A Quick Start Guide to Investing Part 2

George Mandl and Neil Singh

Personal Finance SDG

Friday, November 11^{th}, 2022

1. Personal Financial Planning: Investment Playbook
2. Portfolio Management: Achieving your Plan
3. Fundamental Analysis
4. Technical Analysis

Objective 1: Simplify decision making process

A well-defined financial plan is very personal and unique to you. It enables you to construct a portfolio tailored to you and your needs that, with time and discipline, will deliver you to your objective.

- There are countless ways to combine assets, companies, sectors, risk factors
- A well-defined financial plan will automatically filter out combinations that do not align with your objective
- The result is that you establish boundaries and perspective

Objective 2: Assessing your capacity to invest

- It is **essential** to determine **how much capital is available** to you for investing
- Consider:
  - Historic patterns (income, spending)
  - Current situation (rent, bills, immediate cash flow)
  - Possible future situations (emergency expenses, loans/debts, worst case scenarios)
- Understanding your cash flow will help you build your portfolio over time

Objective 3: Avoiding distractions

- A plan, when **developed properly and executed with discipline**, prevents you from chasing the market
- Rather than pursue movements in particular assets, you let the assets that align with your goal move for you
- Fear-of-missing-out and profit-chasing are mitigated
- Market noise is filtered out
- Consistency is developed

Cash entering your accounts

- **Regular income**: Income you can reliably expect
  - Salary, income tax returns, loans, grants, rental/sublet income
- **Irregular income**: Income you cannot reliably expect
  - Bonuses, commissions, scholarships, awards, gifts, e-transfers, tips

Cash exiting your accounts

- Mandatory Spending: These are your necessary costs of life
  - Rent, loan interest payments, loan principal payments, bills, groceries, regular medication, pet expenses, transportation, etc.
- Discretionary Spending: These are life enhancements that are non-essential
  - Entertainment, luxuries, durable goods, presents, etc
- Spending Categorization: A more granular alternative
  - This requires more time but for the micro-managers among us but there's plenty of room for automation and detailed data insights

What can you do with your capital?

- **Expected Future Capital (EFC)**: Capital available to invest in the future

$$\text{EFC} = \text{Cash-In} - \text{Cash-Out}$$

- Assume your **EFC** is $\$10,000$:
  - **Opportunity Cost (OC)**: The value of the next best alternative
  - **Risk Free Interest Rate (RFIR)**: The current yield of the highest paying government bond. The 2-year Canadian Government Bond returns 4.15% as of October 25th (15 year high) hence $10,000 would earn $415.00 per year
  - Is the **OC** of investing your **EFC** greater than the $415.00 earned by the **RFIR**?

Means to an end

- Intentions of **withdrawing at a future point** for a **future purchase**
- Investing for a home, car, education, etc.

Flexible safety net

- Intentions of **accumulating wealth** beyond rate of return of a savings account
- Maxing registered accounts, building wealth, etc.

Salary support and retirement

- Intentions of **generating cash flow** either through capital gains or dividends
- Monthly income, annual income, retirement income, job-loss protection, etc.

Many personal reasons

- It's important to identify clearly what your reason is for investing
- If it is not clear, your run the risk of making investing decisions that do not align well with your objectives

Investing for Capital Gains

- Purchase assets that appreciate in value but do not directly affect cash flows
- Growth equities, value equities, ETFs, commodities, real estate, certain bonds, etc

Investing for Cash Flow

- Purchase assets that distribute cash to your account
- Bonds, dividend equities, ETFs, real estate,

A strategic mix of growth and income

- Diversifies across asset classes to reduce exposure to risks
- Divides total allocation across assets such that portfolio aligns with objective

Time horizons dictate asset allocation

- Time Horizon: The length of time before investments are sold off and gains/losses are realized
- Shorter time-frames limit the ability to recover from unforeseen risks
- Longer time-frames allow investors to absorb more risk assuming continued economic growth

Less than 3 years

- There is a near-term requirement for this Capital
- Limited runway to recover from economic downturns
- Lower risk assets are preferable
- Bonds, notes, covered calls

3 to 10 years

- Potential longer-term requirement for this capital
- Longer runway to recover from economic downturns
- Higher risk assets become more feasible along with lower risk assets
- Mix of equities and funds, fixed incomes, derivatives

Greater than 10 years

- Long-term goal or no use case for capital
- A runway that can protect against economic downturns
- Lower risk assets appear less desirable since time can buffer against risk allowing room for greater potential growth
- Assets tend toward higher risk options and away from lower risk

Spend only as much time as you need to

- Investing does not need to be a time-consuming task
- If your times is better spent elsewhere, then it probably should be spent elsewhere
- Fewer decisions may yield better results

Little to no time available

- You cannot or do not intend on making decisions or monitoring your account
- You do not enjoy investment research
- Your time is better spent developing employable skills

Some amount of time available

- You can and are willing to make decisions at some frequency
- Monitoring investments and doing research are enjoyable for you
- You prefer to read about markets than do the next best thing

As much time available as you would like

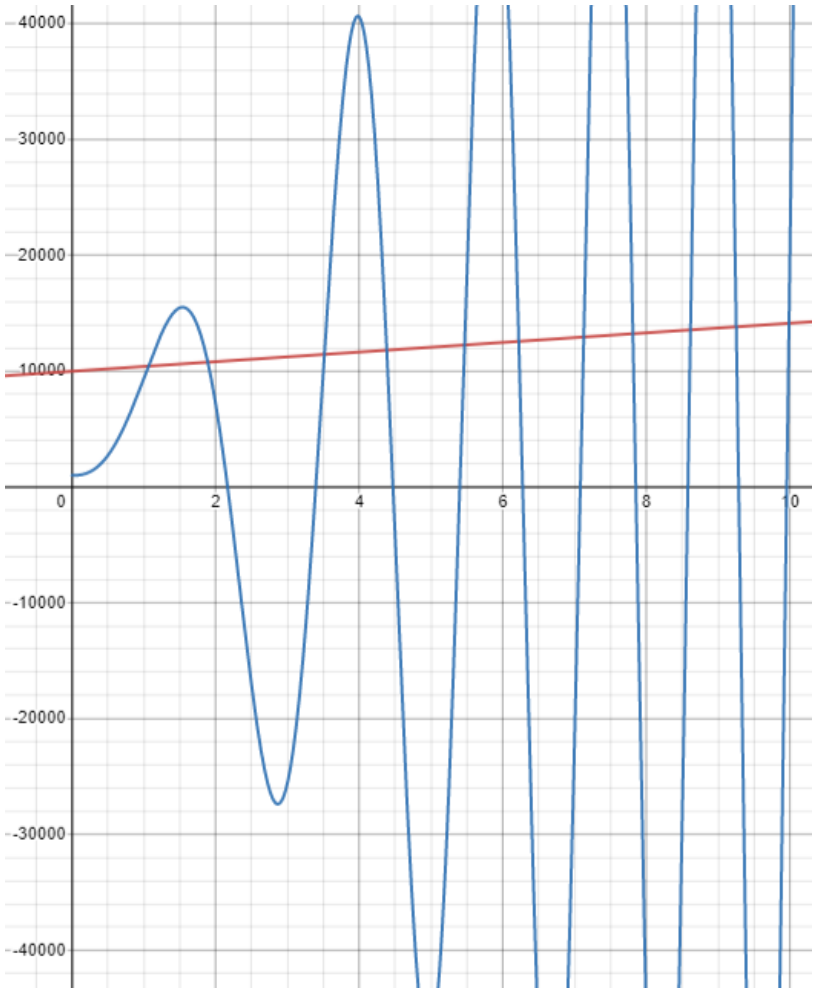
- You can spend all the time you like making decisions at any frequency
- You passively do market research along with your other activities
- Your other commitments leave with you plenty of time

Risk as Standard Deviation and price changes

1. Risk: The standard deviation of returns over a period of time
   - Standard Deviation: The scaling of a distribution from the mean of population
2. Risk: Also known as volatility, is potential range of price changes over a period of time
   - Over 1 year, an asset that could likely see price changes of $\pm 20\%$ per day is considered more volatile than an asset that could likely see price changes of $\pm 4\%$ per day

- **Risk and return are highly correlated**. High risk implies high potential return while low risk implies low potential return
- Risks can be managed to various extents

Risk as price changes



There is little to no room for risk

- Minimum growth is acceptable for you
- Seeking risk-free or near risk-free returns
- Require capital back in short or medium term
- Capital is not covered well by future expected cash flow
- You are prone to emotionally driven decisions

You can accept some degree of risk

- Near average growth is desirable for you
- Risks are acceptable for a higher return
- No foreseeable requirements for invested capital
- Capital can be replaced over time
- You can withstand volatility

You are indifferent to risk

- Above average growth is the objective
- Maximum risk tolerance for any return
- Capital invested is negligible to you
- Capital can be easily replaced
- Volatility is your friend

Low Risk

- Capital preservation
- Yield enhancement
- Cash, fixed income/bonds, and mutual funds

Medium Risk

- Balance between yield enhancement and capital gains
- Willing to take more risks for higher returns
- Fixed income, equities, mutual funds/ETFs

High Risk

- More interested in making capital gains
- Higher risks and higher returns
- Equities, commodities, and/or alternative asset classes

What you can put a number on

1. Expected Future Capital (EFC, dollars)
   - i. Money available to invest over some time
2. Opportunity Cost of EFC (OC, dollars)
   - i. The benchmark return for your EFC
3. Risk Free Interest Rate (percent)
   - i. The yield of the 10-year Gov. of Canada Bond
4. Time Horizon (years, months, etc)
   1. Time until you withdraw your returns or losses
5. Risk Tolerance (percent)
   1. The percent change you are comfortable with

Expected Future Capital

- The expected dollar amount available to invest over some period of time
- Add all expected income (regular and irregular) and subtract all expected expenses (mandatory and discretionary)

$$Income = (salary) + (grants) + (OSAP) + (IncTaxRef) + ...$$

$$AnnualExpenses = (Rent) + (Groceries) + (Pet) + (Takeout) + ...$$

$$ExpectedFutureCapital = AnnualExpenses - Income$$

Opportunity Cost

- Once you identify your EFC, you can compare options
  - Opportunity cost is the benchmark for comparing investment options.
  - This should be the easiest and most risk-free option for your capital
    - Pay off OSAP loans (3.5%)?
    - Government bonds (RFIR, 4%)?
    - Loan to a friend (10%)?
  - How much risk must you take on to achieve a greater return than this?

Time Horizon 1

- Time horizon is the amount of time you will hold onto your investments
- Shorter horizons are exposed to greater economic risks than longer horizons
  - If an economic downturn happens, you have a longer runway to recover from potential losses or to grow a barrier that will absorb loss in value

Time Horizon 2

1. Less than 3 years
   - Short horizon, requires at least principal on withdrawal, little resilience to economic risk and natural market fluctuation
2. Between 3 and 10 years:
   - Medium horizon, potential use case for capital, more resilience to economic risk and can absorb negative market fluctuations
3. Greater than 10 years:
   - Long horizon, no clear use case for capital, high potential protection from economic risk and benefits from market fluctuations

Risk Tolerance 1

- Risk is the standard deviation of the percent changes of an asset over time
- Your **tolerance** should be **relative to** the your **opportunity cost**
- Steps to calculating risk:
  1. Find a sample of historical asset price for a period of time
  2. Calculate standard deviation
  3. Annualize according to interval of sample and time horizon
  4. This will be your volatility (risk) for 1 year

Risk Tolerance 2

Annual volatility from daily standard deviation over 5 years

```
In [1]: import yfinance as yf

In [2]: import math

In [3]: apple = yf.download('AAPL', '2017-11-18')
[**********************100%**************************]  1 of 1 completed

In [4]: print(apple.pct_change().multiply(100).describe().to_string())
              Open         High          Low        Close    Adj Close       Volume
count  1258.000000  1258.000000  1258.000000  1258.000000  1258.000000  1258.000000
mean      0.122553     0.116436     0.117778     0.122511     0.126504     4.430566
std       2.056536     1.736115     1.857762     2.092621     2.091965    33.442189
min      -8.660205    -9.264187    -8.776571   -12.864696   -12.864702   -71.226650
25%      -0.891987    -0.727495    -0.804699    -0.859080    -0.852025   -16.387026
50%       0.199326     0.140811     0.242321     0.099464     0.104877    -1.896950
75%       1.161976     0.989706     1.087308     1.236632     1.236628    18.716171
max       9.725565    10.506504    10.201779    11.980827    11.980818   262.830335

In [5]: risk = 2.092621 * math.sqrt(256)

In [6]: risk
Out[6]: 33.481936

In [7]:
```

Risk Tolerance 3

- Assume Apple has an annual risk (volatility) of 33%
- Assume your opportunity cost is (Gov. bond) is 4%
- In one year, you are risking a 33% greater loss for a 29% greater gain
- Is that acceptable to you?

Risk Tolerance 4

1. Low risk
   - Potential loss greater than the OC (RFIR) of EFC is not feasible
   - Medium risk: Potential loss less than ___ times the OC (RFIR) of EFC is acceptable
   - High risk: Any potential loss is acceptable for ___ times the OC (RFIR) of EFC

Things that don't need a number

1. Reason for investing
   - i. Motivation for building a portfolio
2. Portfolio objective
   - i. Portfolio development style

Reason for investing

1. Financing:
   - Investing to fund a future capital requirement (home, education, etc)
2. Saving:
   - Investing to accumulate wealth or protect value with no clear future requirements for funds
3. Income:
   - Generating cash flow for income replacement, retirement, etc

Portfolio objective

1. Growth:
   - Focused on **capital appreciation** (return on investment) with no interest in cash flow
   - **Does not align well with income-oriented** investment reasons as volatility is unpredictable (risk cannot be decoupled from return)
2. Income:
   - Focused on generating **predictable cash income** (yield on cost) and income growth
   - Can satisfy all investment reasons, however, dividends reduce the value of shares
3. Balanced:
   - Combines capital appreciation and cash income
   - Exposes portfolio to a **broader subset of the market**

Time availability

- Hands off: You prefer to limit the time spent thinking about investing
- Hands on: You enjoy planning and monitoring your portfolio but
- Micromanager: You love interacting with financial markets

Definitions

Diversification: Refers to the number of holdings across a particular domain and the weight each holding has in your portfolio. The greater number of holdings and the more equal weightings, the more diversified the portfolio

- 30% derivatives, 40% ETFs, 30% ForEx?
- 60% Technology, 40% real-estate?
- 25% Canada, 50% U.S, 25% China?

Asset Class Diversification

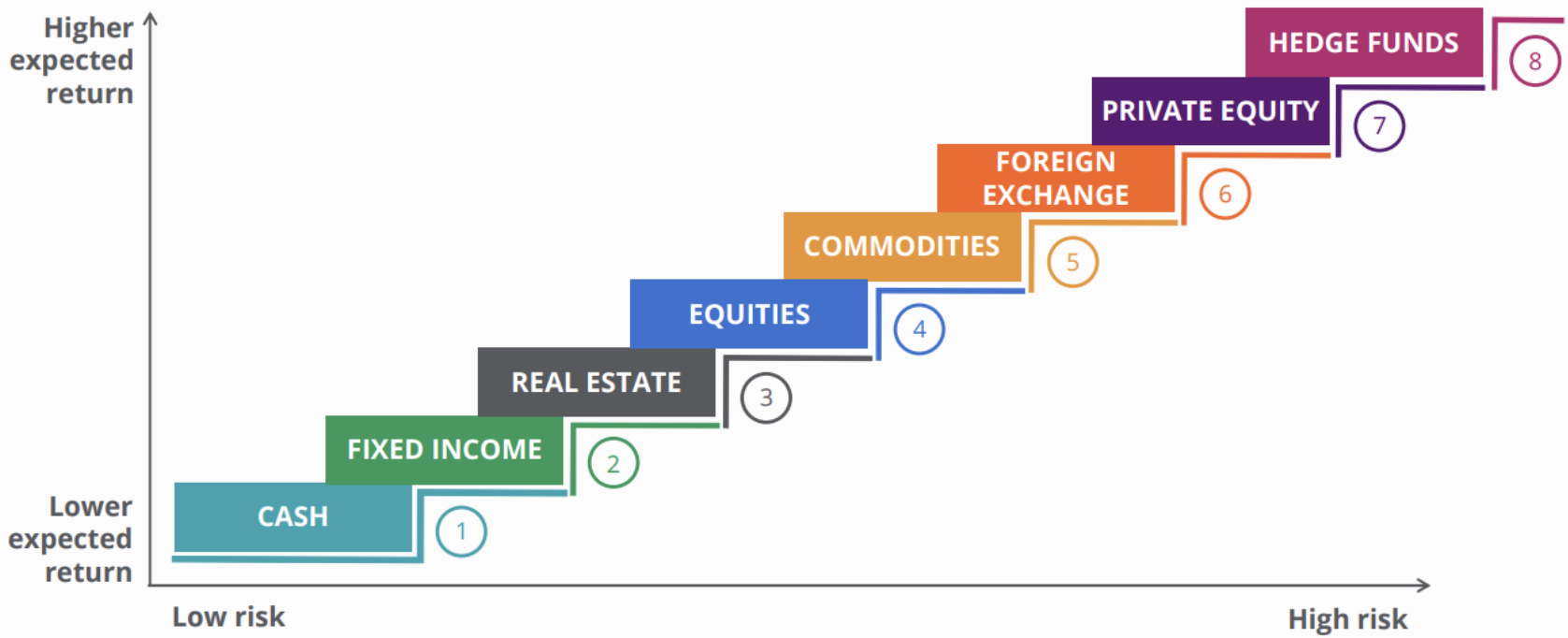
The 7 Common Asset Classes
Uncommon Asset Classes

1. Cash and Cash Equivalents
2. Equities
3. Fixed Incomes
4. Real Estate
5. Commodities
6. Derivatives
7. Currencies

The 2 higher net work assets:

1. Private Equity
2. Hedge Funds

Expected Return Versus Risk



Sector diversification

1. Healthcare
2. Material
3. Real Estate
4. Consumer Staple
5. Consumer Discretionary
6. Utility
7. Energy
8. Industrial
9. Communication Services
10. Financial
11. Technology

Global Industry Classification Standard: Business categorization

Some sectors behave behave differently than others

- The nature of healthcare companies and the cash-flow they create are different than that of technologies
- There are **common risks** to each sector and there are **shared risks** between each sector
- Diversification is a means of managing these risks

Industry diversification

- 24 industry groups
- 69 industries
- 158 sub-industries

Global Industry Classification Standard: Business categorization

Geographic Allocation

Criteria		Frontier	Emerging	Developed
A Economic Development				
A.1	Sustainability of economic development	No requirement	No requirement	Country GNI per capita 25% above the World Bank high income threshold* for 3 consecutive years
B Size and Liquidity Requirements				
B.1	Number of companies meeting the following Standard Index criteria	2	3	5
	Company size (full market cap) **	USD 1,070 mm	USD 2,139 mm	USD 4,278 mm
	Security size (float market cap) **	USD 91 mm	USD 1,070 mm	USD 2,139 mm
	Security liquidity	2.5% ATVR	15% ATVR	20% ATVR
C Market Accessibility Criteria				
C.1	Openness to foreign ownership	At least some	Significant	Very high
C.2	Ease of capital inflows / outflows	At least partial	Significant	Very high
C.3	Efficiency of operational framework	Modest	Good and tested	Very high
C.4	Availability of Investment Instrument	High	High	Unrestricted
C.5	Stability of the institutional framework	Modest	Modest	Very high

* High income threshold: 2020 GNI per capita of USD 12,695 (World Bank, Atlas method)

** Minimum in use for the May 2022 Semi-Annual Index Review, updated on a semi-annual basis

Definition

- Correlation: The degree to which two asset values change with respect to one another. Expressed as a number between -1.0 and 1.0
- Often times, correlation is calculated using the Pearson product-moment correlation method
- This is used to balance risks of asset combinations based on historic price data
- Quantifies the relationship between assets

Risk types

1. Business risks: Factors that affect sales or profit margins
2. Financial risks: Factors that debt repayment and financial leverage
3. Liquidity risks: Factors that affect selling at fair market value
4. Exchange rate risks: Factors that affect investment denominations
5. Country risks: Factors derived from political or economic change

Management fees, commission fees, exchange rate fees, account fees, etc

- More diverse portfolios cost more money to achieve diversification
- Calculate the total cost of your portfolio as the sum of fees divided by the sum of book value
- This is the minimum return on invested capital required to be net positive

Dividends, interest payments, etc

- Calculate the cash-in of your portfolio as the sum of positive cash flows divided by the sum of book value
- This is your yield on cost

The 8 plan Elements

1. Expected Future Capital (EFC, dollars)
2. Opportunity Cost of EFC (OC, dollars)
3. Risk Free Interest Rate (percent)
4. Time Horizon (years, months, etc)
5. Risk Tolerance (percent)
6. Reason for Investing
7. Portfolio Objective
8. Time Availability

How does your plan relate to the different asset classes?

Many assets will not align with your financial plan

- Each asset has a unique risk profile that dictates valuations (Apple versus Enbridge)
- Not all assets provide cash flow (commodities, FX, equities)
- Some assets have limited lifespans (derivatives, bonds)
- Some assets are not risky enough for your investing reason (some bonds)
- Certain high-risk assets may require monitoring while some low-risk assets do not

Filtering out irrelevant assets 1

- The goal is to reduce the number of assets to a small subset that aligns with your plan the best
- First, create a watch-list of different assets
- Once you have an idea of all the different things you would like to invest in, compare those relative to the 8 elements of your financial plan

Filtering out irrelevant assets 2

1. Calculate the standard deviation of the asset and compare that with your opportunity cost
2. Does that outcome align with your risk tolerance?
   - If you are only comfortable with potential losses of twice the OC (RFIR) of EFC, then perhaps the asset doesn't align with you
3. Is it risky enough to meet your financial objective?
   - If you desire returns of 10% a year, then a low-volatility stock like a utility company with 6% annualized volatility may not allow you to achieve that
4. Repeat this process for each of the 8 elements of your plan

Measuring the relevant assets 1

1. Once you have filtered out the assets that do not align with your plan, you can use what remains to construct a portfolio
2. Evaluate the remaining assets relative to the 5 portfolio construction metrics
   i. Diversification (Sector, Geographic, Industrial)
   ii. Correlation (Change of assets relative to each other)
   iii. Risk Exposures (Business, Financial, Country, etc.)
   iv. Cost (asset price, commission, etc.)
   v. Cash Flow (dividends, coupons)

Measuring the relevant assets 2

1. The more concentrated you are in one particular industry, the more impactful industrial risks are
   i. measure the correlation of assets–sometimes very different industry share common risks that aren't always apparent
2. Managing risks is crucial to reducing portfolio volatility
   i. Understand how the underlying investment creates value–APPL purchases chips from Taiwan Semiconductor Manufacturing (TWD)
   ii. A negative impact to TWD will impact Apple valuations
3. Certain assets have higher commission fees than others or are simply expensive
4. Dividends can increase or decrease and coupon payments become more appealing as bond prices fall

Book Value and Market Value

- Book value is the initial price you paid for your investment(s).
- When you buy the same asset multiple times, the book value will change
- Market Value is the current price of your assets on the market

Annualized Return

- Annualized return is the geometric average amount of money earned by an investment each year over a given time period
- Formula for Annualized Return:

$$((1 + r_1) \times (1 + r_2) \times ... \times (1 + r_n))^{\frac{1}{n}} - 1,$$

- where n = number of years and r_i = return in year i
- Formula for annualized return for non-yearly returns:

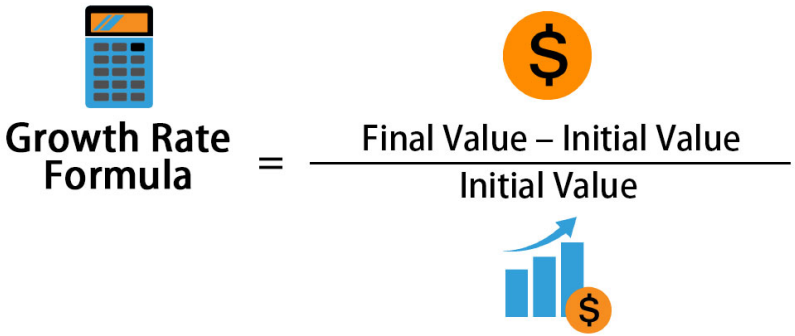
$$(1 + CumulativeReturn)^{\frac{365}{DaysHeld}} - 1$$

Yield on Cost (YOC)

- Yield on Cost is a measure of dividend yield calculated by dividing the current dividend by the initial price paid (book value)
- Stocks that consistently grow their dividends over time can deliver very high YOCs especially if the investor holds the stock for many years
- To determine the YOC of your entire portfolio, take the total current dividend and divide it by the portfolio's book value

Income Growth

- Tailored towards income generating assets such as real estate, fixed incomes, and dividend earning equities
- Income growth is calculated using the simple growth rate formula:



Price-to-Earnings

- The Price-to-Earnings (P/E) ratio is calculated by dividing a stock's current price by its latest earnings per share
- P/E ratio shows what the market is willing to pay today for a stock based on its past or future earnings
- You can determine the P/E ratio of your portfolio by taking a weighted average of the P/E ratio of all your portfolio's equities

Average Volatility

- Standard deviation: The average amount a portfolio's value has differed from the mean over a period of time

$$\text{Standard Deviation} = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$$

where:

x_i = Value of the i^{th} point in the data set

$\bar{x}$ = The mean value of the data set

n = The number of data points in the data set

Sharpe Ratio

- The Sharpe Ratio compares the return of an investment with its risk
- The ratio is useful in determining to what degree excess returns are accompanied by excess volatility
- Generally the higher the Sharpe Ratio, the more attractive the risk-adjusted return

$$Sharpe\ Ratio = \frac{R_p - R_f}{\sigma_p}$$

where:

R_p = return of portfolio

R_f = risk-free rate

σ_p = standard deviation of the portfolio's excess return

What is technical Analysis?

- Technical Analysis deals with price movements in the market
- The root of technical analysis is the idea of supply and demand in the market
  - Buyers represent demand
  - Sellers represent supply
- Technical analysis uses assumptions to predict future prices

4 Technical Analysis

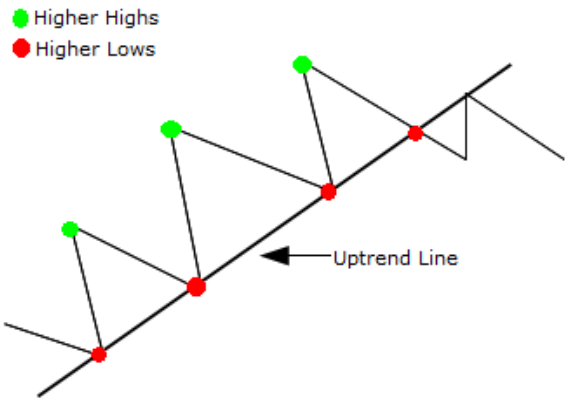
- What is technical analysis?
- Basic assumptions of technical analysis
- Trends, Support, and Resistance

Basic assumptions of technical analysis?

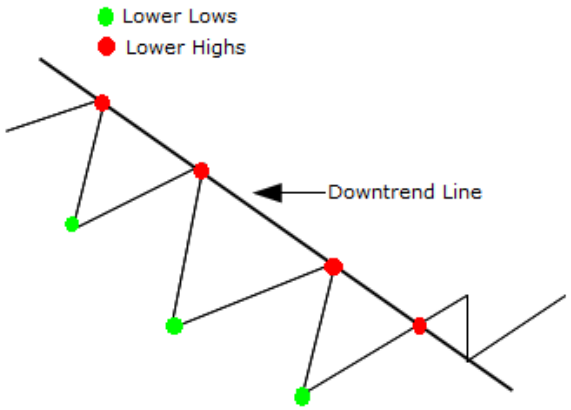
1. The Market Discount Everything. At any given time a stock's price reflects everything that has or could affect the company
2. Price moves in trends. After a trend has established, the future price movement is more likely to be in the same direction as the tend than against it
3. History Tends to Repeat Itself. Based on the psychology of market supply and demand, market participants tend to provide a consistent reaction to market stimuli over time

Trends

- A trend in technical analysis is the movement of the highs and lows
  - An uptrend is a series of higher highs and lower lows
  - A downtrend is a series of lower lows and lower highs
  - A sideways trend has little movement up/down in the peaks and troughs



Trend Line Showing Uptrend



Trend Line Showing Downtrend

Support and Resistance

- Support is the level through which the price seldom falls
- Resistance is the level that the price seldom surpasses
- Once a support or resistance level is broken, the supply and demand psychology of the market has shifted and support and resistance levels must be re-established

Using Support and Resistance

- Used them to make trading decisions and identify trend reversals
- For example: When you have identified a tested level of resistance, you cash out on your profits as the price moves towards the resistance level since it is unlikely it breaks past the resistance
- Be aware:
  - A break beyond a level does not guarantee a role reversal
  - There is lots of volatility around the support and resistance levels

Volume

- Volume is the number of shares that are traded over a given period
- It is important because it allows you to determine the strength of a trend
- Volume should move with the trend. If the volume deteriorates, it is usually a sign of weakness in the trend.