Valuation Primer

A Basic Framework for Understanding Intrinsic Value

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Intrinsic Value Is Different Than Market Price

Intrinsic value is an important but somewhat difficult concept to understand. One of the central things to understand is that when we are talking about intrinsic value, we are talking about something distinct and independent from the price in the market. In this paper we will be using terms like intrinsic value, business value, and business worth interchangeably. What these terms have in common is that they refer to something inherent to the underlying investment rather than the fluctuating prices that result from market dynamics.

Market prices are supposed to reflect the intrinsic value of an investment, but due to a variety of factors market prices tend to take on a life of their own. In order to properly ground our decision making in economic reality, we must understand intrinsic value. As we will discuss throughout this paper, intrinsic value can generally be described as follows:

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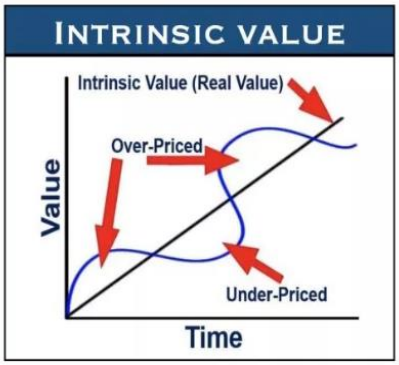
*The intrinsic worth of an investment is **the present value of its future cash flows**. In other words, a business has value as the result of how much cash it will earn for its owners over time. Therefore, when we are talking about intrinsic value, we are looking to the underlying business as the source of our returns, not prospective price changes in the stock.*

The trouble with intrinsic value is that, unlike market prices, we cannot simply type in a ticker symbol and receive the answer. In this paper we will try to establish a general framework, as well as a few specific calculations, to help determine the intrinsic value of a company. But it is important to always remember that underlying business value is not a precisely knowable figure, and we cannot observe intrinsic value directly. So although intrinsic value is a real thing, perhaps the most important thing in investing, it is always an approximation and is better thought of a probabilistic range rather than an exact figure. If nothing more, the attempt to understand the ideas and calculate a publicly traded company's intrinsic value, even if done imperfectly, will help an investor avoid the big market blunders.

	How You Make Money	How is it Determined?	What Causes It?	Focus of Attention
Market Price	Correctly Predicting Stock Price Moves	Supply and Demand For Shares in Market	Investor Behavior	External - Whats Happening in the World
Intrinsic Value	Buying Things For Less Than Intrinsic Value	Cash Earnings of the Business	Competitive Position of Business	Internal - The Business Itself

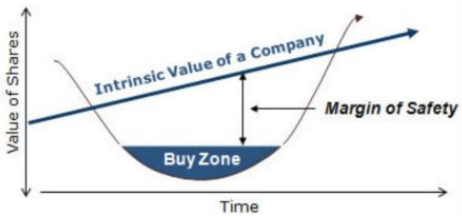
The Reasons for Establishing Intrinsic Value

By investing based on intrinsic value we are grounding our decision making in the economic fundamentals of that particular investment. One of the biggest mistakes investors make is being unduly influenced by oscillating stock prices caused by other investors reacting to the current headlines. This leads most investors to make their decisions based on how they think future market prices will act in relation to current market prices (whether the stock will go up or down) rather than what they should be doing which is analyzing how the *market price relates to the underlying worth* of the investment. Is the stock overvalued, fairly-valued, or undervalued based on the cash the underlying investment will generate going forward? Intrinsic value keeps us rational by tying our decisions to economic reality instead of price fluctuations, popular opinion, or our own subjective preferences and errors.



For the most part, markets are efficient in that most things, most of the time, trade at a price that we might call in a "zone of reasonableness." That is, in a properly functioning market most investments sell for something approximating fair value. But markets are far from perfect. Market prices can be driven by emotion, speculation, geopolitics, current headlines and other factors aside from the underlying cash earnings of the investment. In any given year, the intrinsic value of a business is likely to remain relatively stable (absent major changes to the business), but because stock prices can be driven by factors beyond fundamentals, the price in the market of any given business can fluctuate substantially. This can create a situation where a gap is created between market price and underlying value.

Opportunity lies where there is a major dislocation between the market price and the underlying value of the business. By doing our own independent valuations of businesses we can uncover these mis-pricings. We want to purchase an investment when it is undervalued (when the market price is below intrinsic value), and we want to avoid or sell an investment when it is overvalued (when the market price exceeds intrinsic value). In other words, when making purchasing decisions we are trying to buy businesses for less than they are worth. We call the difference between the intrinsic value and the market price "the margin of safety." The more undervalued an investment the greater the margin of safety.



By investing based on intrinsic value we place a check on the market. Value investors always approach the market with healthy degree of skepticism. Although we know that the market is in most cases correct, we do not blindly accept its conclusions. Instead we compare the market price to our assessment of intrinsic value to determine if an investment is over or under valued. At times, these dislocations allow us to purchase investments for far less than they are worth. In other situations, it protects us from investing in overvalued stocks whose price has been bid up far beyond intrinsic value by popular enthusiasm.

By understanding intrinsic value, we are also able to develop a more patient and long-term view of investing in holding our investments. By having a firm grasp of what we think an investment is actually worth, it gives us the strength to withstand the sometimes challenging emotional effects of market volatility. Rather than allowing market turmoil to fill us with doubt and fear, intrinsic value allows us something concrete to fall back on in order to stay the course.

Investing is an Exchange

From the previous section we know intrinsic value is important because it grounds our decision making by forcing us to think in terms of what an investment is *actually worth* rather than simply relying on its market price. Before turning to a few calculations later in the paper, it is helpful to conceptually understand where this intrinsic value that we have been talking actually comes from. In short, the intrinsic value of an investment is determined by the amount of cash the underlying business will earn in future years.

Investing is an exchange in which you give up a lump sum today and what you get in return is a set of future cash payments over the life of the asset. The public markets drastically obscure this fact, but what you are buying when you make an investment is the right to receive a series of future cash payments. Think of a business as the conduit through which you gain access to a stream of cash earnings produced by the company. The major questions then become: 1) what will these future cash payments be? 2) How much should I pay to receive these cash payments?

Investing Is an Exchange

What We Are Buying When We Purchase an Investment Is an Incoming Stream of Future Cash

The Cash Outflow Today Must Be Justified by Future Cash Earnings

Cash Out Flow Today Cash Inflows in the Future

Example: **Facebook (FB)** as of December 2018

In exchange for this payment today we have purchased the stream of free cash flow generated by Facebook each year in the future

Cash Outflow of $140 per share $400B for Entire Company

Every Year Facebook Will Generate Some Level of Free Cash Flow That We Hope Will Justify Our Purchase Price Over Time

As time passes, we will find out whether the $140 per share purchase price was too high or too low based on how much cash the company earns for us on a per share basis.

Successful investing requires determining whether at $140, Facebook is over or under valued on the basis of a reasonable estimation of how much cash the company will produce for us starting today and lasting until the time the business closes its doors.

As this illustrates, when you buy a stock you are paying today for all of the future cash earnings of the company. It is the amount of cash produced by the underlying business over time that gives a stock its value. But rather than focus on the underlying earnings power of the business, the public markets provide an easy distraction for investors. Investors get sidetracked by the ups and downs of the stock price rather than focusing on how much cash the business will generate in the future.

For this reason, in calculating the intrinsic value of a public company, it is often useful to forget about the fact that its shares trade on a public market and instead imagine you are dealing with a private company in which the success or failure of the investment will come exclusively from the cash generated by the business. Imagine you didn't have the benefit of daily price quotes,

and instead focus on how much you should be willing to give up today in exchange for all of the future cash earnings of the business. The answer lies in the intrinsic value of an investment which is the amount that the investment would be worth today if you held the investment forever and received your return from the cash generated each year by the business.

Therefore, the practical point of valuation is about figuring out how much we should be willing to pay upfront given our expectations for future cash flows. As discussed, this present worth of an investment comes not from how much you like that investment, popular opinion, or stock price movements, but rather the value of an investment is determined from the amount of cash it will produce for its owners in each of the subsequent years in the future.

The Time Value of Money and Discounting

To work through a calculation of the intrinsic value of an investment, an investor must understand the concept of the time value of money and the practice of discounting future cash flows. The time value of money is the concept that money available at the present time is worth more than the identical sum in the future because present dollars can be reinvested to grow in the interim.

If I offered you $100 today or that same $100 a year from now, you should take the $100 today and invest it over the interim year so you end up with more than $100 a year from now. If we are going to wait for cash flows to occur in the future, we must be compensated for our time. Perhaps something like $100 today or $110 a year from now would make for a fairer deal. In any event, the point of the concept of the time value of money is that cash payments that occur in the future are worth less to us now, and that we must be compensated with greater future cash sums if we are to wait for payments to occur.

We use the concept of the time value of money and the practice of discounting to put the future cash payments we expect our investment to generate into what they are worth to us today in present dollars.

Remember that, simply put**, the intrinsic worth of a business is the present value of its future cash flows.** Notice that even though what gives a business its value is its *future* cash flow, we want to know how much those future cash flows make the business worth *today.* This means we must adjust the cash we expect to receive in distant years to put it in terms of today's worth. We call the process of putting future cash payments in terms of today's dollars, discounting future cash flows.

We discount future cash flows by applying a *discount rate*, sometimes also called *the required rate of return* and also the *cost of capital,* to each of the future cash flows we expect our investment to generate. While there is a large academic discussion around exactly what investors should use as their discount rate, for mid to large size publicly traded companies it is safe to

assume that the range of 8%-10% is appropriate. The historical data tends to validate that this is the approximate return investors require from their publicly traded equities.

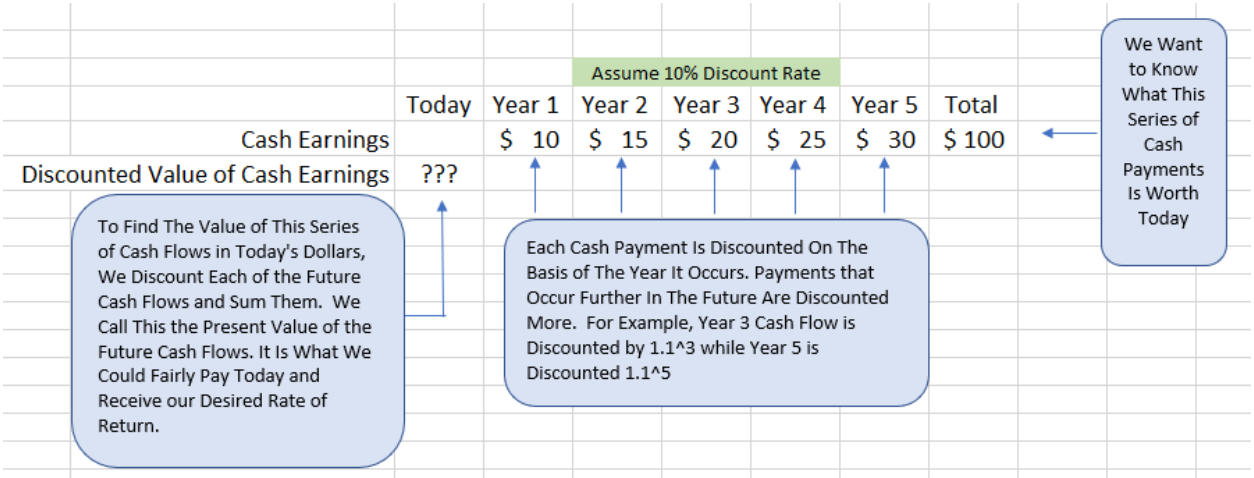
We use our required rate of return of approximately 8%-10% to discount each of the cash flows in future years. We raise our discount rate/required rate of return to the exponent corresponding to how many years in the future we are going to have to wait for that cash flow to occur. We do this with each of the cash flows we expect to receive in the future. We then sum all of the years of discounted cash together to determine the total present value of the future cash.

$$PV = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} \cdots \frac{CF_n}{(1+r)^n}$$

Valuing a Business - The Present Value of Future Cash Flows

Let's work through a simplified example to show how we would calculate the intrinsic value of a business by calculating the present value of its future cash flows. In this example, for simplicity, let's say the business opportunity we are going to invest in is going to only last 5 years. Each year the business is expected to earn a certain amount of money. Let's say in the first year the company will produce $10 million of free cash, in the second year $15 million, in the third year $20 million, and then $25 million, and finally $30 million in the last year.

We want to know what this business is worth today. We figure out the intrinsic worth of this investment by finding the present value of its expected future cash flows. This figure we would call the intrinsic value of the business. We would then use this estimation of intrinsic value to decide whether to invest in the business. If we could purchase the business for our estimation, or ideally substantially less than our estimation of intrinsic value, we would make the investment. If the asking price was higher than our estimation of intrinsic value, we would choose to pass on the investment. Our goal should be to buy business cash flows for less than they are actually worth and forego investment opportunities where we are overpaying for the future cash earnings of the investment. Here is our investment opportunity laid out. The expected business cash flows are as follows:



To find the intrinsic value of this business, we discount each year of future cash flow by our required rate of return (here 10%). For example, for the first year's cash of $10 million, to find the discounted value of this $10 million we divide it by 1.1 (1 + discount rate) which is $9.09 million. The second year we would follow the same process except we would raise the denominator to the 2nd power because the cash flow is occurring in the second year. So the cash flow of $15 million in the second year would be divided by 1.1 ^ 2. The resulting discounted value is $12.4 million. So even though we expect to receive $15 million in the second year, the discounted value is less (only 12.4) because of the time value of money.

We continue this process for each year. In this case our business is only lasting for 5 years. We would then sum all of our discounted future cash flow amounts together to arrive at what the present value of those cash flows are worth today.

Present Value of Discounted Cash Flows

$$PV = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} \cdots \frac{CF_n}{(1+r)^n}$$

CF equals cash flow for a period,

r equals the discount rate, and

n equals the number of periods.

Here are the cash earnings each year as well as the corresponding discounted values:

			Assume 10% Discount Rate				
	Today	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Cash Earnings		$ 10	$ 15	$ 20	$ 25	$ 30	$ 100
Discounted Value of Cash Earnings	???	$9.09	$12.40	$15.03	$17.08	18.63	$72.22

The Present Value Of These Cash Flows is $72.22

Although The Nominal Sum of These Cash Flows is $100, There Value Today is Less Because We Must Be Compensated For Waiting For Future Cash Payments

If You Paid $72.22 Today and Received These Cash Payments Your Rate of Return Would be 10%

When we discount each of the future cash flows of this business and then add them together, we get a present value of $72.22 million. This $72.22 million is what we would call our estimation of the intrinsic value of the business. Notice that although the nominal value of the cash flows produced by the business over the 5 years is $100 million, the present value of these cash flows is less because of the time value of money. Our discount rate of 10% reflects the fact we must receive a rate of return to wait for future cash. One interesting thing to note is that the effects of discounting become more severe the farther we get in the future. For example, the $30 million the business will produce in 5 years is only worth $18 million of value today.

Now that we have an estimation of intrinsic value it would be time to make an investment decision. For the sake of this example let's presume this business was trading in the public market. Let's say that when we go and look up the ticker symbol, we find that at current quoted prices the entire market cap of the company is trading for $40 million. Through our discounted cash flow analysis, we just estimated that the business was worth $72.22 million. We would say that there is a large dislocation in the market and that the business in the market is undervalued in comparison to what we believe the business is worth. In this instance, since the market price is far below the intrinsic worth of the business, we would purchase the investment.

Recall that investing is really an exchange in which the investor gives up a lump sum today and receives a series of future cash earnings in return. In this scenario, what we would be giving up is the $40 million purchase price for the business and what would we be getting in exchange? In return we would be receiving the 5 years of future cash earnings of the business that we stated had a present value of over $70 million. In other words, we would be buying $70 million of value for only $40 million. Our goal in investing is to find situations like this where we can buy a business for far less than it is worth.

Alternatively, let's say that when we looked up the ticker symbol in the market the find that at the current quoted prices the entire market cap of the company is $125 million. Since the price in the market far exceeds our estimation of the intrinsic value of the company of 72.22 million, we would forego this investment. No matter the amount of popular enthusiasm for an investment, it is only worth the present value of its future cash flows. Investor behavior can sometimes drive market prices irrationally above intrinsic value because investors get caught up in current market momentum rather than intrinsic value.

Notice that in both cases our investment decision was not dictated by stock price fluctuations, financial headlines, current market sentiment, or our own subjective emotions. Nor did we base our investment decision on our belief as to whether the stock price in the market would go up or down. We merely use the market price to compare the market's implied valuation to our own estimation of intrinsic value. If an investment is undervalued, providing a large margin of safety between the market price and our determination of intrinsic value, we purchase the investment. When the price in the market overvalues the business, or when the market price is too close to our appraisal of intrinsic value to provide an adequate margin of safety, we simply decline the investment and look elsewhere.

This is how we should approach the public markets. As of December 2018, the market cap of Procter and Gamble (PG) is approximately $225B, IBM is $100B, and General Mills is $23B. Each year these companies will generate some level of cash earnings. What the market is saying is that if you bought one of those companies today and held it forever, the discounted value of all of the future earnings of the company is equal to those above market caps. The market's assessment may or may not be correct. It is our job to do our own valuation to determine if the market is properly valuing the business. Is all of the future cash earnings of IBM in today's dollars greater, equal to, or less than $100B? If we believe the present value of all of the future cash earnings is actually far more than the market price, we should buy. If the opposite is true, we would decline.

Quick Review: What We Need to Know About Valuing a Business

The Intrinsic Worth of a Business is the Present Value of Its Future Cash Flows

1) What we are buying when we purchase a share of a company is the stream of future cash earnings generated by the business

2) It is the amount and timing of these cash earnings from the business that determine its intrinsic worth

3) We discount the expected future cash earnings of a business to figure out what those future earnings are worth in today's dollars

4) Our investment decision consists of comparing our appraisal of the intrinsic value of the business to the market price to determine if the market is overvaluing, fairly valuing, or undervaluing the investment

Valuation Models to Calculate Present Value of Future Cash Flows

In the simplified example above, we assumed the business was only going to last 5 years. In reality, the businesses we must value will likely have cash flows far into the future and, in most cases, we assume the business will last in perpetuity. This can make discounting each year's individual cash flow, like we did above, quite a lot of work. Luckily there are valuation models that allow us to avoid discounting in this long-handed form. Two of these basic models will be presented first. After that, a third model will be presented that incorporates several more inputs that results in a more robust real-world valuation, but it is also more complicated.

Before looking at these models we should remind ourselves that what we are trying to calculate when using them to value a business has not changed: we are still attempting to calculate the present value of the business's future cash flows. Nothing has changed there. These are merely useful shortcuts that allow us to avoid the laborious task of discounting individual cash flows far in the future by hand. As a result, these models will provide an equivalent answer as if you did the long-form calculations.

The first two models presented work under fairly simplistic and mostly unrealistic assumptions. However, these foundational models are still incredibly useful to understand. They set some basic parameters for the valuing of future cash flows that we can build on as we develop a working comfortability with valuing a business. The first simplified model values a business under the assumption it will earn the same amount of money each year going forward. The second model allows us to add growth into the equation.

Basic Scenario 1: The Business Produces the Same Level of Cash Flow Every Year

The first basic valuation scenario to learn is how to figure out how much a business is worth if it were to earn the same amount of money every year in the future. Although somewhat unrealistic, this valuation method can provide a helpful baseline to figuring out what a business might be worth. Since we are assuming the cash flow will continue each year forever, we call this calculating the value of a perpetuity. The value of a business, if it were to earn the same amount of money each year is easy to calculate:

$$\text{Value of a Steady Cash Flow (Perpetuity)} = \frac{\text{Cash Flow}}{\text{Cost of Capital}}$$

As an example, lets take a look at the software company Oracle (ORCL). In the last year Oracle produced around $11B of free cash flow. The valuation formula allows us to figure out what the intrinsic value of the company is if Oracle continued to earn $11B each year, forever.

Company	Annual Free Cash Flow
Oracle Corp.	11B

How much is Oracle worth if we assumed the company continued to earn $11B each year going forward, and we assumed equity investors required a 9% rate of return? Using the above equation, we would divide the annual cash flow by the cost of capital to get the value of this perpetuity. Value of Oracle Assuming Steady Earnings = 11B ÷ .09 = 122.22B.

Company	Annual Free Cash Flow	÷	Valuation
Oracle Corp.	11B	0.09	122.22B

Let's do the same thing for Apple Inc (AAPl). In the last year Apple has produced around 48B of free cash for its investors.

Company	Annual Free Cash Flow
Apple Inc.	48B

How much is Apple worth if we assumed Apple continued its current performance forever?
Value of Apple Assuming Steady Earnings = 48B ÷ .09 = 533.33B

Company	Annual Free Cash Flow	÷	Valuation
Apple Inc.	48B	0.09	533.33B

If Apple were to produce $48B each year going forward, the intrinsic worth of the business in today's dollars would be $533.33B. Notice that we could have performed this same calculation long hand, discounting each year's cash flow individually forever, but using the perpetuity equation is so much easier. In either event, what we are doing is calculating the present value of the company's future cash flow to determine its intrinsic value.

We could compare our estimate of intrinsic value to the market price to determine if the market is overvaluing, fairly valuing or undervaluing the business. Let's assume that we truly believed that Oracle would earn $11B annually for its investors on a run rate basis. If that were the case, the business would be worth $122B. If we went to the market and Oracle was currently selling for only $75B, this would be an attractive buying opportunity. On the other hand, if we went to the market and it was selling for $250B, we would want to pass on the investment because a business that produces $11B annually of cash flow simply isn't worth $250B.

Using the perpetuity model is a good first step to getting your head around what a business might be worth. But many businesses won't be expected to earn the exact same amount of free cash every year going forward. If you want to adjust your valuation to include a particular growth rate, we use the next valuation model.

Basic Scenario 2: The Business Grows its Cash Flow at a Constant Rate Every Year

Another basic valuation scenario to know is one in which your business grows at some rate each year. Finding the present value of the future cash flows in this case involves making only one minor change to the valuation formula we were using above. We account for the growth rate in the denominator.

$$\text{Value of a Constantly Growing Cash Flow} = \frac{\text{Cash Flow}}{\text{Cost of Capital} - \text{Growth Rate}}$$

What would Oracle be worth if we assumed that we started with the base cash flow of 11B, but instead of it always earning $11B, the company was able to grow its free cash flow by 2% every year. Let's assume, like above, that investors require a 9% rate of return.
Value of Oracle = 11B ÷ (.09-.02) = $157.14B.

Company	Annual Free Cash Flow	÷	Valuation
Oracle Corp.	11B	0.07	157.14B

Same thing would apple to Apple. We would find the present value of a 48B free cash flow growing at 2% annually by taking 48B ÷ (.09-.02) = **$**685.71B.

Company	Annual Free Cash Flow	÷	Valuation
Apple Inc.	48B	0.07	685.71B

We can see in the case of Apple that a $48B free cash flow growing at 2% is worth $685.71B in today's dollars. This compares to a valuation of $533B in the no growth case above. We can see that increasing the amount of money the company will earn in the future, increases the intrinsic worth of the company. This obviously follows from the fact that what we are calculating is the present value of a stream of cash earnings over time. The greater the cash earnings over time, the greater the intrinsic value.

Compare the valuations of Oracle and Apple under various growth scenarios:

	* Assumes 9% Required Return				
		Growth Rate			
Company	Annual Free Cash Flow	0%	2%	5%	7%
Apple Inc.	48B	$533.33B	$685.71B	$1.2T	$2.4T
Oracle Corp.	11B	$122.22B	$157.14B	$275B	$550B

Notice how increasing the growth rate dramatically raises the intrinsic value. For example, if Apple were able to grow at 7% forever it would be worth an astounding $2.4 trillion today. Some businesses including Apple can grow at 7% or greater for a short duration of time, but there is no business that can grow at 7% *forever*. Using a high growth rate in perpetuity is not realistic, but it helps bring home the important concept that increasing the future cash flows of the company increases its intrinsic value in the present.

These are two basic valuation models. They rely on simplifying assumptions such as constant cash earnings over time or a constant growth rate over time. But grasping the basic concepts and mechanisms for calculating the intrinsic value of a business can still help us evaluate whether the price in the stock market is a reasonable estimation of the business's intrinsic value.

Even when using simple valuation tools, we are much less likely to get caught up in the frenzy of the crowd because we will be focusing on how much we think the business is actually worth, not what other investors are buying and selling their shares for. Market prices will vary substantially over time and having at least a basic grasp of what you think a business might be worth can help you keep a level head in the face of this market noise.

We should make our investment decisions by comparing our estimation of intrinsic value to the market price to determine if the market's assessment of the business is reasonable. Below are 5 businesses with an estimate of intrinsic value given simplistic assumptions for constant growth rates. The right column is the market capitalization based on the share price in the market in Q4

of 2018. The point of this exercise is not to draw any conclusions concerning any specific company but to reinforce two major points: 1) intrinsic value is distinct from market price and is determined by the present value of our estimates for future cash flows 2) The price in the market can over value, fairly value, or undervalue an investment given our assumptions for the future cash earnings of the business.

	* Assumes 9% Required Return				
		Growth Rate			
Company	Annual Free Cash Flow	0%	2%	5%	Q4 2018 Market Cap
Apple Inc.	48B	$533.33B	$685.71B	$1.2T	$725B
Oracle Corp.	11B	$122.22B	$157.14B	$275B	$165B
Clorox	.6B	$6.66B	$8.57B	15B	$19.5B
CBS Corp	1.2B	$13.33B	$17.14B	$30B	$17B
Honeywell	5.5B	$61.11B	$78.57B	$137.5B	$100B

For example, if we assumed that Oracle would continue to earn $11B of free cash every year with 0% growth, the company would currently be overvalued in the market. On the other hand, if we thought future cash flows would continue to grow from the current $11B, say at 5% a year, the company would be undervalued in the market. We want to use the process of valuation to find those rare instances where the market is undervaluing a business given our conservative estimates for the future cash earnings of the business. In many instances the market price will be in a zone of reasonableness around the fair value of the company, in which case we might simply want to look elsewhere for companies with a greater dislocation between market price and intrinsic value.

You can also use your understanding of valuation to reverse engineer market prices to see what implied assumptions are embedded in those prices. Take Honeywell as an example. The current Market Cap is $100B. You can see that this $100B market valuations implies that market participants are assuming the company will grow somewhere will grow its free cash flow between 2%-5% in the future. This might seem reasonable in this instance. Suppose though that due to some market shock Honeywell's market cap fell substantially to $50B. In that circumstance, we might conclude that the implicit assumptions in the market price are far too low. If Honeywell company could at least sustain its current earnings power, we would conclude that at a $50B valuation the embedded assumptions are simply far too low compared to the likely cash earnings generated over time.

As stated before, these two valuation models are quite basic but they will help investors start to get a grasp of what a business might be worth given certain assumptions about the future cash earnings of the business. The point of all these models is not exact precision, but rather to get investors to start to think about intrinsic value rather than blindly following the ups and downs of the market. Hopefully these give investors some indication of intrinsic value to check the market against.

Business Valuation Scenario 3: Combining a Steady State Value with Future Value from Reinvestment

The final introductory valuation model presented in this paper incorporates several more inputs than the previous two models. The basic framework for this model begins by breaking the intrinsic value of a company into two distinct parts: 1) A steady state value based on some level of base earnings of the company and 2) the amount of future value the company can create by making accretive investments.

$$\text{Value of the firm} = \text{steady-state value} + \text{future value creation}$$

One difference to note from the outset with this model is that here we are calculating the entire value of the firm, sometimes called enterprise value, whereas in the first two models we were focused exclusively on equity value. Recall that in the first two models we compared our estimate of intrinsic value to the market capitalization implied by the share price, here we will compare our estimate of intrinsic value to the enterprise value in the market. The main difference is that enterprise value includes the net debt of the company. Two of the main changes this causes is that we will use Net Operating Profit after Tax (NOPAT) rather than free cash flow to equity, and we will also be discounting using a cost of capital that reflects the lower cost of debt rather than just the required return to equity holders.

As noted above, the Intrinsic Value of the firm = Steady State Value + Future Value Creation. We will take a look at the steady state value first.

$$\text{Steady-state value} = \frac{\text{Net operating profit after tax (normalized)}}{\text{Cost of capital}} + \text{excess cash}$$

NOPAT: The basic structure of calculating the steady state value should look familiar because the first term is analogous to the calculation of a perpetuity that we saw in the first model we looked at. The main difference here is that we are using NOPAT rather than Free Cash Flow. But in both models, we are assuming that the business will produce some level of earnings that will be constant every year in the future. As we discovered earlier, to calculate the value of a perpetuity we divide the earnings by the cost of capital. What we are calculating is how much the company would be worth under a no growth scenario, therefore we call it the steady state value.

Excess Cash: In this valuation model we add the value of any excess cash on the balance sheet to the value of the perpetuity to get our entire steady state value. In many instances the amount of excess cash a company has won't make a large difference to the valuation. However, in some instances a company may have a large amount of cash and our valuation would undervalue the business if we did not take it into account. For example, in 2018 Apple (AAPL) had over $200B of available cash and Google (GOOG) and Microsoft (MSFT) had over $100B on the balance sheet. With such large sums we need to take this into account to get an accurate valuation.

Now we will look at the second part of this valuation model which is the portion of intrinsic value that comes from future value creation above that of the steady state.

$$\text{Future value creation} = \frac{\text{Investment} * (\text{return on capital} - \text{cost of capital}) * \text{competitive advantage period}}{\text{Cost of capital} * (1 + \text{cost of capital})}$$

To calculate the portion of intrinsic value from future value creation we will need the cost of capital like other models, but we will also need 3 new inputs that we have not seen before.

Investment: In order to figure out how much intrinsic value will be created in the future, we need to know how much capital the company will be able to put to work in coming years. A good way to ground this investment figure is to consider what percentage of NOPAT the company can realistically reinvest back into the company. Shortly we will discuss that the relevant time frame to think about reinvestment is over the competitive advantage period (CAP). In other words, our CAP sets our relevant investment horizon. For example, let's say our CAP is 10 years, what percentage of NOPAT can the company you are looking at reinvest over the next ten years? Is it 10%, 25%, 40%, 70%? Some businesses are more mature and stable and won't have very many reinvestment opportunities. Other businesses have larger runways for growth. Looking at the history of the company as well as the industry in which it operates will help provide some context.

Return on Capital: We must also determine what return the business is able to generate on the capital that it is going to invest. Different businesses will be able to earn varying returns given the competitive position of the business as well as the attractiveness its industry. One thing to note is that the average US company has returned its cost of capital over time. From 1963 to 2004, the US market's median ROC, excluding goodwill, averaged nearly 10 percent. Businesses that have barriers to entry also called "economic moats" such as patents, strong brands, economies of scale, customer switching costs, network effects, etc. can earn greater than 10% return on capital. More commodity type businesses such as those with low barriers to entry, undifferentiated products, low margin structures, and capital-intensive operating models are likely to just earn 10% and many will earn less.

Competitive Advantage Period: This is the length of time we feel comfortable forecasting that the company will be able to sustain its reinvestment and the return on capital we have projected. The CAP is the length of time you believe the company will maintain its competitive position and make value accretive investments. It all comes down to how strong you think the company's moat is. The average business does not have a moat. It must compete on price and any excess returns in the industry will be competed away by new entrants. However, a small select number of businesses have an economic moat that we can feel confident assigning a competitive advantage period to. For very strong businesses, with deep competitive positions and high barriers to entry, we may forecast a CAP of 10-15 years. For above average businesses, with good but not impenetrable economic moats, we may assign a CAP of 5-10 years. All other businesses will not have a CAP because we will not be confident that their ROC will be above the cost of capital for any sustainable period of time.

Bringing it all together, we can see that this valuation model requires the following inputs:

NOPAT	Excess Cash	Reinvestment	Return on Capital	Cost of Capital	CAP
??	??	??	??	??	??

Here are the formulas again that we will be applying our inputs to in order to determine the intrinsic value of a business:

$$\text{Value of the firm} = \text{steady-state value} + \text{future value creation}$$

$$\text{Steady-state value} = \frac{\text{Net operating profit after tax (normalized)}}{\text{Cost of capital}} + \text{excess cash}$$

$$\text{Future value creation} = \frac{\text{Investment} * (\text{return on capital} - \text{cost of capital}) * \text{competitive advantage period}}{\text{Cost of capital} * (1 + \text{cost of capital})}$$

Now that we are familiar with the terms, we should analyze this valuation model and note a few important observations:

- The steady-state value of the firm, calculated using the perpetuity method, assumes that current net operating profit after tax (NOPAT) is sustainable indefinitely. It is the value of the firm assuming that incremental investments will neither add nor subtract value.

- Future value creation comes down to how much money a company invests, what spread that investment earns relative to the cost of capital, and for how long a company can find value-creating opportunities. Intrinsic Value is increased the higher the investment, the bigger the spread between returns and cost, and the longer the CAP is.

- The central importance of return on incremental invested capital is vital. If that return is equal to the cost of capital, the value of the equation's second term collapses to zero.

- Therefore if a company's return on capital is equal to its cost of capital, the whole "future value creation" portion of the model becomes irrelevant. It drops away and the value of the firm is simply its steady state value because if return on investment is not above the cost of capital, the firm is not creating any value in its future investments.

- Another way to look at it is that the formula shows the impact of growth. For companies that have a large spread between the return on invested capital and cost of capital, rapid growth adds a lot of value. But as just discussed, whether growth is good or bad is

contingent on the incremental return. Only investment above the cost of capital creates value.

- The entire formula really consits of two parts: a commodity component represented by the steady state value and a future growth component reserved for only those companies that have an economic moat that allows them to earn above the cost of capital.

- This valuation model allows us to dissagragate a valutaion and see how much we are paying for current earnings and how much of a valuation is dependent on future value creation.

Let's do a few sample valuations to see how changing a few of the variables affect the intrinsic value.

1. How much is a company worth that earns a 100m of NOPAT indefinately, has no excess cash, is able to reinvest 40% of NOPAT, earns 15% return on capital, has a cost of capital of 8%, and has a CAP of 10 years?

NOPAT	Excess Cash	Reinvestment	Return on Capital	Cost of Capital	CAP
$100 Mil.	0	40% of NOPAT	.15 (15%)	0.08 (8%)	10 Years

Notice first that we are dealing with an above average business. It has returns on capital above the cost of capital and we are willing to assume that this strong competive position is going to last for 10 years.

When we plug these assumptions into the model we get an intrinsic value of:

Intrinsic Value	**$1.574B**

2. How about that same company except now it is only able to reinvest 25% of NOPAT at only 12% for 5 years? How much is the intrinsic value effected by moving the variables down a bit?

NOPAT	Excess Cash	Reinvestment	Return on Capital	Cost of Capital	CAP
$100 Mil.	0	25% of NOPAT	.12 (12%)	0.08 (8%)	5 Years

Here we get an intrinsic value of:

Intrinsic Value	**$1.307B**

3. What about a situation in which this business only earns 8% return on capital? Notice here that what we are really asking is about is the steady state value of the firm. With return on capital equal to the cost of capital, the future value portion becomes irrelevant.

NOPAT	Excess Cash	Reinvestment	Return on Capital	Cost of Capital	CAP
$100 Mil.	0	N/A	.08 (8%)	0.08 (8%)	N/A

The steady state value of this company is:

Intrinsic Value	**$1.25B**

4. Finally how about the ideal scenario where we have a fabulous business with deep competive advantages that allows it to earn high returns of capital of 30%, that can reinvest 70% of its earnings, and has a long runway that it allows it to do so for 20 years.

NOPAT	Excess Cash	Reinvestment	Return on Capital	Cost of Capital	CAP
$100 Mil.	0	70% of NOPAT	.3 (30%)	0.08 (8%)	20 Years

Notice the huge increase in intrinsic value compared to the steady state:

Intrinsic Value	**$4.814B**

Increasing the amount of investment, the return on capital and the CAP can have drastic effects on the intrinsic value of a business. A note of caution, however. Very few businesses can reinvest large sums of money at huge returns for long periods of time. More moderate assumptions are warranted for almost all businesses.

5. As one final use of this valuation model lets try it out on a real-world scenario. We have used Oracle (ORCL) several times throughout this paper. As of Q4 2018 Oracle has an enterprise value of 165B. Let's see given some basic assumptions whether we think Oracle is over-valued, fairly valued or undervalued by the market.

   Oracle had NOPAT of 11B in the past year. For simplicity lets use this figure for calculating the steady state. Oracle has a large amount of excess cash, approximately 50B, that we must consider. Oracle also seems to have a decent economic moat, with customer switching costs arising from customers having Oracle software embedded in their businesses. Customers don't like switching products because of the disruption it would cause. This allows Oracle to earn returns above its cost of capital. This also will likely allow

Oracle to maintain its position well into the future. For this example, let's say Oracle will maintain its moat for the next 10 years. Finally, Oracle can reinvest back into its business, but it is not necessarily a high growth business. Let's assume a 25% reinvestment rate.

NOPAT	Excess Cash	Reinvestment	Return on Capital	Cost of Capital	CAP
$11B	$50B	25% of NOPAT	.12 (12%)	0.08 (8%)	10 Years

Using these assumptions, we get an intrinsic value for Oracle of:

Intrinsic Value	**$200.23B**

Compared to the enterprise value we can buy Oracle for in the market:

Enterprise Value	165B

You can see that if our assumptions above actually hold, we would say that Oracle is moderately undervalued in the market. An investor could play with the assumptions to see how it would affect our estimate of intrinsic value. Adjusting certain variables will obviously affect the estimate of intrinsic value.

The real point of any example in this paper is not to draw a precise conclusion on a specific investment but rather to show how the process of valuation works in practice. Just as important from the actual calculations is understanding the conceptual framework around intrinsic value. Prices in the market will fluctuate wildly over time, and we need a more permanent method for evaluating investment opportunities. By understanding what intrinsic value is and having a basic understanding of how to calculate it, investors should be able to act more calmly and rationally when met with the day to day market noise they will encounter.

We should always remember that intrinsic value is how much a business is actually worth on the basis of the amount of cash it will earn in the future. When we are talking about intrinsic value, we must turn our attention inward to the present value of the business's future cash flows. Our overall objective in investing should be to buy businesses for less than they are worth. If we ground our decision making in the intrinsic value, we have the tools to identify those rare opportunities.

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What We Learned

- The intrinsic worth of a business is the present value of its future cash flows.
- The market price is supposed to reflect the intrinsic value of a business, but many outside factors can cause the market price to deviate substantially from the true worth of the underlying business.
- As a result, a business can be over-valued, fairly valued, or undervalued in the market.
- The biggest mistake investors make is making decisions based on anticipated moves in market prices rather than how the market price relates to intrinsic value.
- An investor should buy when there is a large margin of safety between the intrinsic value of the company and the market price. In other words, we want to purchase a business when we can buy it in the market for far less than it is worth.
- Investing in a share of a business is an exchange in which we give up a lump sum in the present and in return we get all of the future cash earnings of the company.
- It is the cash earnings of a business over time that give shares an intrinsic worth today.
- We discount the future cash earnings of a business to find out what they are worth in today's dollars.

Present Value of Discounted Cash Flows

$$PV = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} \cdots \frac{CF_n}{(1+r)^n}$$

- There are valuation models that provide useful shortcuts to calculate the present value of a business's cash flows.
- We learned three valuation models. The first was the value of a business when it is expected to earn the same amount each year in the future. The second model allowed us to introduce growth.

$$\text{Value of a Steady Cash Flow (Perpetuity)} = \frac{\text{Cash Flow}}{\text{Cost of Capital}} \qquad \text{Value of a Constantly Growing Cash Flow} = \frac{\text{Cash Flow}}{\text{Cost of Capital} - \text{Growth Rate}}$$

- The final valuation model divided the intrinsic value of a business into a steady state and a future value portion. The future value portion is dependent on the business finding investment opportunities that earn a return above the cost of capital.

$$\text{Steady-state value} = \frac{\text{Net operating profit after tax (normalized)}}{\text{Cost of capital}} + \text{excess cash}$$

$$\text{Future value creation} = \frac{\text{Investment} * (\text{return on capital} - \text{cost of capital}) * \text{competitive advantage period}}{\text{Cost of capital} * (1 + \text{cost of capital})}$$