL/analysis?p=AAPL>

### Let's put it all together!

Now that we have all the necessary inputs, we can calculate the five year price target for Apple. The formula is:

$$EPS * avg\ historical\ P/E\ ratio * conservative\ growth\ rate^5$$

Using the data we gathered in the previous steps gives us:

$$11.89 * 15.4 * (1 + 0.07395)^5 = \mathbf{\$261.59}$$

According to our calculation, Apple is worth \$261.59 five years from now. However, what we really want to know is what Apple 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 9% 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:

$$261.59 / (1 + 0.09)^5 = \mathbf{\$170.02}$$

Awesome, we just calculated our first intrinsic value! Apple is approximately worth \$170 today according to the P/E valuation model.

Please leave out the decimals, because remember: this is only a rough estimate. Apple's stock price at the time of writing is ~ \$262, 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 15% per year? Simply discount the five year price target with 15% to calculate your maximum purchase price. In the case of Apple, this means you should not consider buying until the price drops below  $261.59 / (1 + 0.15)^5 = \mathbf{\$130}$ .

*\* 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 net present value (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 these cash flows and adds them up.

In order not to predict into infinity, we assume the company is sold after year 10, which is why the year 10 FCF is multiplied by a factor 12, simulating the multiple at which the company would be sold (this multiple is usually between 10 and 15, but is rather arbitrary, so err on the conservative side), and this value is then added to the previous calculation.

Finally, the cash and cash equivalents which the company has on its balance sheet are added and total debt is subtracted 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) once more.

## Free Cash Flow

Breakdown	TTM	9/29/2019	9/29/2018	9/29/2017	9/29/2016
∨ Free Cash Flow					
Operating Cash Flow	69,004,000	69,391,000	77,434,000	63,598,000	65,824,000
Capital Expenditure	-10,759,000	-10,495,000	-13,313,000	-12,795,000	-13,548,000
<b>Free Cash Flow</b>	<b>58,245,000</b>	58,896,000	64,121,000	50,803,000	52,276,000

Looking at Apple's cash flow statement, we find that the trailing twelve months FCF for Apple is **\$58,245,000** at the time of writing (values are in thousands).

Source: <https://finance.yahoo.com/quote/AAPL/cash-flow?p=AAPL>

## Cash & Cash Equivalents

Breakdown	9/29/2019
∨ Assets	
∨ Current Assets	
∨ Cash	
Cash And Cash Equivalents	48,844,000

While the free cash flows are important, we should also take into account any *cash and cash equivalents* which the company has on its latest quarterly balance sheet. For Apple, this entry has a very respectable value of **\$48,844,000**.

Source: <https://finance.yahoo.com/quote/AAPL/balance-sheet?p=AAPL>

## Total Liabilities

Total Liabilities	248,028,000
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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 total liabilities worth **\$248,028,000** on its balance sheet.

Source: <https://finance.yahoo.com/quote/AAPL/balance-sheet?p=AAPL>

## Growth rates

The growth rate which we apply to the free cash flow is the same as the one we used in method 1, 9.86%, or **7.395%** with the margin of safety applied.

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 **9%** discount rate.

## Shares Outstanding

### Share Statistics

Avg Vol (3 month) <sup>3</sup>	26.58M
Avg Vol (10 day) <sup>3</sup>	21.18M
Shares Outstanding <sup>5</sup>	4.52B

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 **4.52 billion** shares outstanding.

Source: <https://finance.yahoo.com/quote/AAPL/key-statistics?p=AAPL>

## 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):

## DCF valuation

**\$185**

Inputs	
Cash & Cash Equivalents	\$48,844,000
Total Liabilities	\$248,028,000
Free cash flow	\$58,245,000
Shares outstanding	4,520,000
Expected growth rate	9.86%
Margin of Safety	25.00%
Conservative growth rate	7.40%
Growth decline rate	5.00%
Discount rate	9.00%
Year 10 FCF multiplier	12

Calculations			
	Year	FCF * Growth rate	NPV FCF
	1	\$ 62,552,217.75	\$ 57,387,355.73
	2	\$ 66,946,667.43	\$ 56,347,670.59
	3	\$ 71,414,679.64	\$ 55,145,235.85
	4	\$ 75,942,576.10	\$ 53,799,635.50
	5	\$ 80,516,805.32	\$ 52,330,398.90
	6	\$ 85,124,065.52	\$ 50,756,699.00
	7	\$ 89,751,413.58	\$ 49,097,096.75
	8	\$ 94,386,359.94	\$ 47,369,331.32
	9	\$ 99,016,949.18	\$ 45,590,154.05
	10	\$ 103,631,826.57	\$ 43,775,203.48

Total NPV FCF	\$ 511,598,781.18
Year 10 FCF value	\$ 525,302,441.79
Cash & Equivalents	\$ 48,844,000.00 +
Total Liabilities	\$ 248,028,000.00
Company value:	\$ 837,717,222.96

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 (\$43,775,203.48).

According to this calculation, you would need to pay a handsome **\$837,717,222,960** to buy Apple in its entirety. Fortunately, we can buy a single share 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.

Since the current stock price is currently ~ \$262, Apple also appears to be significantly overvalued according to the DCF model. Remember that we are only interested in buying stocks whose price is significantly lower than the calculated intrinsic value.

## **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 by the company's shareholders' equity to arrive at the ROE figure. As an example we will use Apple (AAPL) again.

### **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 Apple (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 dividends 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, discount rate, and conservative growth 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.

## Return on Equity

Profitability	2010-09	2011-09	2012-09	2013-09	2014-09	2015-09	2016-09	2017-09	2018-09	2019-09	TTM
Tax Rate %	24.42	24.22	25.16	26.15	26.13	26.37	25.56	24.56	18.34	15.94	15.94
Net Margin %	21.48	23.95	26.67	21.67	21.61	22.85	21.19	21.09	22.41	21.24	21.24
Asset Turnover (Average)	1.06	1.13	1.07	0.89	0.83	0.89	0.70	0.66	0.72	0.74	0.74
Return on Assets %	22.84	27.07	28.54	19.34	18.01	20.45	14.93	13.87	16.07	15.69	15.69
Financial Leverage (Average)	1.57	1.52	1.49	1.68	2.08	2.43	2.51	2.80	3.41	3.74	3.74
Return on Equity %	35.28	41.67	42.84	30.64	33.61	46.25	36.90	36.87	49.36	55.92	55.92
Return on Invested Capital %	34.77	41.13	42.12	26.17	26.28	31.50	22.13	20.05	24.50	25.82	25.82
Interest Coverage	—	—	—	369.79	140.28	99.93	43.15	28.59	23.50	19.38	19.38

Since earnings can fluctuate over time, we take the average ROE of the last 5 years. This results in a solid **45.06%** for Apple. 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=AAPL>

## Shareholders' Equity

▼ Stockholders' Equity	
Common Stock	45,174,000
Retained Earnings	45,898,000
Accumulated other compreh...	-584,000
<b>Total stockholders' equity</b>	<b>90,488,000</b>

The amount of shareholders' equity, sometimes also referred to as stockholders' equity, Apple has on its balance sheet in its latest quarter is **\$90,488,000**.

Source: <https://finance.yahoo.com/quote/AAPL/balance-sheet?p=AAPL>

## Dividend Rate

### Dividends & Splits

Forward Annual Dividend Rate <sup>4</sup>	3.08
Forward Annual Dividend Yield <sup>4</sup>	1.18%
<b>Trailing Annual Dividend Rate <sup>3</sup></b>	<b>3.00</b>
Trailing Annual Dividend Yield <sup>3</sup>	1.15%

The final input we need is the value of dividends paid per share, called the *dividend rate*. Apple currently pays **\$3.00** in dividend per share.

Source: <https://finance.yahoo.com/quote/AAPL/key-statistics?p=AAPL>

## The model

Let us now calculate the intrinsic value estimate for Apple according to the ROE model.

# ROE valuation

**\$117**

Inputs	
Shareholders' equity	\$90,488,000
Return on Equity (5y avg)	45.06%
Shares outstanding	4,520,000
Dividend rate per share	\$3.00
Expected growth rate	9.86%
Margin of Safety	25.00%
Conservative growth rate	7.40%
Discount rate	9.00%

Calculations (per share)			
Year	Shareholders equity	Dividend	NPV dividends
1	\$ 21.50	\$ 3.22	\$ 3.22
2	\$ 23.09	\$ 3.46	\$ 3.17
3	\$ 24.80	\$ 3.72	\$ 3.13
4	\$ 26.63	\$ 3.99	\$ 3.08
5	\$ 28.60	\$ 4.29	\$ 3.04
6	\$ 30.72	\$ 4.60	\$ 2.99
7	\$ 32.99	\$ 4.94	\$ 2.95
8	\$ 35.43	\$ 5.31	\$ 2.90
9	\$ 38.05	\$ 5.70	\$ 2.86
10	\$ 40.86	\$ 6.12	\$ 2.82

Year 10 net income	\$ 18.41
Required value	\$ 204.57
NPV required value	\$ 86.41
NPV dividends	\$ 30.17 +
Intrinsic value:	\$ 116.58

We take the **shareholders' equity per share** ( $\$90,488,000 / 4,520,000 = \$20.02$ ) and let it grow at the **conservative growth rate** (7.395%). This gives a value of **\$21.50** at the end of year 1, and a value of **\$40.86** at the end of year 10.

We let the **dividends** grow at the same rate, and then take the NPV of those dividends in each year by using the 9% **discount rate**.

**Year 10 net income** is the income per share which the shareholders' equity in year 10 will be able to generate ( $\$40.86 * 45.06\% = \$18.41$ ).

The **required value** is the amount of shareholders' equity that would be required if the company merely earned the historical market return of 9% ( $\$18.41 / 0.09 = \$204.57$ ). In essence, this amount of \$204.57 is the value which we can assign to the profit generating income of \$18.41.

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 ( $\$204.57 / 1.09^{10} = \$86.41$ ) and add to it the sum of the 10 years of discounted dividends (\$30.16).

This gives us an intrinsic value estimate for Apple of ~ **\$117** ( $86.41 + 30.16$ ). Again, the current share price at the time of writing is \$262, which again tells us that Apple is currently significantly overvalued.

This does not mean that Apple's stock price can't go any higher from here, because in the end it is impossible to predict what a fool will give for it, it just means that it would be *irrational* to purchase Apple stock today at this seemingly inflated price.

## 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 briefly 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: **look for more than 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 bulletproof financials which are run by competent management.

The three estimates vary for Apple, and this example was chosen on purpose 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 a reasonable ballpark figure.

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 judgement and common sense.

*"...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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To make life easier for you as an investor, I developed the **Premium Value Spreadsheet**; a tool which allows you to analyze US listed stocks in **one click**.



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The spreadsheet *automatically* retrieves historical financial data about the stock, performs all of the **intrinsic value calculations** explained in this e-book, and even analyzes the **fundamentals** of the company for you.

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## **APPENDIX: FORMULAS & 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.

*Earnings per share = Net income / 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.

*Free cash flow = Cash from operating activities - 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.

$$\text{Net present value} = \text{Future value} / (1 + \text{Discount rate})^{\text{Number of years from today}}$$

## **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 ratios differ greatly from industry to industry.

$$\text{P/E ratio} = \text{Share price} / \text{Earnings per share}$$

## **Retained earnings**

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

$$\text{Retained earnings} = \text{Net income} - \text{Dividends}$$

## **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.

$$\text{Return on equity} = \text{Net income} / \text{Shareholders' equity}$$

## **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.

$$\text{Sustainable growth rate} = \text{Return on equity} \times (1 - \text{Dividend payout ratio})$$

## **Value investing**

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