

# Intrinsic Valuation – Part 1

*Free cash flow and terminal value*

# Agenda

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## Education – Week 6

Intrinsic vs. relative valuation

Free cash flow

Discounting

Terminal value

# Intrinsic vs. relative valuation

When valuing a company, we can either use intrinsic valuation or relative valuation... So, what's the difference?

## Relative Valuation

- > Values an asset based on how the market values **similar assets**
- > Driven by the belief that **similar assets** should trade for **similar prices**
- > Can be used to make bets on the relative performance of similar assets
- > A limitation is that the market may be currently mispricing a sector/industry
- > E.g. The value of an apartment in Claremont based on what similar sized apartments have sold for in Montclair

## Intrinsic Valuation

- > Values an asset based on the **present value of all future cash flows**
- > Driven by the belief that an asset should sell for what it could generate in cash **from now until judgement day** discounted to the present value
- > Gives you a better idea of what variables drive s the value of the asset
- > E.g. The value of an apartment in Claremont is the present value of all future cash flows you could earn if you were to rent it out

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# Discounted cash flow (DCF): 3 basic parts

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- > Intrinsic value of a company is the present value of all the future cash flows it will generate in its lifetime (this is called a DCF)

Free cash flow  
projections

*Projects out future cash flowing into the company less the reinvestment requirements—typically 3-10 year projection*

Discount rate

*Money today > money tomorrow, you have to apply a discount factor to account for the opportunity cost of capital*

Terminal value

*After your initial FCF projection period, the company doesn't disappear, so terminal value captures the PV of FCF in perpetuity*

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# Free cash flow

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## Two types of free cash flow:

- > Unlevered free cash flow: measures free cash flow available to both debt and equity holders of the business
- > Levered free cash flow: measures free cash flow available to only equity holders (stockholders) of the business

*When doing a DCF, you are valuing the entire firm, therefore, we focus on **unlevered free cash flow**, which has the following components:*

- EBIT, i.e. earnings available to all stakeholders
- Tax rate, i.e. Uncle Sam's share of the profits (t)
- Depreciation and amortization, i.e. non-cash expenses (D&A)
- Capital expenditures, i.e. reinvestment (Capex)
- Changes in net working capital ( $\Delta\text{NWC}$ )



# Free cash flow – formula

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$$\text{Unlevered FCF} = \text{EBIT} * (1 - t) + \text{D\&A} - \text{Capex} - \Delta\text{NWC}$$

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# Free cash flow – intuition

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$$\text{Unlevered FCF} = \text{EBIT} * (1 - t) + D\&A - \text{Capex} - \Delta\text{NWC}$$

1. **Start with EBIT:** Measures earnings available to all stakeholders in the business: equity holders, debt holders, and the government
2. **Subtract taxes:** This is the government's claim to the business. What's left is available to debt and equity holders
3. **Add back D&A:** These are expensed on the income statement as proxy for reinvestment, but they are not cash expenses
4. **Subtract Capex:** This is cash that needs to be reinvested in the business, but is not expensed on the income statement
5. **Subtract  $\Delta\text{NWC}$ :** See next slide...

# Working capital – explanation

Working capital consists of short-term operating assets and liabilities a company needs to operate the business

## What are short-term operating assets and liabilities?

- > Defining feature of a working capital asset/liability is something that isn't earning/yielding a fair rate of return
- > Think of these as “wasting assets”

## Working capital assets

- > Examples include: accounts receivable, inventory, prepaid exp., etc.
- > Cash and ST marketable securities **are not** WC assets

## Working capital liabilities

- > Examples include: accounts payable, deferred revenue, DTL, etc.
- > Current portion of ST debt **is not** a WC liability

# Working capital – (TSX: GOOS)

Which of these current assets are WC assets?

	Notes	March 28, 2021	March 29, 2020
		\$	\$
<b>Assets</b>			
<b>Current assets</b>			
Cash		477.9	31.7
Trade receivables	8	40.9	32.3
Inventories	9	342.3	412.3
Income taxes receivable	6	4.8	12.0
Other current assets	20	31.0	43.5
<b>Total current assets</b>		<b>896.9</b>	<b>531.8</b>

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 = WC asset

Are “Other current assets” working capital assets?

# Working capital – (TSX: GOOS)

## Are “Other current assets” working capital assets?

Type	Valuation Approach
Cash, trade receivables, accounts payable and accrued liabilities	The carrying amount approximates fair value due to the short term maturity of these instruments.
Derivatives (included in other current assets), other long-term assets, accounts payable and accrued liabilities or other long-term liabilities)	Specific valuation techniques used to value derivative financial instruments include: <ul style="list-style-type: none"><li>- quoted market prices or dealer quotes for similar instruments;</li><li>- observable market information as well as valuations determined by external valuers with experience in the financial markets.</li></ul>

- > Check the footnotes!
- > As it turns out, GOOS classifies derivatives (marketable securities) in other current assets, which are not WC assets

*\*On page 20 of most recent 20-F*

# Working capital – (TSX: GOOS)

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Which of these current assets are WC liabilities?

## Liabilities

### Current liabilities

Accounts payable and accrued liabilities	14, 20	177.8	144.4
Provisions	15	20.0	15.6
Income taxes payable	6	19.1	13.0
Short-term borrowings	16	—	—
Current portion of lease liabilities	12	45.2	35.9
<b>Total current liabilities</b>		<b>262.1</b>	<b>208.9</b>

# Working capital – (TSX: GOOS)

Which of these current assets are WC liabilities?

## Liabilities

### Current liabilities

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<b>Total current liabilities</b>		<b>262.1</b>	<b>208.9</b>

 = WC liabilities



# How does working capital affect FCF?

**Increases** in working capital means there will be **more cash tied up** in the company's working capital: **WC** (↑) = **FCF** (↓)

- > If a company requires more inventory to grow sales, the cash paid for that inventory must be subtracted from free cash flow
- > If a company provides a service for a customer but hasn't received cash payment yet, the increase in AR gets subtracted from FCF

**Decreases** in working capital means there will be **less cash tied up** in the company's working capital: **WC** (↓) = **FCF** (↑)

- > If a company receives payment for a service before providing the service, cash received from customer is added to FCF
- > If a company receives materials from supplier but hasn't yet paid in cash, increase in accounts payable gets added to FCF

# Where do you find the components of FCF?

$$\text{Unlevered FCF} = \text{EBIT} * (1 - t) + D\&A - \text{Capex} - \Delta\text{NWC}$$

Income statement

$$\text{EBIT} * (1 - t)$$

Estimate earnings of the firm

Balance sheet

$$\Delta\text{NWC}$$

Estimate reinvestment requirements needed for the firm to grow

Cash flow statement

$$D\&A \ \& \ \text{Capex}$$

# Why should we use unlevered FCF?

## Advantages

- > Calculates cash earnings available to all stakeholders of the company (debt + equity, creating apples to apples comparison for companies with different capital structures)
- > Firms can manipulate earnings when prepared on an “accrual” basis (i.e. under-depreciating); true “cash” prevents this pitfall

## Disadvantages

- > FCF will have large fluctuations due to lumpiness of reinvestment via capital expenditures
- > Hard to accurately project out working capital, since incremental working capital requirements may change over time

## Why not use net income? Why not EBITDA or operating cash flows?

- > Net income doesn't give apples to apples comparison for companies with different capital structures (more debt = higher interest expense)
- > EBITDA doesn't include WC requirements, OCF doesn't factor in the capital structure, and **both do not include reinvestment spending (capex)**

# Discounting

*“A bird in the hand is worth two in the bush.” – Aesop*

# Intuition of discounting

Money in your hand today is worth more than money in your hand tomorrow, so a discount factor must be applied to future cash flows



# Intuition of discounting

The discount factor is the **opportunity cost** of tying up capital in the firm, or the **expected return** required by stakeholders

$$\text{Discount rate} = R_f + \text{equity risk premium}$$

$$R_f = \text{risk free rate (typically 10Y treasury)}$$

## *There are a couple key principles governing cost of capital*

- > Cost of capital should be higher when yields on government bonds (i.e. “risk-free” rate) are higher
- > Cost of capital should be higher for companies that are riskier, because risk-averse investors must be compensated for risk

*\*There is generally disagreement about how to calculate the discount rate... nuances of calculating the discount rate will be discussed later*

# Intuition of discounting

The further out you are discounting, the larger the discount factor; intuition is that there is higher opportunity cost and higher uncertainty

$$DCF\ Value = \sum_{t=1}^{\infty} \frac{CF_t}{(1+r)^t}$$

$$DCF\ Value = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \dots + \frac{CF_t}{(1+r)^t}$$

$CF = \text{Cash Flow}$

$r = \text{Discount Rate}$

The equity risk premium generally ranges **between 4% and 8%**—note that riskier businesses deserve higher risk premiums

# Terminal value

*How to capture the PV of cash flows in perpetuity*



# Intuition of terminal value

A firm has potentially infinite life...  
Therefore, the present value of cash flows in perpetuity

Since we can't estimate a firm's cash flows forever, it can sometimes be unrealistic to project out FCF for a period greater than 10 years...

- > To capture the value of cash flows after your projection period, we calculate the terminal value for the business
- > Terminal value = present value of cash flows in perpetuity

Let's say you make a DCF with a 3-year free cash flow projection...

$$DCF\ Value = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{Terminal\ Value}{(1+r)^3}$$

# Calculating terminal value

There are **two ways** of calculating terminal value **at period n**:

Exit multiple approach

*Take projected earnings (EBITA or EBITDA) in your final projection year and multiply by EV/EBITA or EV/EBITDA multiple*

*Terminal Value =  $EBITA_n$  \* IS Multiple*

Industry standard multiple can be determined from public comps or PMVs

Gordon growth model

*Assume cash flows grow at a constant rate following your final projection year at rate  $g$  and discount all future FCF to present value*

*Terminal Value =  $\frac{CF_n * (1 + g)}{r - g}$*

Growth rate typically between 0.5% and 3.5% with inflation at lower bound and GDP at upper

# Calculating terminal value

Let's say you make a DCF with a 3-year free cash flow projection...

$$DCF\ Value = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{EBITA_3 * IS\ Multiple}{(1+r)^3}$$

or ...

$$DCF\ Value = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{\frac{CF_3 * (1+g)}{r-g}}{(1+r)^3}$$

# Putting it all together

*All the steps of a doing a DCF*

# All the steps of doing a DCF

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1. **Forecast FCF:** Typically, 3-10 years... Must project out EBIT, tax rate, D&A, capex, and net working capital (formula on slide 9)
2. **Estimate discount rate:** Will discuss nuances and how to calculate this in a later week... For now, 6-10% passes the reasonability test...
3. **Calculate terminal value:** Use either exit multiple approach or the Gordon growth model (formula on slide 26)
4. **Discount future FCF:** Discount forecasted FCF in near-term and terminal value using the discount rate (slide 23)
5. **Sum up PV of FCF:** Add up all FCF discounted to the present value to get to an implied enterprise value
6. **Subtract net debt:** Subtract debt and add cash and investments to get to the implied equity value
7. **Divide by total shares:** Divide equity value by total shares outstanding to get the per share intrinsic value

# Intrinsic Valuation – Part 2

*Cost of capital and ROIC*

# Agenda

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## Education – Week 6

Discount Rates

ROIC vs. Cost of Capital

# Discount Rates

*“A bird in the hand is worth two in the bush.” – Aesop*



# Choosing the right discount rate

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- > The discount rate should represent the opportunity cost of capital (i.e. the required rate of return by investors)

WACC

*WACC is the **academic approach** to estimating your opportunity cost of capital*

Why WACC is wrong

*Capital obviously has a cost, but just because you use fancy formulas and Greek letters doesn't mean you're right*

Why discount rates must be imprecise

*"It is better to **be roughly right** than precisely wrong" – John Maynard Keynes.*

# Weighted Average Cost of Capital (WACC)

WACC represents the cost of funding (debt and equity) a company's operations assuming no changes to capital structure

WACC blends the rates of return that debt and equity holders require and is weighted to capture the mix

$$WACC = R_e * \frac{E}{D + E} + R_d * \frac{D}{D + E} * (1 - t)$$

- $R_e = \text{Cost of equity}$
- $R_d = \text{Cost of debt}$
- $E = \text{Market value of equity}$
- $D = \text{Market value of debt}$
- $t = \text{Tax rate}$

# Issues with WACC: dynamic capital structure

- > WACC **assumes a constant capital structure**... But a company's capital structure is always changing!
- > The market value of stocks and bonds fluctuate and companies often issue debt and equity in addition to repaying debt and repurchasing stock... Capital structures are dynamic!

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# Issues with WACC: cost of equity

- > Cost of debt is more straightforward: just take the weighted average coupon rate on the company's bonds or look at credit ratings
- > But, there's no printed coupon rate or yield to maturity on your equity... **So how do we know what the cost of equity is?**

$$WACC = R_e * \frac{E}{D + E} + R_d * \frac{D}{D + E} * (1 - t)$$

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# Capital Asset Pricing Model (CAPM)

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Theorists came up with a fancy model for what the cost of equity *should be* assuming a perfectly efficient market...

$$\text{Cost of equity} = R_f + \beta * (R_m - R_f)$$

- $R_f$  = Risk free rate (yield on government bond, e.g. 10Y Treasury)
- $R_m$  = Expected return from investing in the overall equity market
- $R_m - R_f$  = Excess expected return from investing in equity market
- $\beta$  = Measure of how volatile a stock is vs. the overall stock market (e.g.  $\beta$  of 2 means stock tends to go up 2% if S&P 500 is up 1%)

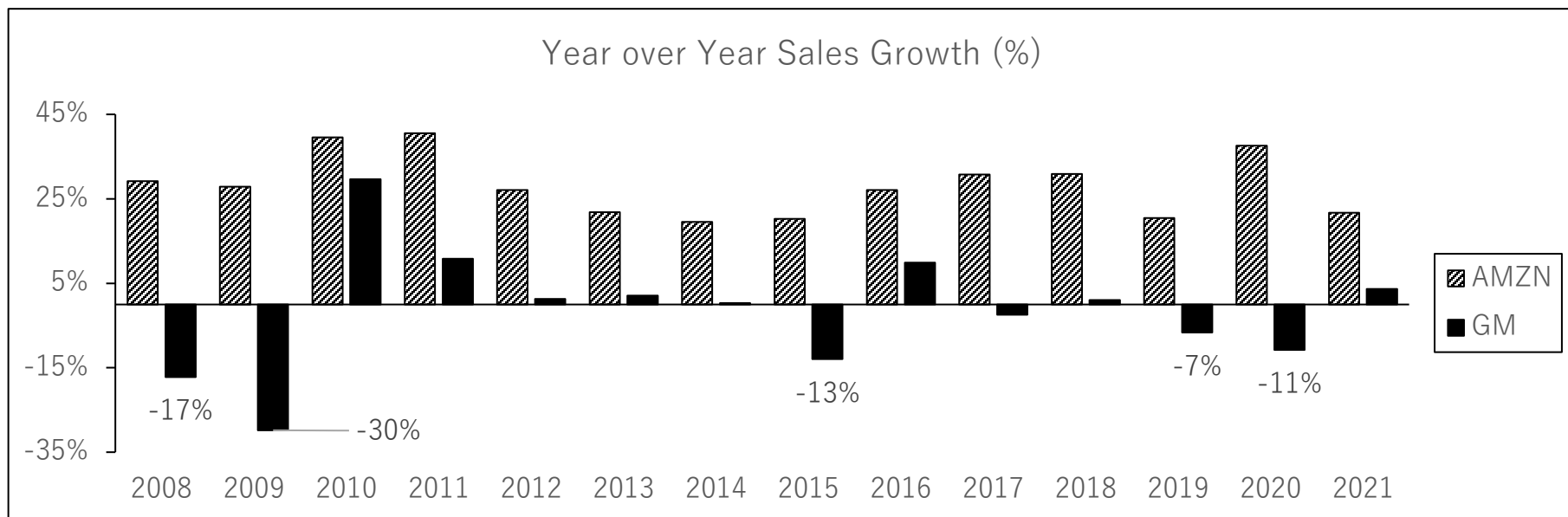
# Why using CAPM in practice is wrong

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1. **Historical volatility is an incomplete (and poor) measure of risk** as a stock's risk is not only measured by its short-term price swings
2. **Beta is backwards looking**, but businesses evolve over time; industry economics, competitive dynamics, and barriers to entry change
3. **Beta sometimes lacks statistical significance.** What happens if a company just recently IPO'ed a few days ago?
4. **Estimating beta can sometimes be difficult.** For example, if a stock's historical beta is 0, does that mean the company is risk-free? What if a stock has a negative beta? Is it less risky than government bonds?
5. **Empirically, CAPM does a poor job of explaining historical returns,** and an even worse job of predicting future returns
6. **Markets are not perfectly efficient.** Volatility oftentimes is completely divergent from fundamentals. Let's look at AMZN vs. GM...
7. **And much more...**

# Does beta properly explain risk?

- > Amazon has a higher beta than General Motors\*, but GM's profits are much more volatile. GM is more cyclical and economically sensitive business with lower market share and barriers to entry...
- > Just look at the revenue swings! Note, cloud is highly consolidated and non-cyclical and AMZN's retail business has high barriers to entry. Meanwhile, auto OEMs are highly cyclical and competitive...



\*AMZN's beta was 1.33 while GM's beta was 1.28 as of 9/2/2022; Source: S&P Capital IQ

“ Of course capital isn’t free. It’s easy to figure out your cost of borrowing, but theorists went bonkers on the cost of equity capital. I’ve listened to many cost of capital discussions and they’ve never made much sense. It’s taught in business school and consultants use it, so board members nod their heads without any idea of what’s going on... It’s a perfectly amazing mental malfunction.

## CHARLIE MUNGER

Vice Chairman of Berkshire Hathaway



# Why discount rates must be imprecise

Discount rates have to be a bit arbitrary because cost of equity can't be precisely measured the same way cost of debt can

## So, if we don't use WACC or CAPM, what should we use?

- > The general framework for adding a risk premium to your risk-free rate (10Y treasury yield) is the correct approach
- > But we shouldn't assign a single discount rate to all companies as riskier companies/industries deserve higher discount rates
- > An alternative method would be to rank the riskiness of the underlying company on a scale of 1-5 and incrementally add 1 point for each additional risk level

$$\textit{Discount Rate} = R_f + ERP + \textit{Risk Category} * 1\% - 3\%$$

# Practitioner's approach to discount rates

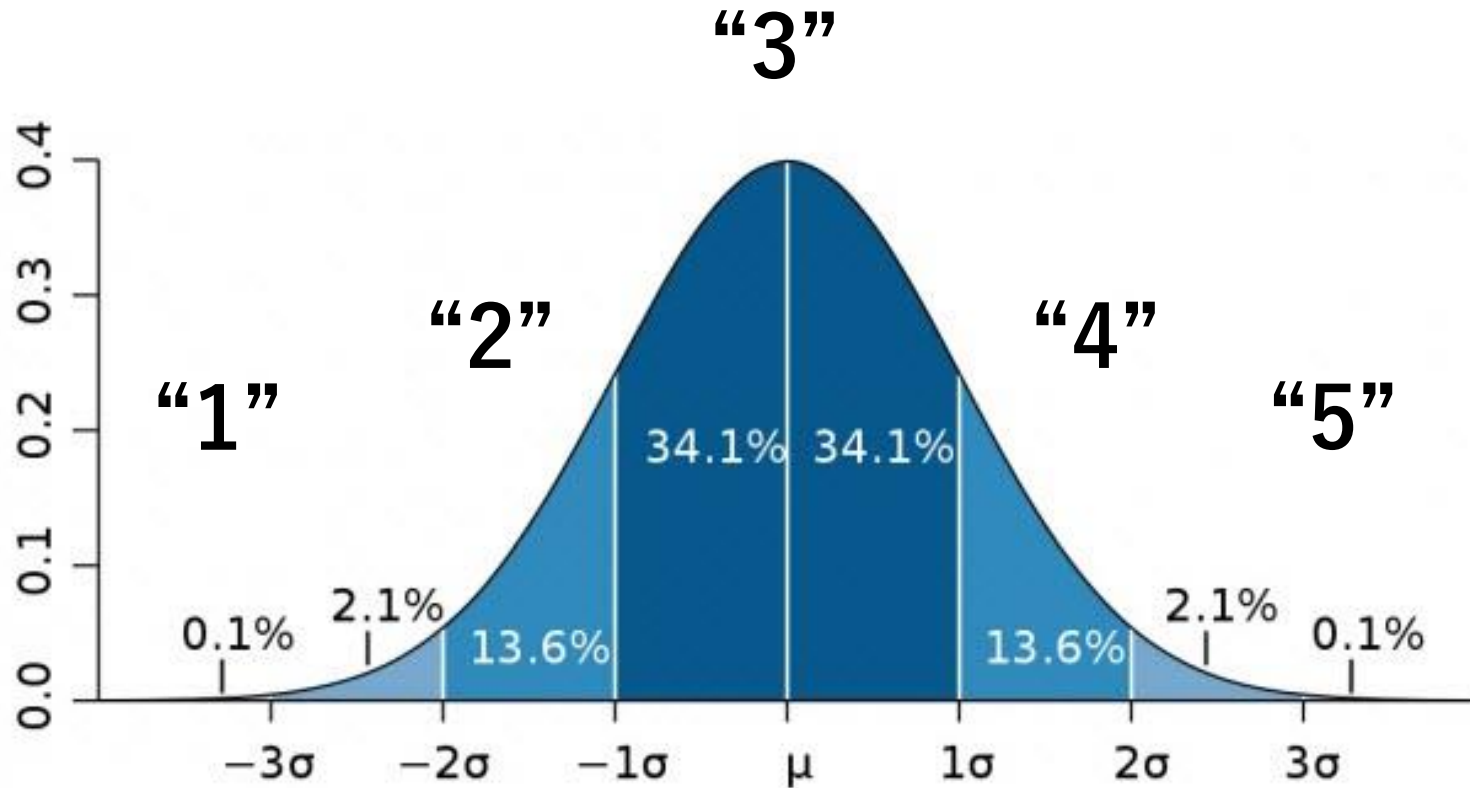
$$\text{Discount Rate} = R_f + ERP + RC * 1\% - 3\%$$

- $R_f = \text{Risk free rate}$
- $ERP = \text{Equity risk premium or } R_m - R_f \text{ (typically 6\% to 7\%)}$
- $RC = \text{Risk category (scale of 1 to 5)}$

## Risk category intuition:

- > Think of a bell curve of all the publicly traded companies in the world... Where would you rank the riskiness of the company that you're trying to value on that bell curve?
- > A risk category of 3 would mean that you rank this as a business with an average amount of risk (<1 standard deviation from the mean) while a 1 would mean the business has very low risk

# Risk category intuition



Least Risky Stocks

Most Risky Stocks

# Considerations with practitioner's approach

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- > **Arbitrariness:** Guessing the risk category is ultimately a judgement call which is a bit arbitrary and inherently prone to error
- > **Perceived risk category:** Ultimately, it's the perceived risk that determines what the market will give a stock credit for
- > **Truncated tails:** There could be companies with a lot of uncertainty that potentially are riskier than a "5" risk category...
- > **Would vs. should:** There's a difference between what a company "should" mathematically be worth and what the market gives it credit for, but in the long-term math tends to work
- > **Imprecision:** There isn't as much precision or theoretical backing compared to WACC/CAPM which might infuriate your econ prof...

The alternative to WACC/CAPM isn't perfect, but nothing is. Nevertheless, "it is better to be roughly right than precisely wrong."

# Return on Invested Capital

*ROIC vs. cost of capital: the fundamental basis of capitalism*

# ROIC vs. cost of capital

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"We test the wisdom of retaining earnings by assessing whether retention, over time, delivers shareholders at least \$1 of market value for each \$1 retained." – Warren Buffett

## Intuition of cost of capital:

- > Money today is worth more today than money tomorrow
- > The fundamental basis of capitalism is that if you own capital today, you can deploy it to produce more capital tomorrow

## Purpose of a company:

- > Return on invested capital is the return a company generates from capital invested in the business
- > A company's primary purpose is to earn an economic profit; i.e. ROIC greater than its cost of capital (Buffett's \$1 test)

# What is a company's purpose?

## A company's purpose is to pass Buffett's "\$1 test"

This occurs when a business earns a ROIC in excess of the cost of capital

- > Say a company invests \$1,000 in a new factory and the estimated opportunity cost of capital is 10%
- > How much must the business earn to pass the "\$1 test"?

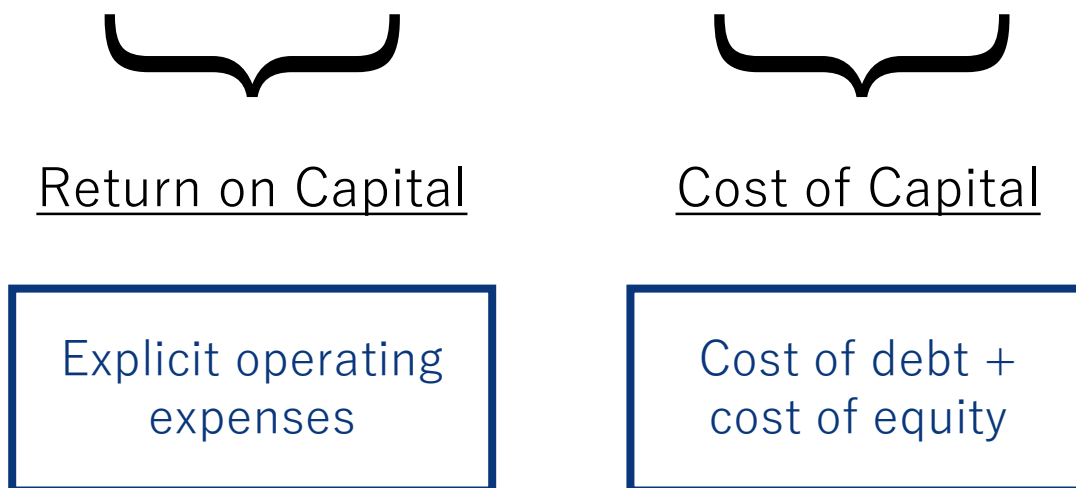
	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
Profit from investing \$1,000 in factory	\$80	\$100	\$120
Opportunity cost of \$1,000 in capital	\$100	\$100	\$100
<b>Economic Profit</b>	<b>-\$20</b>	<b>\$0</b>	<b>\$20</b>

# What is a company's purpose?

**Must earn more than \$100/year to pass "\$1 test"**

Company earns "economic profit" if return on capital exceeds cost of capital

**Economic Profit** = Revenue – Business Costs – Opportunity Costs



Over the long-term, return on capital and the amount a company reinvests is what determines the return offered on the stock



“ If a business earns eighteen percent on capital over twenty or thirty years, even if you pay an expensive looking price, you'll end up with one hell of a result.

**CHARLIE MUNGER**

Vice Chairman of Berkshire Hathaway

# What is ROIC?

Return on invested capital (ROIC) is the return a company generates from capital invested in the business

$$ROIC = \frac{NOPAT}{Invested\ Capital} = \frac{EBIT * (1 - t)}{WC\ Cash + WC + Net\ PP\&E}$$

- *NOPAT = Net operating profit after tax*
- *EBIT = Earnings before interest & taxes*
- *t = Tax rate*
- *WC Cash = Working capital cash (**typically ~3% of sales**)*
- *WC = Working capital*
- *Net PP&E = Net property, plant, and equipment (fixed assets)*

# Invested capital

$$\text{Invested Capital} = \text{WC cash} + \text{WC} + \text{Net PP\&E}$$

ROIC's numerator (NOPAT) is straight forward. But what's the intuition behind invested capital? What even is invested capital?

- > Invested capital is the total amount of **tangible capital** that a company uses for its operations
- > The purpose of ROIC is to understand how much **incremental profit** a company earns from each **incremental dollar invested** in the business
- > We've discussed WC (*Intrinsic Valuation Part 1*) and PP&E (*Accounting*) previously, but what's the deal with **WC cash**? Well, you can't run a business with a \$0 checking's account, so some of your cash can't earn a fair rate of return and is effectively a **working capital asset**
- > We don't know exactly how much WC cash is, but ~3% of sales is typically a reasonable assumption

# Return on invested capital (ROIC)

Hold on a second... Doesn't the formula for ROIC look sort of similar to the formula for calculating free cash flow?!

$$ROIC = \frac{EBIT * (1 - t)}{WC + Net PP\&E}$$

$$FCF = EBIT * (1 - t) - \Delta WC - (Capex - D\&A)$$

Mathematically, ROIC is the building block of intrinsic valuation (DCF):

- $\Delta$  in Working Capital = Derivative of working capital
- $Capex - D\&A$  = Derivative of net PP&E

# ROIC: the key input to your DCF

The inputs to ROIC reveal a company's profitability and conversion of earnings into free cash flow

- > FCF measures how a company turns earnings into cash and ROIC measures how well a company turns tangible assets into profit
- > The same inputs used to calculate ROIC are used to calculate FCF

$$ROIC = \frac{NOPAT}{Invested\ Capital} = \frac{\frac{NOPAT}{Sales}}{\frac{Invested\ Capital}{Sales}} = \frac{NOPAT\ Margin\ (\%)}{Capital\ as\ \%\ of\ Sales}$$

$$FCF = Sales * NOPAT\ Margin\ (\%) - \Delta\ in\ Sales * Capital\ as\ \%\ of\ Sales$$

# Return on invested capital additional reading

For a more detailed discussion on calculating ROIC, read Michael Mauboussin's *Calculating Return on Invested Capital*

## Calculating Return on Invested Capital

How to Determine ROIC and Address Common Issues

June 4, 2014

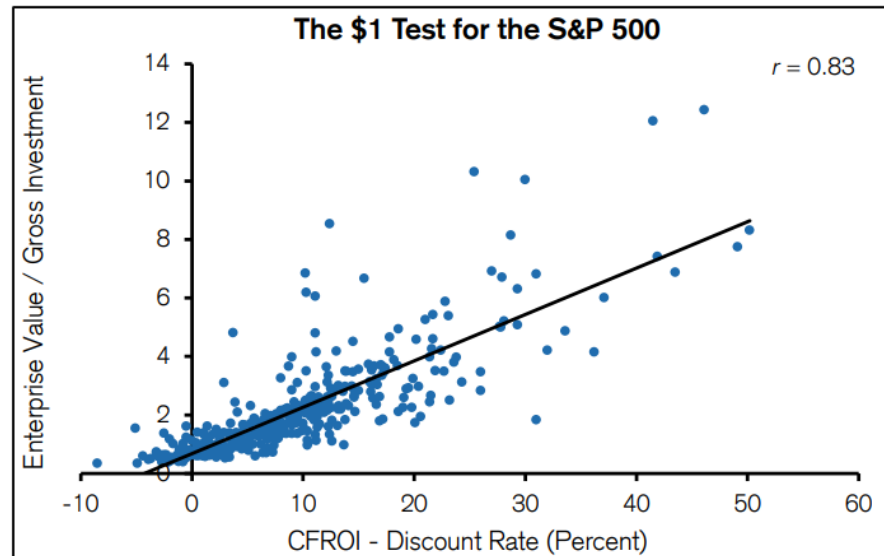
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Source: Credit Suisse HOLT<sup>®</sup>, FactSet, and Credit Suisse (see Appendix A for details about the chart).

# Home Depot ROIC

Home Depot earns a much higher ROIC than its cost of capital and has the best efficiency/sqft of any home improvement retailer in the U.S.

Income Statement	
Revenue	151,157
EBIT	23,040
Tax rate	24.4%
<b>EBIT*(1-t)</b>	<b>17,418</b>

Balance Sheet	
WC Cash (1% of Sales)	1,512
WC Assets	26,712
WC Liabilities	(24,381)
Net PP&E	25,199
<b>Invested Capital</b>	<b>29,042</b>

ROIC vs. Cost of Capital	
NOPAT Margin (%)	11.5%
Capital as % of sales	19.2%
<b>ROIC</b>	<b>60.0%</b>
Risk-free rate	3.0%
Risk premium	6.5%
Risk category	2
<b>Cost of Capital</b>	<b>8.5%</b>
<b>Economic profit</b>	<b>51.5%</b>

Home Depot is a great business, but what does this 60% ROIC mean? Is Home Depot going to compound value by 60% per year?

# Reinvestment is just as important as ROIC

High ROIC is great, but reinvestment is just as important...

$$\text{Value Compounding Rate} = \text{ROIC} * \text{Reinvestment Rate}$$

## Company A

- > Earns 30% ROIC
- > **Reinvests 100%** of earnings at 30% ROIC
- > Value **compounds by 30% annually** (30% ROIC \* 100% reinvestment rate)

## Company B

- > Earns 30% ROIC
- > **Reinvests 50%** of earnings at 30% ROIC
- > Value **compounds by 15% annually** (30% ROIC \* 50% reinvestment rate)

Both companies earn 30% ROIC, but Company A has more opportunity to deploy its capital at a 30% ROIC and is thus a superior investment



# Home Depot ROIC + Reinvestment Rate

Home Depot ROIC/Reinvestment			
	2015	2021	Δ
Net Income	7,009	16,433	9,424
Invested Capital	25,247	29,042	3,794
Cumulative 6Y Earnings	75,258		
Δ in Invested Capital	3,794		

Home Depot invested \$3.8B in tangible capital between 2015 and 2021 and grew earnings by \$9.4B

Reinvestment Rate	5.0%
Incremental ROIC	248.4%
<b>Value Compounding Rate</b>	<b>12.5%</b>
<b>6Y Stock Price CAGR</b>	<b>23.7%</b>

$$\frac{\Delta \text{ in Invested Capital}}{\text{Sum of Total Earnings}}$$

$$\frac{\Delta \text{ in Earnings}}{\Delta \text{ in Invested Capital}}$$

# Putting it all together

*All the steps of a doing a DCF*

# All the steps of doing a DCF

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1. **Forecast FCF**: Typically, 3-10 years... Must project out EBIT, tax rate, D&A, capex, and net working capital (formula on slide 9)
2. **Estimate discount rate**: Find the 10Y treasury yield, then choose a risk category and multiply it by your ERP (slides 41 and 42)
3. **Calculate terminal value**: Use either exit multiple approach or the Gordon growth model (formula on slide 26)
4. **Discount future FCF**: Discount forecasted FCF in near-term and terminal value using the discount rate (slide 23)
5. **Sum up PV of FCF**: Add up all FCF discounted to the present value to get to an implied enterprise value
6. **Subtract net debt**: Subtract debt and add cash and investments to get to the implied equity value
7. **Divide by total shares**: Divide equity value by total shares outstanding to get the per share intrinsic value