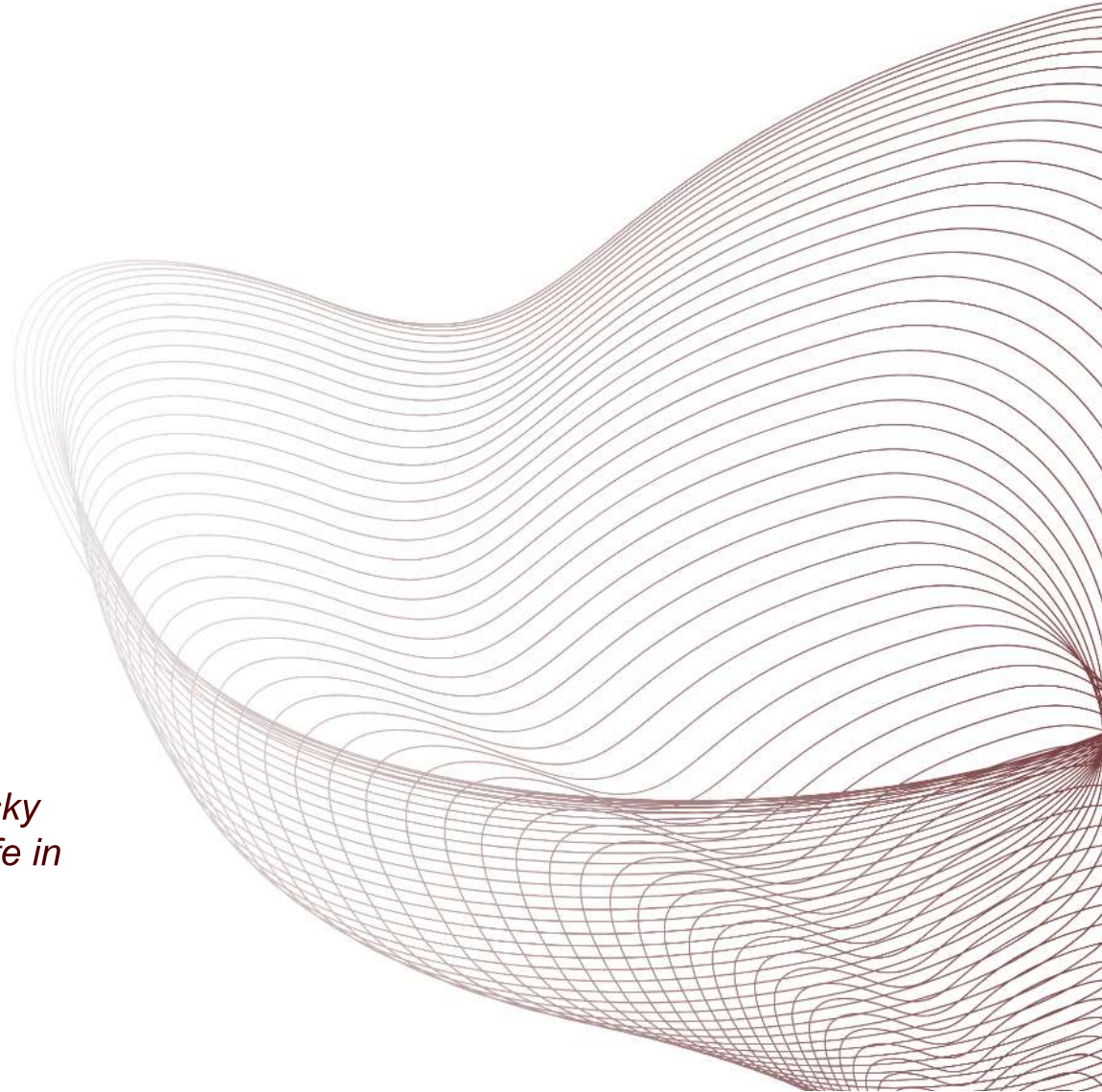


Investment Analysis

September 25th, 2023

Talk to your neighbor: How do you measure how risky something is? Not just within investing, but just in life in general.



Let's start with a game

1. Let's pretend that we as a group are a bank and are looking to lend out money.
2. We're going to go through different people and companies and rank them by how trustworthy we think they are. Ask yourself: How likely are they to pay me back?
3. After we rank everyone, we need to decide what interest rates to charge.

How likely are they to pay you back?

Prof. Guyton:
Mortgage



Walter White:
Mortgage



Mr. Blackburne,
AIC SAW Director:
Credit Card Loan



Ford



US Govt.



Apple



Phase 1 Biotech
Startup

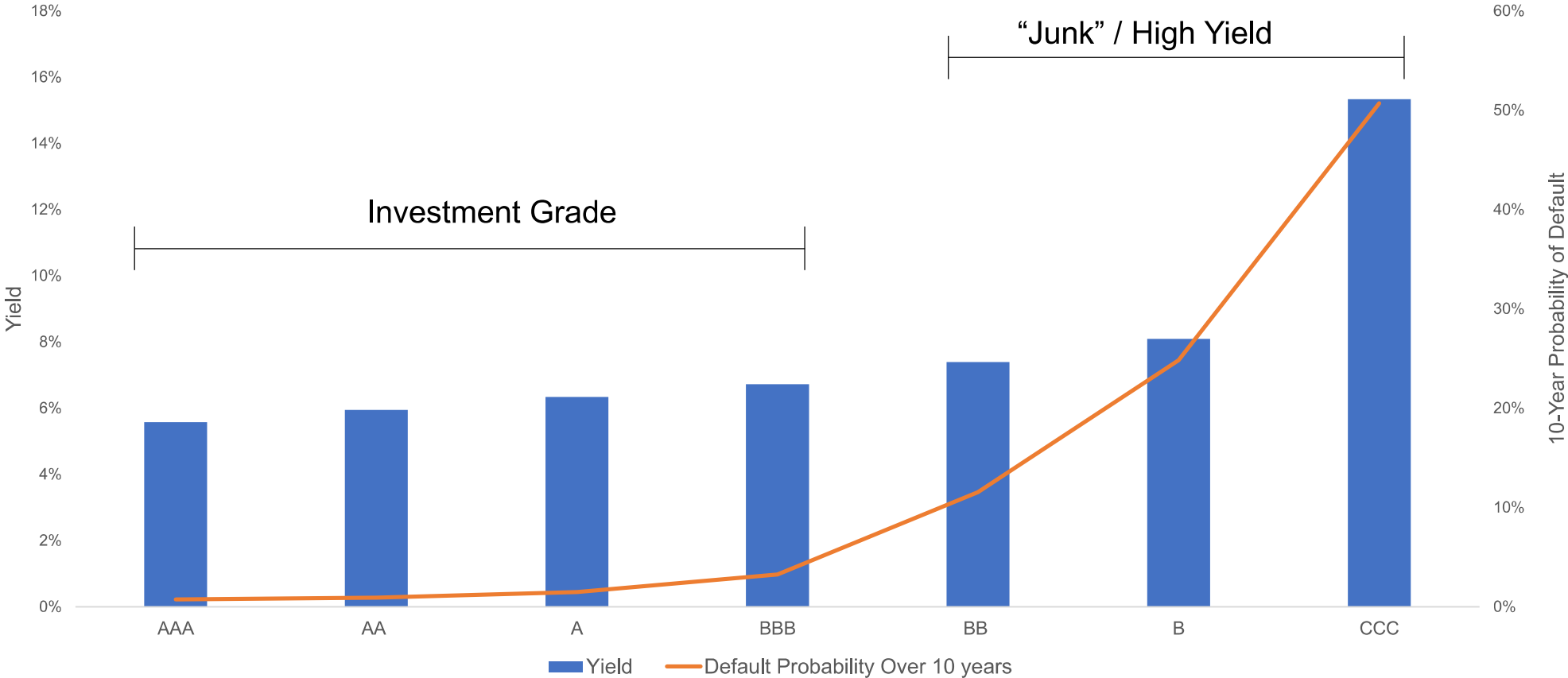


Argentina Govt.



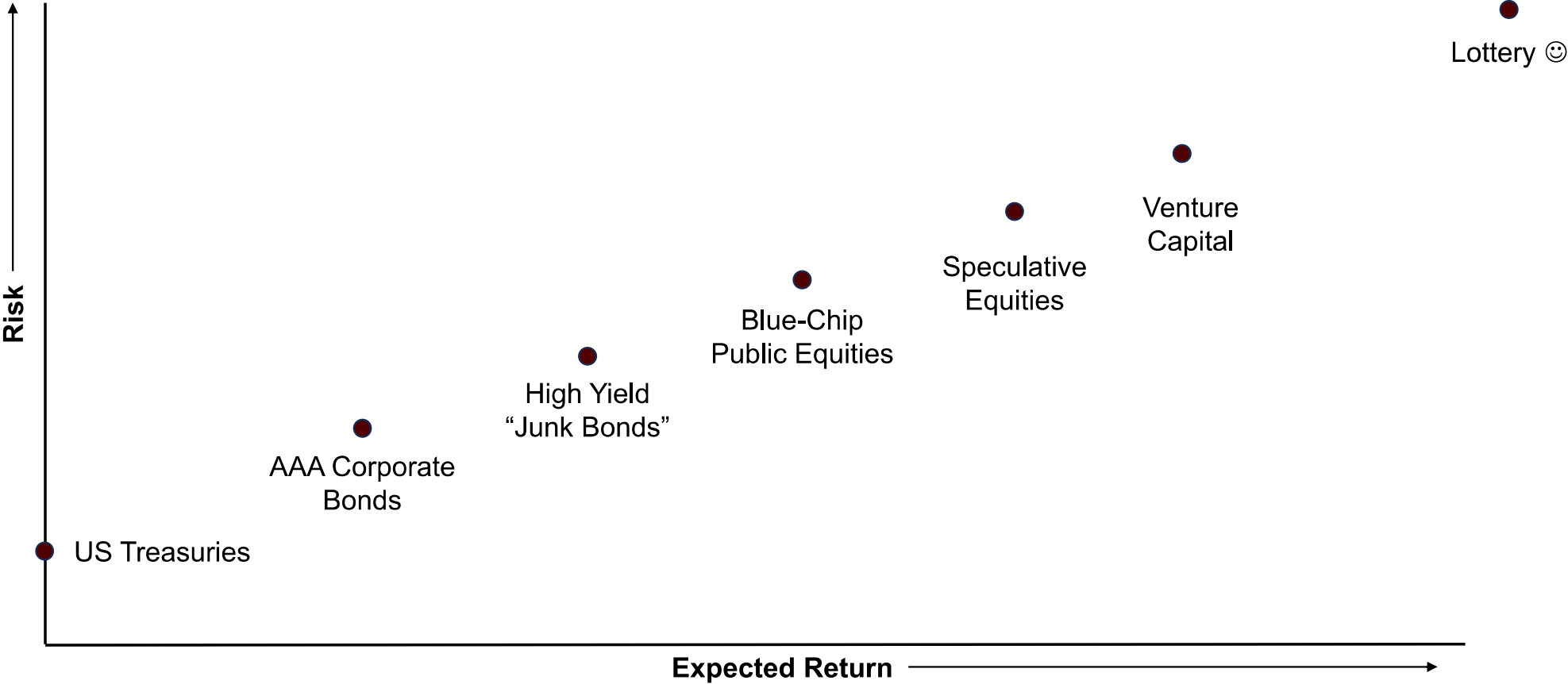
Comparing our results to the corporate yield curve

US Corporate Yield Curve



Sources: S&P Global Fixed Income Research, Live Wire Markets

Risk and return for various investments



Efficient Market Hypothesis

- The Efficient Market Hypothesis (EMH) was developed by Eugene Fama in his Ph.D. dissertation in the 1960s.
- The EMH states that prices reflect all available information about future values.
- Markets have become more efficient over time as a result of competition, low barriers to entry, and low information costs

Weak-Form EMH

Historical trading prices and volume data is reflected in market prices.

Semi-Strong EMH

All publicly available information is reflected in current market prices.

Strong EMH

All public and private info, including insider info, is reflected in market prices.

“The proposition is that prices reflect all available information, which in simple terms means since prices reflect all available information, there’s no way to beat the market.”

-Eugene Fama

“Taken to its logical extreme, it means that a blindfolded monkey throwing darts at the stock listings could select a portfolio that would do just as well as one selected by the experts.”

-Burton Malkiel (*A Random Walk Down Wall Street*)

What are the implications of the EMH?

If we assume markets are perfectly efficient (Semi-Strong / Strong EMH), what are the implications of this assumption?

You can't consistently beat the market!

But we don't believe that, right?

1. Get better data, or get data faster (publicly available of course)
2. Interpret and synthesize data/information better than the average investor
3. Market inefficiencies arise all the time (just talk to BR)
4. There are many ways to beat the market. Many have before and many continue to do so
5. If you think the market is perfectly efficient, just buy the index

What is Alpha?

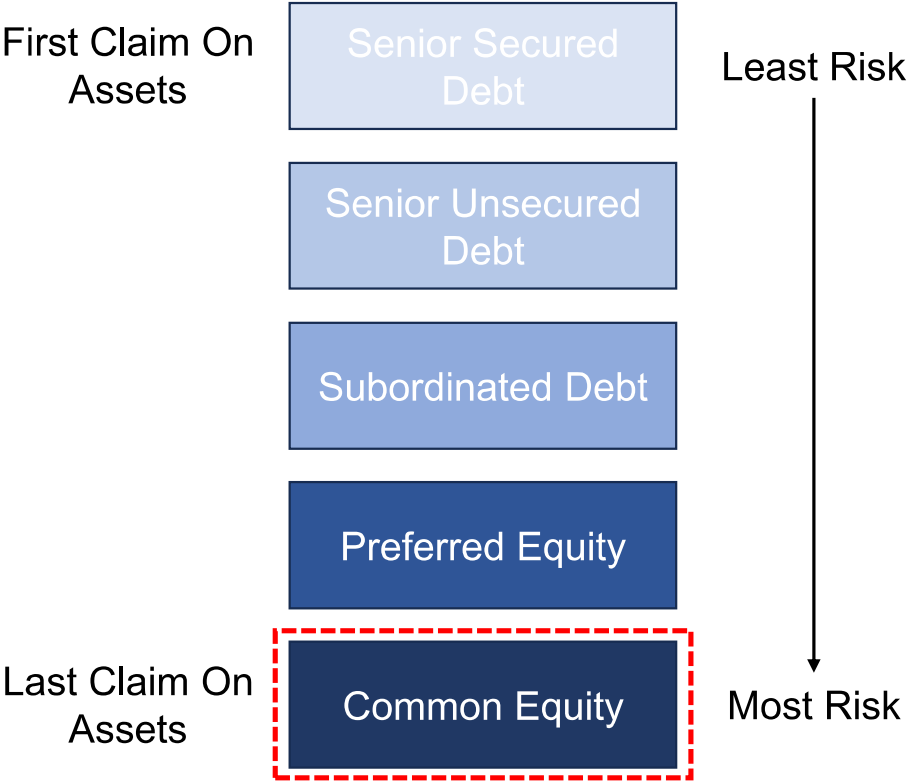
There are two types of alpha: **positive** alpha and **negative** alpha.

- **Positive** alpha is any returns above the expected return
- **Negative** alpha is any returns below the expected return

We will calculate expected return later. For now, remember that more risk = more reward.

$$\text{Alpha} = \text{Actual Return} - \text{Expected Return}$$

Investment Opportunities Across The Capital Structure



When looking at stocks, 99% of the time we're looking at common equity.

The lower you sit on the capital structure, the less likely it is for you to recover your capital if the company goes bankrupt, i.e., more risk.

More Risk = More Expected Return

As investors, we can invest in debt and equity securities (bonds/stocks) throughout a company's capital structure.



~\$109B outstanding debt
68 different bond offerings

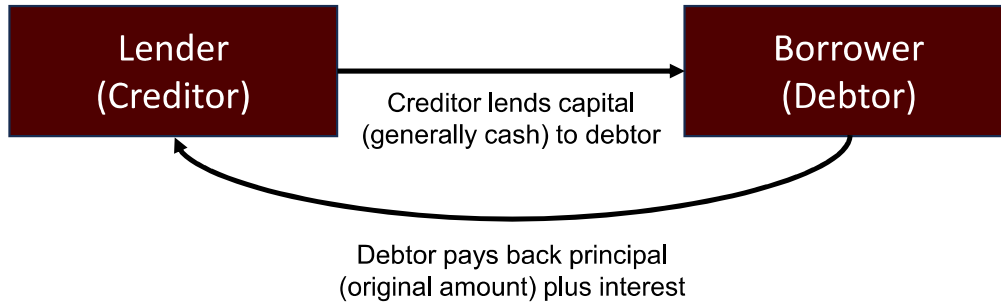
~\$2.8T of common equity
(same as market cap)

Capital Structure Earnings Example

Capital Structure		\$10 Earnings	\$15 Earnings	\$5 Earnings
\$50 Debt	10% interest rate	\$5 Interest Expense $5 / 50 = 10\%$ return	\$5 Interest Expense $5 / 50 = 10\%$ return	\$5 Interest Expense $5 / 50 = 10\%$ return
\$50 Equity	"Residual" claim on earnings	\$10 - \$5 = \$5 claim on earnings $5 / 50 = 10\%$ return	\$15 - \$5 = \$10 claim on earnings $10 / 50 = 20\%$ return	\$5 - \$5 = \$0 claim on earnings $0 / 50 = 0\%$ return

- No matter what, debt has a contractual agreement to pay a specific rate. This does not change depending on earnings.
- Equity has a claim on earnings after debt. The returns change based on how much the business earns, for better or for worse.

What is debt?



Debt is the obligation to pay money that is owed to the creditor.

Examples:

Savings & Loans (Mortgage Banks)	<u>Mortgage Loans</u>	Homeowners
Consumer Banks	<u>Credit Cards Loans</u>	Consumers
Public	<u>Treasury Bonds</u>	Federal Government
Public	<u>Municipal Bonds</u>	Municipal Government
Public	<u>Corporate Bonds</u>	Corporations

Secured Debt v. Unsecured Debt

Secured debt is backed by an asset, which can be used as collateral, i.e, the lender can take possession of the asset if the borrower can't pay.



Fixed Rate v. Floating Rate Debt

Fixed rate debt means the payments remain the same regardless of changes in market interest rates. Floating rates means they change alongside market interest rates.

Coupon v. Zero Coupon Debt (Bonds)

Most bonds have coupons. Coupons are interest payments made throughout the life of the bond. Zero coupon bonds do not have coupons, but are instead issued at a discount, i.e, you lend \$90 and the borrower gives you back \$100 at maturity.

How bonds work – Debt Securities (Public Debt)

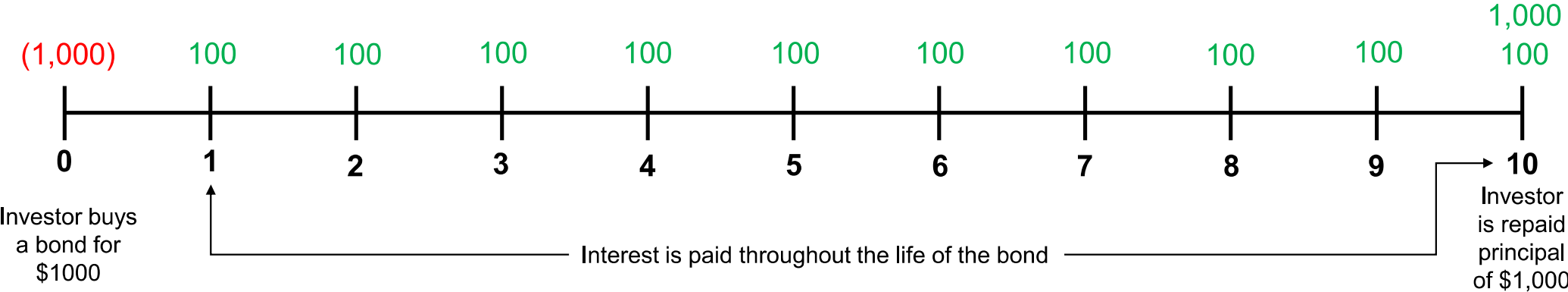
Purpose: Issued by corporations and governments to fund operations, build new facilities, invest in infrastructure, etc.

MOST bonds have fixed coupon payments, i.e., the coupon payment stays the same regardless of market interest rates.

Par value is the price bonds are issued at. This is generally \$1,000.

*****As market interest rates change, the price of the bond changes to give investors the market rate.*****

Bond prices move inversely with bond yield.



What goes into interest rates?

$$\text{Required Interest Rate} = \text{Real risk-free rate} + \text{Inflation Premium} + \text{Default Risk Premium} + \text{Liquidity Premium} + \text{Maturity Risk Premium}$$

1. **Real Risk-Free Rate** "bare minimum": I would rather spend money today than next year, so I need to get paid to compensate for delaying consumption for xyz amount of time.
2. **Inflation Premium**: Inflation will eat away at my purchasing power while I lend money, so I need to charge a higher rate to offset inflation.
3. **Default Risk Premium**: There's a chance whoever I'm lending money to won't pay me back. I need to charge a higher rate to compensate me for this additional risk.
4. **Liquidity Premium** (Bonds): What if I need my money back for an emergency? How quickly can I get my cash back (liquidity)? If it's hard for me to find buyers, I probably want a higher rate to compensate for the lack of liquidity.
5. **Maturity Risk Premium**: Longer dated bonds have a higher duration, meaning they are more sensitive to changes in interest rates, meaning they're more volatile (more risk). Since the asset is more volatile, I should be paid more to compensate for the risk.

Debt Markets

Bond Market Rank	Country / Region	Total Debt Outstanding	Share of Total Bond Market
1	 U.S.	\$51.3T	39%
2	 China	\$20.9T	16%
3	 Japan	\$11.0T	8%
4	 France	\$4.4T	3%
5	 United Kingdom	\$4.3T	3%
6	 Canada	\$4.0T	3%
7	 Germany	\$3.7T	3%
8	 Italy	\$2.9T	2%
9	 Cayman Islands*	\$2.7T	2%
10	 Brazil*	\$2.4T	2%

What is equity?

Equity represents ownership in an asset. Generally speaking, equity represents an ownership stake in a business.

Public Equity = Ownership in publicly traded companies

Private Equity = Ownership in private companies

Equity is a residual claim to a share of earnings after debt obligations have been satisfied.

2 Types of Risk

Firm Specific Risk: Risk that is specific to the company you are investing in. Operating risk, management risk, financial risk, legal and regulatory risk, etc.

- Theoretically, this risk can be ENTIRELY mitigated through a diversified portfolio.

Market Risk: Broader market risk that all companies are exposed to. Macroeconomic risk: interest rates, consumer spending, foreign exchange, inflation, consumer confidence, etc.

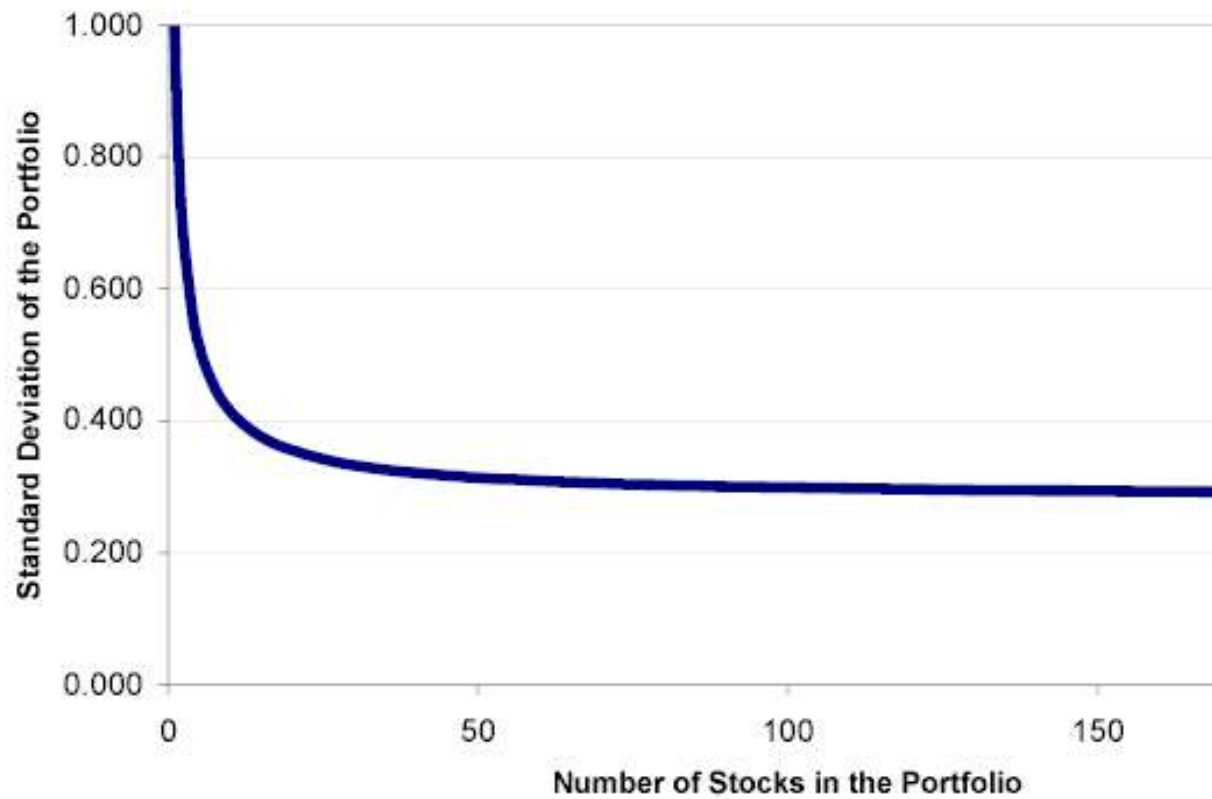
- This risk CAN NOT be diversified away, because all companies are exposed to it.
- Some companies have more market risk than others. i.e., some fluctuate more with the business cycle than others.

Asset pricing models completely ignore any firm specific risk, operating under the assumption that investors will hold a diversified portfolio to minimize risk.

Therefore, when looking at risk, we care about:

1. The volatility of an asset.
2. The asset's correlation to the overall market.

The power of diversification



Equity Risk

What return should I get from a stock?

The riskier the stock, the higher return I should expect.

The widely accepted measure of risk is volatility of the asset + how correlated is it to the index.



Equity risk is generally measured using **beta**, a measure of how volatile an asset is relative to an index (generally the S&P 500).

Beta Across Industries

Home Builders

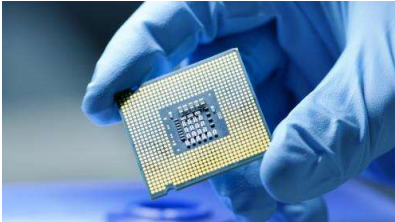


DR Horton Beta: 1.55

Lennar Beta: 1.48

KB Home Beta: 1.67

Semiconductors



TSMC Beta: 1.19

Nvidia Beta: 1.74

AMD Beta: 1.80

Consumer Staples



P&G Beta: 0.41

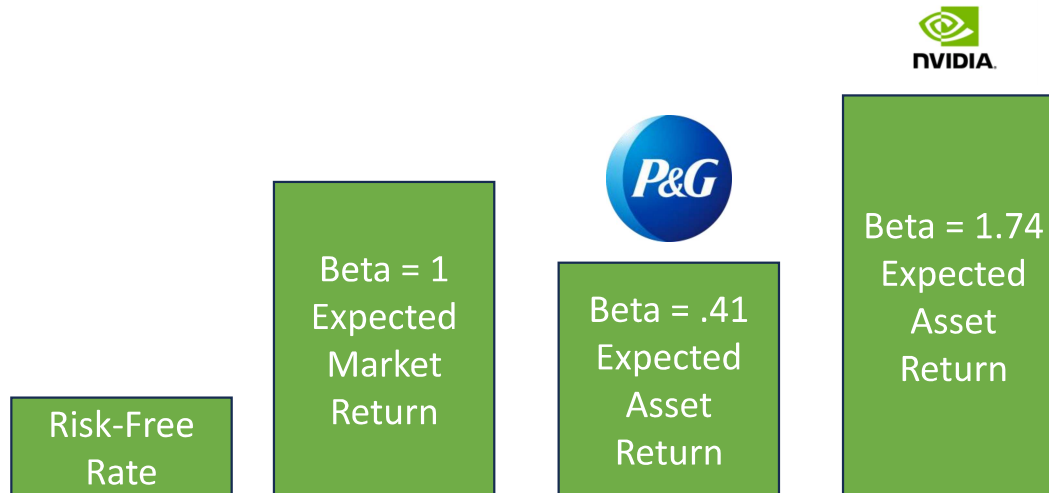
McDonald's Beta: 0.64

Coca Cola Beta: 0.55

Capital Asset Pricing Model

$$\text{Expected Return} = \text{Risk Free Rate} + \text{Beta} * (\text{Exp. Market Return} - \text{Risk Free Rate})$$

1. Risk Free Rate: Can use a government debt yield. Treasury Bills (T-Bills) are US govt securities with maturity of <1 year, which are often use as the risk-free rate.
2. Beta: Measure of the volatility of a stock relative to a benchmark (S&P 500). 5 Year Beta can be found on Yahoo Finance, Bloomberg, Refinitiv, or CapIQ.
3. Expected Market Return: This measures what you believe the benchmark will return in the next 12 months. Expected Market Return – Risk Free Rate = “Market Risk Premium”.



Capital Asset Pricing Model

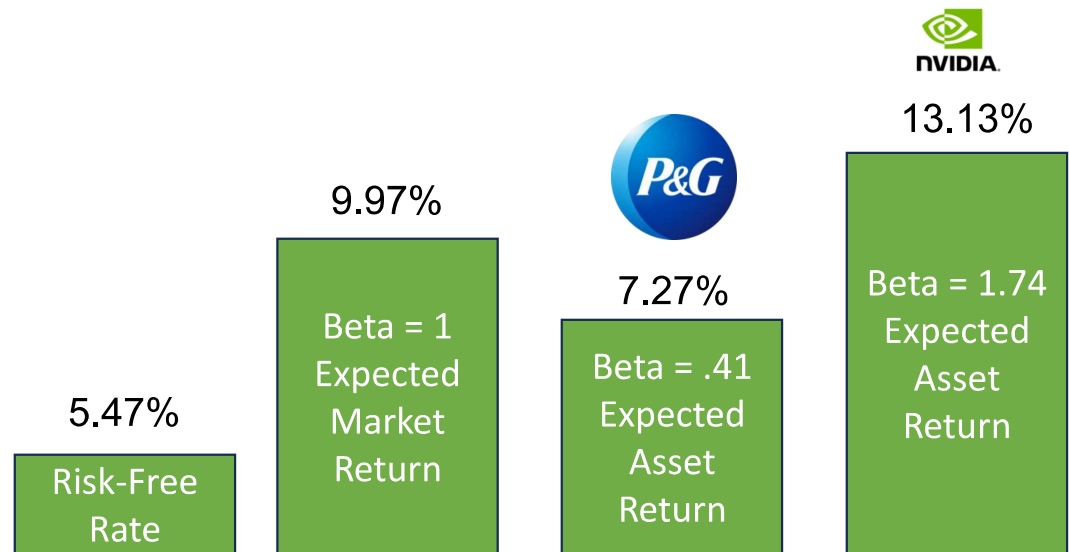
1. 1 Year T-Bill Rate = 5.47%
2. Expected Market Return = 9.87% (From NYU Professor Aswath Damoradan)

Procter & Gamble Expected Return:

$$5.47\% + 0.41 * (9.87\% - 5.47\%) = 7.274\%$$

Nvidia Expected Return:

$$5.47\% + 1.74 * (9.87\% - 5.47) = 13.126\%$$



Did we generate alpha?

Jensen's Alpha Formula:

Alpha = Actual Return - Expected Return (from CAPM)

Procter & Gamble Next 12 Month Returns: 8.5%

$$12.71\% - 7.27\% = 1.23\%$$

Nvidia Next 12 Month Returns: 10.5%

$$10.5\% - 13.126\% = -2.63\%$$

Nvidia is riskier. Even though Nvidia generate higher returns in this example, because it's expected return was higher to compensate for the risk, Nvidia generated negative alpha while P&G generated positive alpha.

(In the Last Twelve Months [LTM], Nvidia has generated 259% returns while P&G has generated ~13% returns)

Takeaways

- All rational investors are risk averse. Therefore, we want to be compensated for taking on more risk.
 - More risk = more expected return
- The efficient market hypothesis states that all available information is already priced into the market, meaning you can't consistently beat the market (generate alpha).
 - Nonetheless, market inefficiencies can be found everywhere, and there are a plethora of investors who have consistently beat the market.
 - Academia claims that any investor who consistently beats the market just takes on more risk.
- Investors can invest across a company's capital structure, in both debt and equity.
 - Equity has more risk, as it is a residual claim on earnings, after debt.
- Diversification completely eliminates firm specific risk and leaves only market risk.
- The Capital Asset Pricing Model is the most commonly used model to calculate the expected return of assets.
 - CAPM uses beta; measures the volatility and correlation of an asset to the overall market.
- Beta is higher for companies who are more sensitive to changes in the business cycle.

More risk = more returns, even outside of investing. Go take risks!