

# Quantitative Finance with R

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# Modules

Introduction to R and Finance

The Random Walk Hypothesis and Geometric Brownian Motion

Efficient Frontier Theory

Capital Asset Pricing Model

Playing with Intraday data

# Some prerequisites

## Install Anaconda

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```
$ bash Anaconda-latest-Linux-x86_64.sh
```

```
$ conda create -n r_env r-essentials r-base
```

# Link to repository

<https://github.com/duskybomb/quantitative-finance-talk>

A man with dark hair, wearing a light blue button-down shirt, is shown from the chest up. He is gesturing with his right hand, palm facing forward, with fingers spread. He appears to be speaking, with his mouth slightly open. The background is a solid, muted blue-grey color. A small black lavalier microphone is clipped to his shirt near the collar.

don't worry about it if you don't  
understand

# Introduction to R and Finance

Simple Operations in R

Compute Log-return

Compute simple return

K-period Simple Return

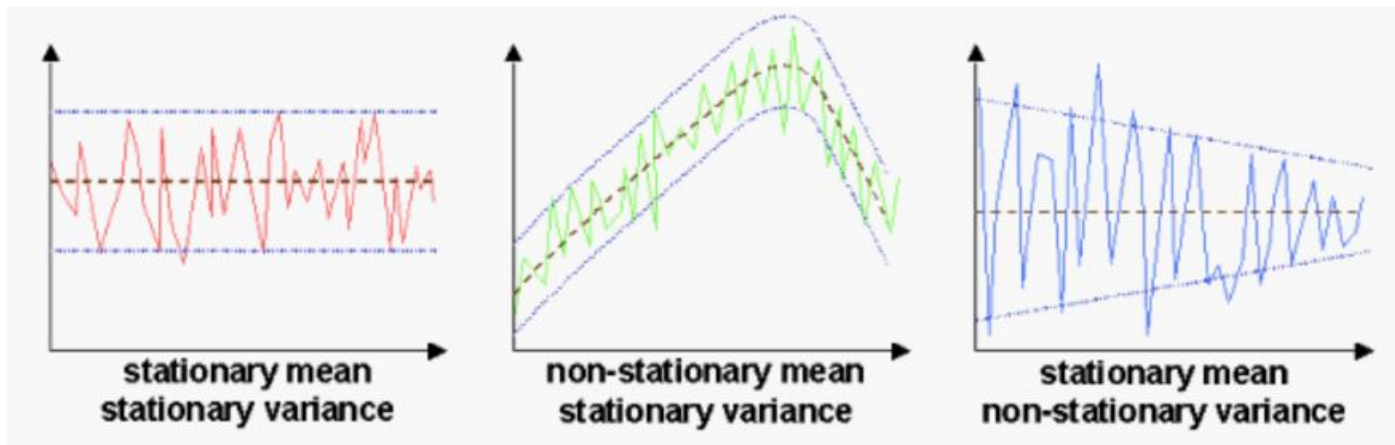
K-period log Return

# Random Walk Hypothesis

Random walk theory suggests that changes in stock prices have the same distribution and are independent of each other. Therefore, it assumes the past movement or trend of a stock price or market cannot be used to predict its future movement.

# Stationary Process

- In probability, a stochastic process is known as stationary if the joint probability distribution is independent of time.
- Parameters such as mean, volatility, correlation etc., do not change over time



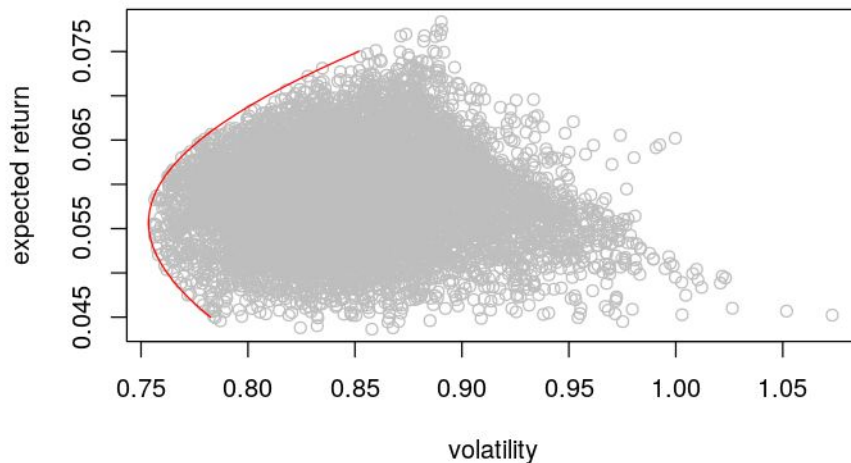


# Geometric Brownian Motion

A geometric Brownian motion (GBM) (also known as exponential Brownian motion) is a continuous-time stochastic process in which the logarithm of the randomly varying quantity follows a Brownian motion (also called a Wiener process) with drift. The properties of price growth with respect to time offers us opportunities to model stock price movement with brownian motion.

# Efficient Frontier and Portfolio Optimization

A set of optimal portfolios that offer the highest expected return for a defined level of risk or the lowest risk for a given level of expected return.



# Capital Asset Pricing Model

Security Characteristic Line

Security Market Line

Factor Model

# Intraday Data!

Thank You

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