What is trading?

A short position

Futures contracts are Derivatives

Stocks
Bonds
Derivatives

are all different types of securities

Stocks
Bonds
Derivatives

Till, now we have mostly spoken about stocks

Derivatives

Derivatives are contracts whose value depends on the value of some other entity

A stock, bond, currency, commodity etc

Derivatives

A stock, bond, currency, commodity etc

Derivatives allow folks to bet on the value of the underlying asset without actually owning it

Derivatives

Futures
Options
Forwards
Swaps

are all different kinds of derivatives

Derivatives

Futures

Options

Forwards

Swaps

Derivatives are a very vast area by themselves

Derivatives

Futures

Options

Forwards

Swaps

Understanding a little bit about how they work, will help us understand some of the mechanics of trading

Derivatives

Futures

Options

Forwards

Swaps

Let's spend a little bit of time on futures contracts

Futures

A Futures contract is a contract between 2 parties

to buy/sell an asset

at a fixed future date

at an agreed price

Futures

A Futures contract is a contract between 2 parties → Vitthal will sell Swetha

to buy/sell an asset → 10 tons of wheat

at a fixed future date → on Jan 31, 2017

at an agreed price → at INR 15/kg

Futures

A Futures contract is a contract between 2 parties → Vitthal will sell Swetha

to buy/sell an asset → 10 tons of wheat

at a fixed future date → on Jan 31 2017

at an agreed price → @ Rs 20/kg

This could be anything - stock, bond, currency or a commodity like oil, gold, wheat etc

Futures

A Futures contract is a contract between 2 parties → Vitthal will sell Swetha

to buy/sell an asset → a commodity

Expiry date of the contract

at a fixed future date → on Jan 31, 2017

at an agreed price → at INR 15/kg

Futures

A Futures contract is a contract between 2 parties → Vitthal will sell Swetha

to buy/sell an asset → a commodity

Expiry date of the contract

at a fixed future date → on Jan 31, 2017

at an agreed price → at INR 15/kg

Futures

The market price of the asset is called the spot price

Forward price

at an agreed price → at INR 15/kg

Futures

A Futures contract is a contract between 2 parties → Vitthal will sell Swetha

to buy/sell an asset → 10 tons of wheat

at a fixed future date → on Jan 31, 2017

at an agreed price → at INR 15/kg

Futures

Vitthal will sell Swetha on Jan 31, 2017

10 tons of wheat at INR 15/kg

In this contract

Vitthal benefits if the spot price of wheat on Jan 31 < INR 15

Futures

Vitthal will sell Swetha 10 tons of wheat
on Jan 31, 2017 at INR 15/kg

Spot price of wheat on
Jan 31 , 2017

< INR 15/kg → Vitthal will benefit

> INR 15/kg → Swetha will benefit

Futures

Vitthal will sell Swetha 10 tons of wheat
on Jan 31, 2017 at INR 15/kg

Vitthal will benefit if wheat price falls below INR 15

Short Position

Swetha will benefit if wheat price rises above INR 15

Long Position

Futures

The price of the futures contract is directly dependent on the spot price of the underlying asset

Futures

If the spot price increases , futures price increases and vice versa

Futures

Futures contracts allow traders to bet on the value of something without directly investing in it

Futures

For example, a futures contract on a stock market index, allows the trader to go long or short on the index

Futures

In addition to this, there are 4 important differences between trading futures and trading stocks directly

Futures

4 important differences

1. It is far easier to express a short view on a stock or a commodity via futures than via the underlying stock or commodity itself - no need to borrow

Futures

4 important differences

2. Futures have an expiry date

You can hold on to a stock forever

Futures

4 important differences

2. Futures have an expiry date

On the expiry date, the futures contract will 'settle'

Futures

4 important differences

2. Futures have an expiry date

The settlement could be a cash settlement or a physical settlement

Futures

4 important differences

2. Futures have an expiry date

In a cash settlement, when the futures contract expires, the cash value of the underlying asset will change hands

Futures

4 important differences

2. Futures have an expiry date

In a physical settlement, the actual stock or commodity is transferred - this can be a pain, and is not the norm

Futures

4 important differences

3. Futures have a margin requirement

To minimize the risk of default on the contract, traders need to maintain a cash margin at a brokerage/clearing house

Futures

4 important differences

3. Futures have a margin requirement

A cash balance of 5-15% of the futures contract value needs to be maintained by the trader

Futures

4 important differences

3. Futures have a margin requirement

As the spot price of the underlying asset changes,
futures value changes,
cash balance requirement changes

Futures

4 important differences

3. Futures have a margin requirement

If the trader does not maintain the required cash balance, then the broker can close out the position

Futures

4 important differences

4. Futures are marked-to-market on a daily basis

Each day, the gains or losses on the contract will be reflected in your account

Futures

4 important differences

4. Futures are marked-to-market on a daily basis

This means that cash will flow into, or out of, your account each day

Futures

4 important differences

4. Futures are marked-to-market on a daily basis

This means that you could run into cash flow issues if you trade on margin and your position loses money

Futures

4 important differences

4. Futures are marked-to-market on a daily basis

This daily mark-to-market is what leads to the phenomenon of the dreaded 'margin call', where your broker asks you to deposit cash or quit trading

Futures

What are futures contracts used for?

Futures

What are futures contracts used for?

Hedgers
Speculators
Arbitrageurs

are the different kinds of folks based on why they invest in futures/derivatives

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

Hedging is the process of protecting against exposure to risk

Futures

What are futures contracts used for?

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Arbitrageurs

A farmer who produces wheat might buy a futures contract to hedge against the risk of wheat prices falling

Futures

What are futures contracts used for?

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Speculators

Arbitrageurs

Speculators have a point of view on which direction the price of the asset will go

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

They use futures contracts to go long or short on an asset based on that point of view

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

are folks who look for market inefficiencies

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

For example, there is a mathematical relationship between the spot price and the futures price

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

If that relationship is violated, for instance if the futures contract is too expensive relative to the spot price

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

Then buying in the spot market and selling in the futures market can guarantee a profit

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

This is called an arbitrage opportunity

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

Arbitrageurs will rush to exploit this, and the spot price will rise, and the futures price will fall

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

This will continue until that mathematical relationship is satisfied again, i.e. until the arbitrage opportunity closes

Futures

What are futures contracts used for?

Hedgers

Speculators

Arbitrageurs

In a perfect market , arbitrage opportunities are rare and disappear in a very short time

Quantitative Trading

involves trading in **Financial Markets**

with the help of **Trading Strategies**

developed using **Mathematical Models**

Quantitative Trading

involves trading in Financial Markets

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What is a trading strategy?

What is a trading strategy?

A trader needs to make a
set of decisions each day

Which securities to trade?

Whether to go long or short?

How long should the position be held?

What is a trading strategy?

A Trading Strategy is a set of rules that decides

Which securities to trade?

Whether to go long or short?

How long should the position be held?

What is a trading strategy?

An example:

Whenever the closing price > opening price of a stock, go long on the stock the next day

What is a trading strategy?

A Trading Strategy is a set of rules

These rules could be based on experience, judgment, or instinct

What is a trading strategy?

A Trading Strategy is a set of rules

These rules could be developed using quantitative models

What is a trading strategy?

A Trading Strategy is a set of rules

How do we figure out whether
a trading strategy is good?

What is a trading strategy?

A Trading Strategy is a set of rules

There are different measures to help evaluate a trading strategy

Performance Measures

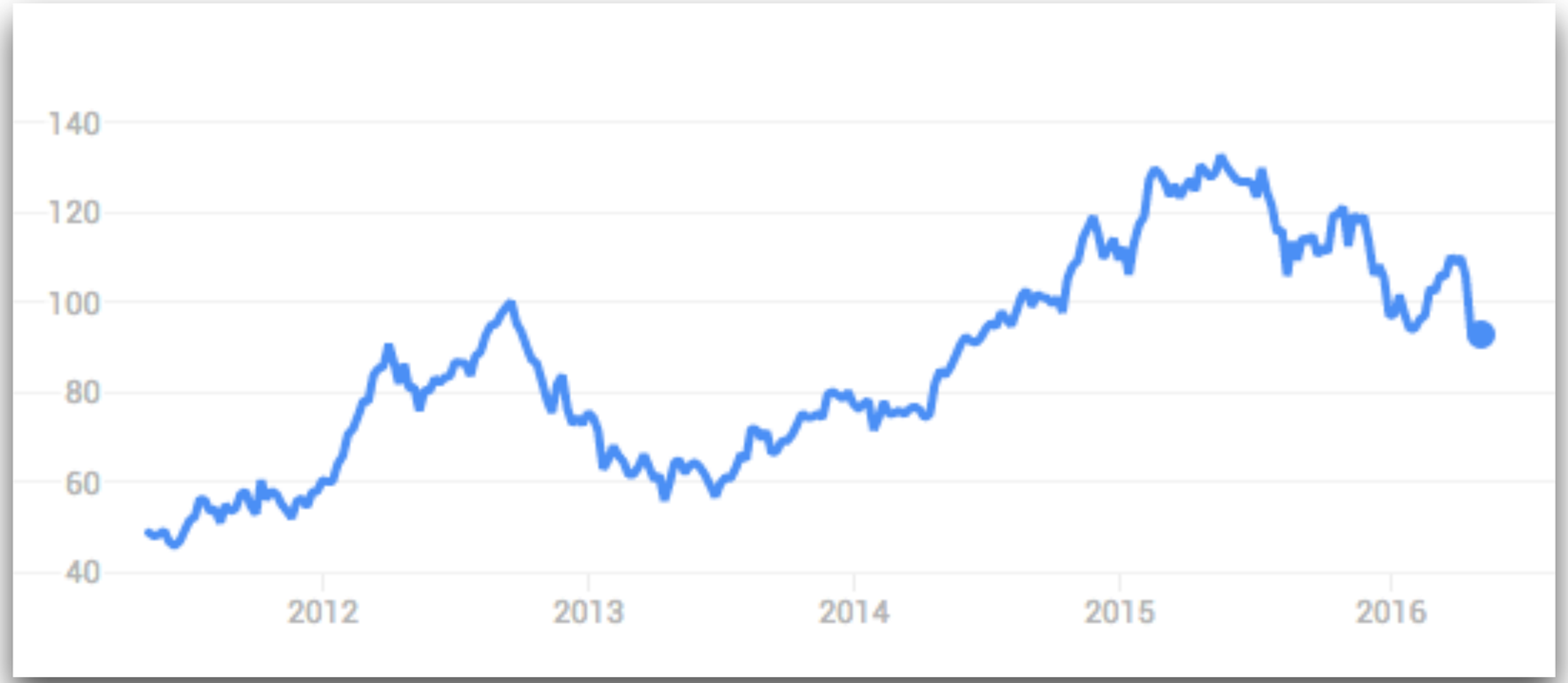
Return — The average upside/downside

Risk — The variability in the Return

Risk adjusted Return — Accounts for both of the above

Return

Here is the price trend of Apple Stock over the last 5 years



Return

Let's say you bought some Apple shares in 2012

Return

As the price of the shares increases, you make a profit

Return

As the price of the shares decreases, you make a loss

Return

The net gain/loss you make over the period that you hold the stock is called the

Return

Return

$$\text{Return} = P_{sell} - P_{buy}$$

Return is usually expressed as a %

Return

$$\text{Return \%} = \frac{P_{sell} - P_{buy}}{P_{buy}}$$

aka Return Rate

Return

How does Return help in evaluating a trading strategy?

Return

Compute the daily returns on your trading strategy

$$\text{Daily Return \%} = \frac{P_{today} - P_{yest}}{P_{yest}}$$

Return

$$\text{Daily Return \%} = \frac{P_{today} - P_{yest}}{P_{yest}}$$

The **Average Daily Return** tells us how the strategy has performed

Average Return

can be calculated based on the frequency of trading, daily/weekly/monthly

Average Return

This measure doesn't account for the fact that the returns might vary a lot

Average Return

This is exactly where Risk comes in

Performance Measures

Return — The average upside/downside

Risk — The variability in the Return

Risk adjusted Return — Accounts for both of the above

Risk

Risk is a measure of
variability in the Return

Risk

Risk is often measured as

The standard deviation of returns

Risk

Standard deviation measures of risk have some flaws

They do not perfectly capture some forms of risk, such as 'tail risk'

Risk

Even so, standard deviation measures of risk are

Very common, and quite robust - if used with caution

Risk

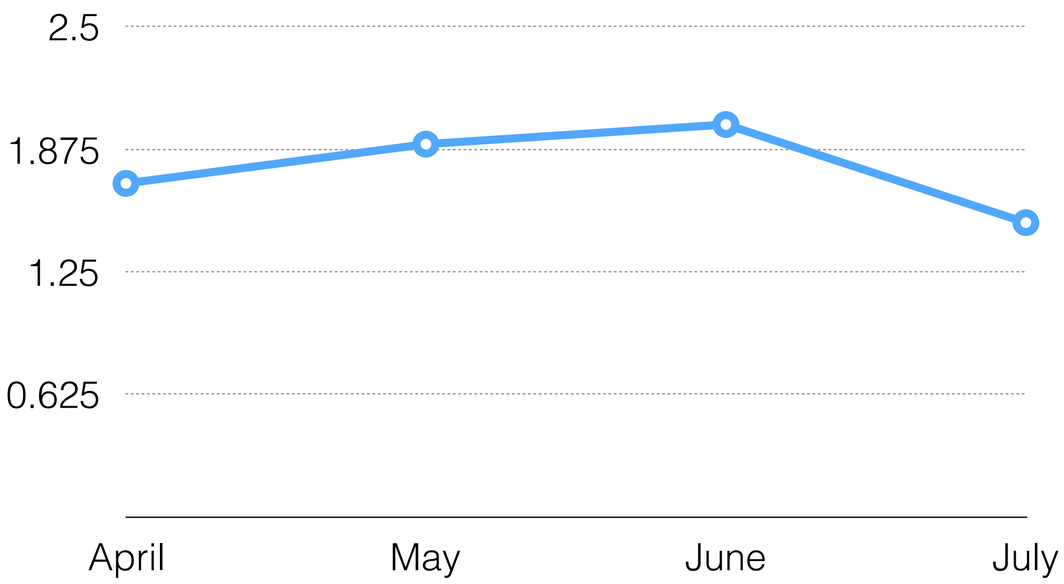
For now, let's use keep things simple -

we will use the terms risk and standard-deviation synonymously

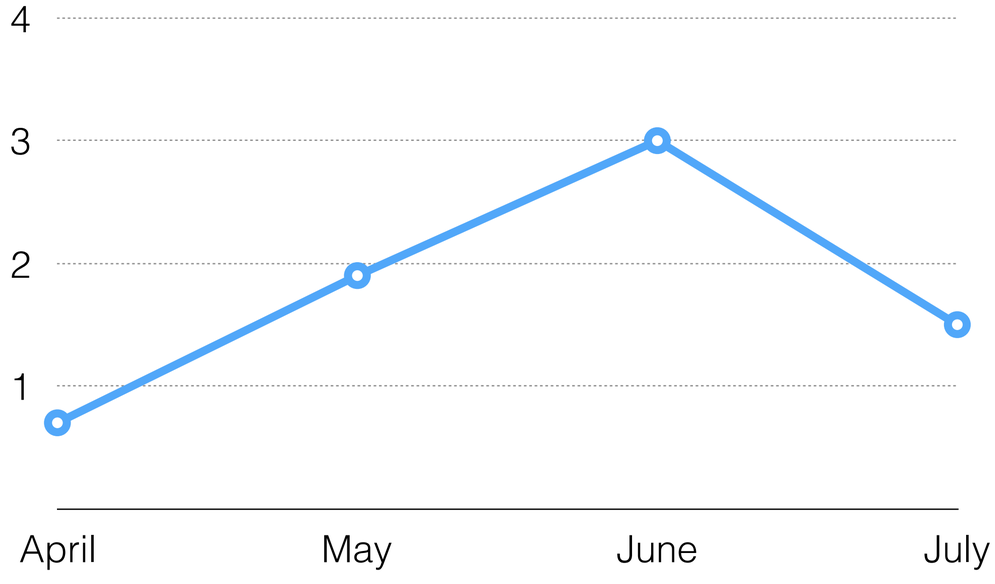
Risk

Let's consider the Monthly return series of 2 stocks

Stock A

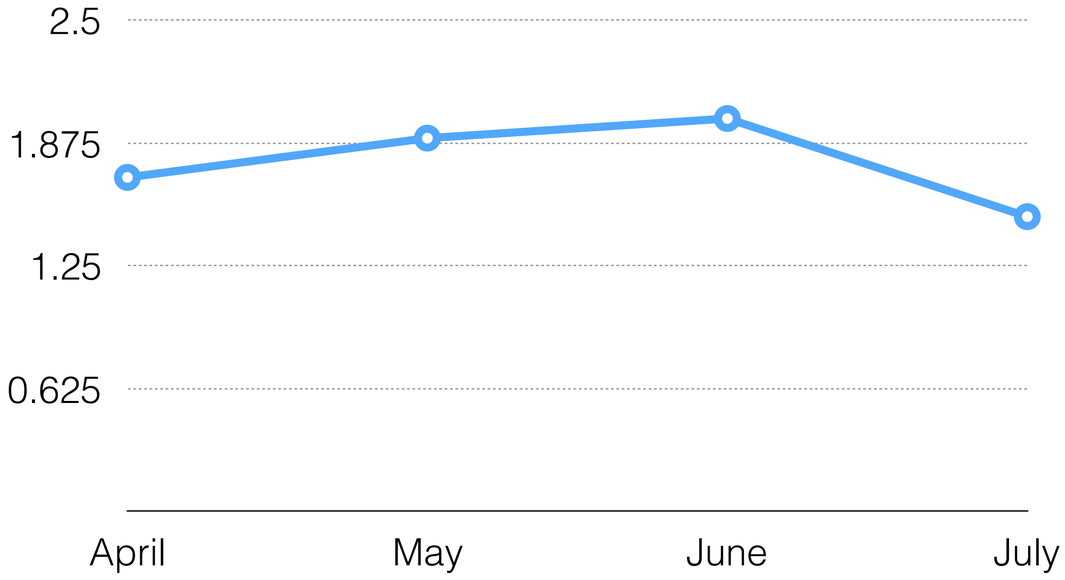


Stock B

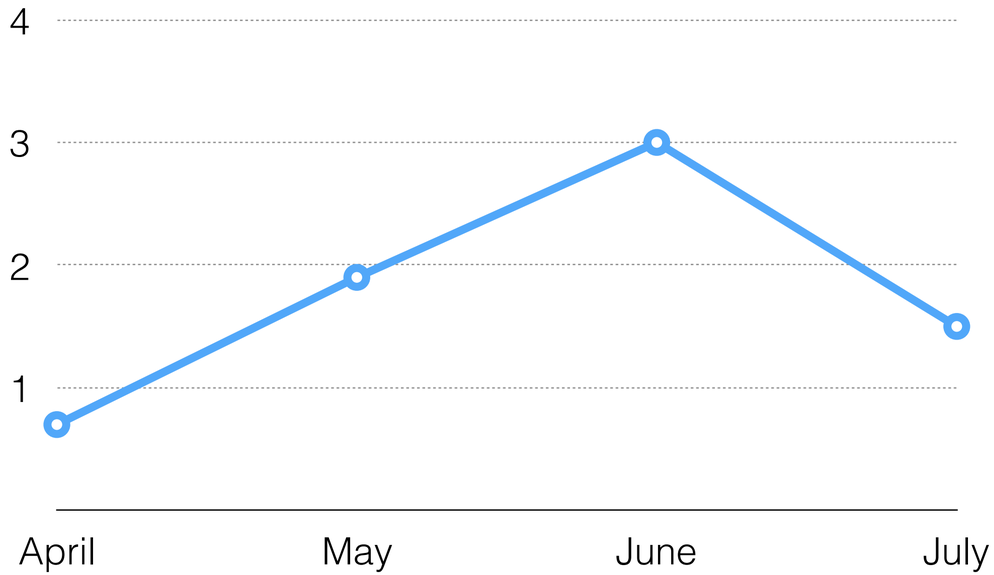


Risk

Stock A



Stock B

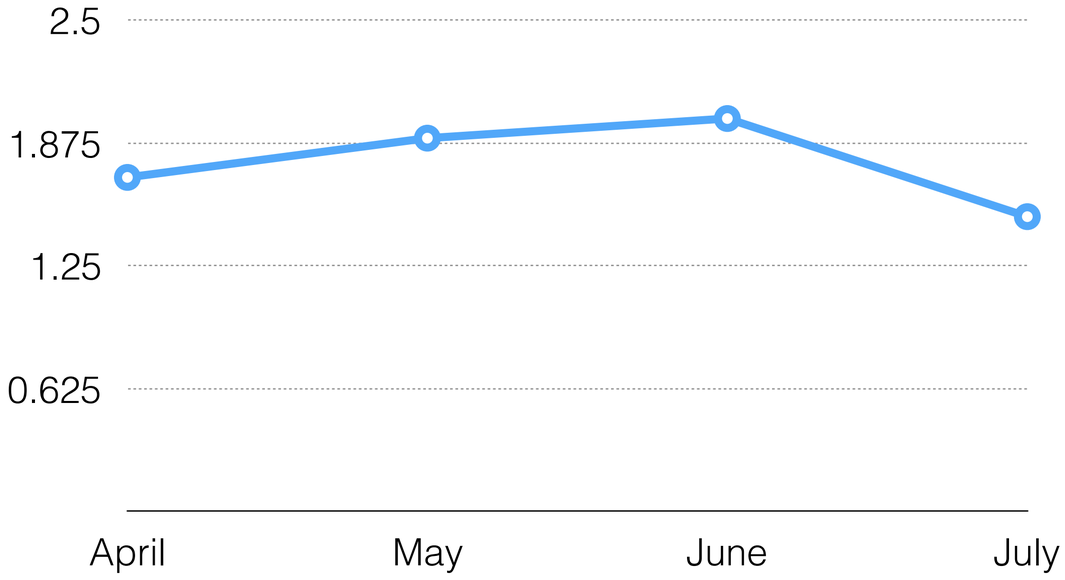


Average monthly return

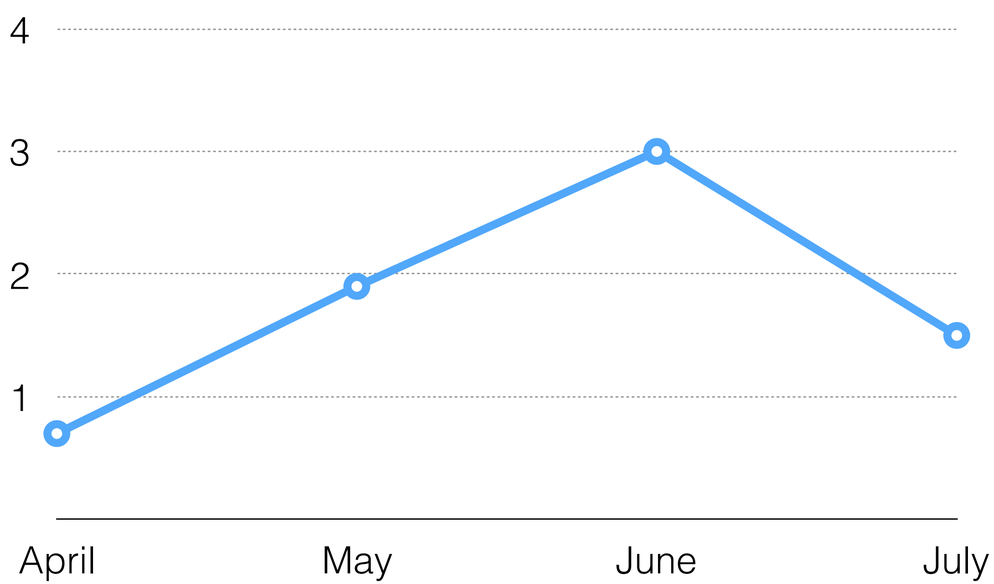
1.8% for both stocks

Risk

Stock A



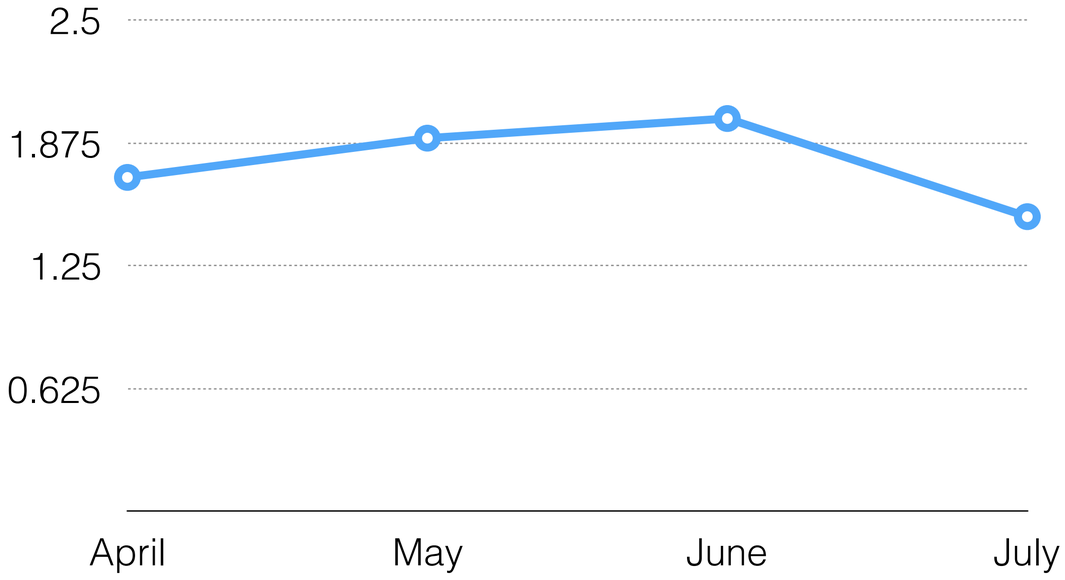
Stock B



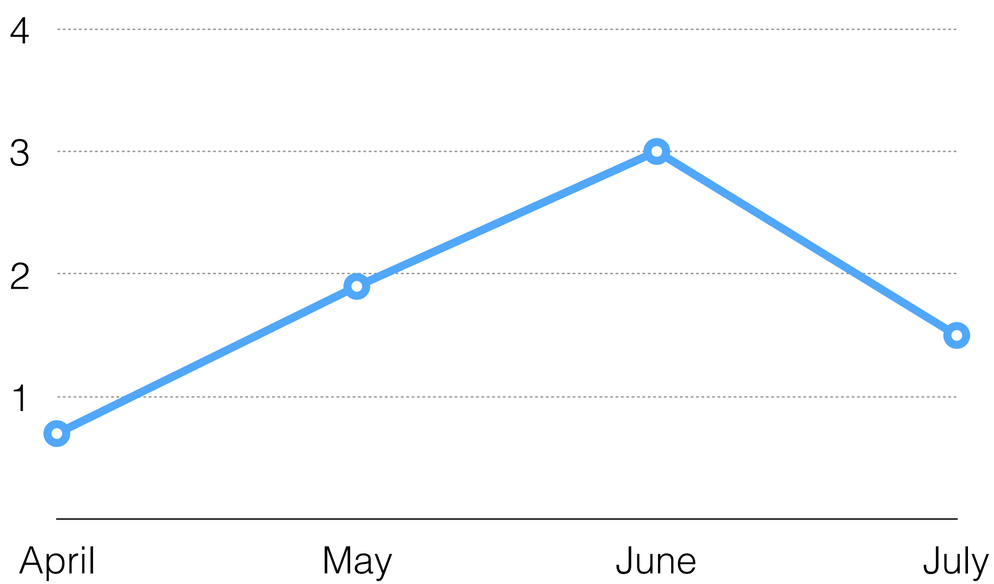
However, Stock B has much more variability in the return

Risk

Stock A



Stock B



This variability makes it riskier to invest in Stock B vs Stock A

Risk

In general, the higher the average return of a security

The higher the risk as well

Risk

The lower the risk of an investment the "safer" the investment is

Risk

Theoretically, it is possible to have a security with **Zero Risk**

The return from such a security is called the **Risk-Free Rate of Return**

Risk

Zero Risk

In reality, all securities carry some amount of risk

Risk

Zero Risk

Risk-Free Rate of Return

Some government issued bonds can be used as a proxy for a risk-free security

It's considered highly unlikely that the government would default on it's obligation

Risk

Zero Risk

Risk-Free Rate of Return

It's considered highly unlikely that the government would default on it's obligation

But governments default quite often, and even the US has flirted with defaulting on its debt, for instance in 2011

Risk

Zero Risk

Risk-Free Rate of Return

In general, an investor would not use a trading strategy unless the return is higher than the Risk Free rate of return