Quantitative Investments

Dale W.R. Rosenthal

1 June 2018
Course Objectives

- This course introduces:
  - asset classes;
  - capital markets;
  - the meaning of prices;
  - diversification; and,
  - some parts of asset pricing;

- This course will be, unavoidably, quantitative in parts.

- Introductory statistics knowledge is helpful.
Coursework

- We will cover 2 chapters each week.
- Some material: same as CFA preps, Wall Street orientations.
- Believe it or not: you can grasp the material with minimal studying.
- Two tools to prevent you from falling behind:
  - Quizzes for each concept area (rapid feedback); and,
  - Homeworks (to help cement concepts, teach R skills).
- You will use what you learn here for the rest of your life.
  - \textbf{Uwaga!} Retirement, kids’ college depend on this.
- Will learn enough to criticize most financial journalism.
Introduction

Chapter 1, *A Quantitative Primer on Investments with R*
An *investment* commits resources now for future benefit. You commit time, cash, work, ideas, materials, space... now. Expect more (money? happiness?) than you put in... later. All of you, right now, are investing:
- Spending time and work to get an education.
- Have cash in a bank account to reduce theft, get interest.

However, we should always consider *opportunity costs*:
- How much benefit could you get doing something else?
- Why not work straight out of high school? More seniority....
- Why not study something easier? Less work....
Real assets are goods which are used to produce other goods.

- Land: home property, timberland, oil well;
- Physical goods: buildings, manufacturing machinery;
- Knowledge: training, experience, college, grad school;
- Intellectual property: patents, copyrights, “secret sauce”;
- Commodities: corn, coffee, copper, gold, oil, natgas; and,
- Energy: electricity.

Real assets can be harder to value, but we use them every day.

Wealth is created from real assets; money alone isn’t enough.

Bitcoin is a real asset — lacking clear fundamental value.
Financial assets are claims on real assets or income.

- Payments from letting land, oil well, buildings, equipment;
- Royalties from use of intellectual property;
- Interest on and return of monies lent to someone;
- Foreign currencies;
- Payments due to partial ownership of a firm; or,
- Cashflows exchanged by prior agreement.

We often further decompose financial assets:

- Fixed-income: a promised stream of income ("bonds");
- Equity: ownership stake, but no income promise ("stocks");
- Derivatives: contracts for payments based on other prices.

Our focus: investments in financial assets (and money).
Economists believe the finance sector is uniquely different:
- Financing helps/encourages people to invest.
- Bartering-based economies fail eventually. Why?
- Cash: easily stored/transported; universally used.

A damaged finance sector puts the whole economy at risk.
- People cannot get loans for cars, homes, school.
- Storeowners cannot use credit to buy goods to sell.
- Firms cannot use loans to complete projects.
- Firms cannot issue shares of ownership to expand.

Why not just accrue cash? Inefficient; discipline of debt.
Capital markets trade financial assets; asset markets trade real assets. We believe capital and asset markets serve multiple purposes:

- Markets help individuals/companies *time their consumption*.
  - Earning more than you need now? Store wealth for later.
  - Earning less than you need now? Use wealth stored earlier.
  - Might also borrow from later wealth to get money now.\(^2\)

- Market prices *convey information* about expected value.
  - Decisions are made based on prices = signals to economy.
  - *Price Theory*: Prices thus most important role of markets.
  - Decentralizes economic planning; power to the people.

---

\(^2\) This is Will Goetzmann’s money time machine.
Capital and asset markets also help us specialize:

- **Allow us to shift unwanted risk** to others.
  - Should farmers, bakers, brewers try to predict wheat prices?
  - Should Southwest, United be predicting jet fuel prices?
  - Or, should they lock in prices and focus on what they do best?
  - Do all Tesla investors want the same risk from battery factory?

- **Facilitate separation of ownership and management.**
  - Meet every day to manage firms you invest in?
  - Or, hire people to run the company for you.
  - Managers are charged with “maximizing shareholder value.”
  - **Agency problems**: possible conflicts of interest for managers.
Capital and asset markets also serve an oversight role:

- Allow us to *compare firms and their performance.*
  - Investors can agitate to punish poor management.
  - Better management can be rewarded with stock/options.
  - Can see reaction to various announcements.
  - Reduce incentives to cheat (e.g. disciplining power of debt).

- Markets also *reward people who find problems.*
  - A key assumption of these markets is trust.
  - Financial statements, inventories, prices must be honest.
  - If not: investor can bet against firm, unveil its dishonesty.
  - Case in point: Enron scandal unveiled by Richard Grubman.
Deciding where to invest involves a few concepts:

- *Asset allocation*: choosing asset classes of investments.
- *Security selection*: choosing instruments to invest in.

Two common ways to determine where to invest:

- *Top-down*: asset allocation, then security selection.
- *Bottom-up*: Security selection ignoring asset allocation.

We will discuss asset classes shortly, but in general:

- Stocks vs bonds vs real estate vs commodities vs cash vs ...
Market participants are always looking for easy profits.
- Electric car makers are all getting rich!
- $\text{Bit}\text{} $\text{coin! COIN! COIN! HODL DAT COIN!}$
- If true, you would all be investing in these areas...
- Act I: easy $; Act II: competitors; Act III: low prices, consolidation.

This leads us to believe markets are competitive:
- *i.e.* There is “No Free Lunch with Vanishing Risk” (NFLVR).
- The economic equivalent of there being no perpetual motion.

Thus we believe there is a *risk-return tradeoff*:
- We expect more return from riskier investments.
- If govt bonds pay 3%/year, why take risk for 3% or less?
Market Participants

Who are these “market participants?”

- Some make up what we call the *real economy*:
  - Individuals/households: save/invest cash; and,
  - Non-financial companies: raise capital for plants/equipment.
- Governments and agencies also participate in markets:
  - Borrow for capital projects: infrastructure, defense, etc.;
  - Trade in the bond market to set rates (aka monetary policy).
  - In some countries, governments invest to pay retirees.
- Finance firms are very active participants in markets.
Market Participants: Financial Firms

- Finance firms participate because they act as facilitators.
- *Investment bankers* assist with raising capital.
  - Help firms find investors and give feedback/advice.
  - Originate securities in the *primary market*; or,
  - Help buy/sell a firm or merge with another firm.
- Investments lead to *securities*: stocks or bonds.
- Those securities are traded in the *secondary market*.
- *Financial intermediaries* help buyers find sellers in market.\(^5\)
  - May match buyers with sellers (act as a *broker*);
  - May trade with buyer/seller (act as a *dealer*).
  - May also advise buyer on where to invest.
  - Banks take in money, pay interest, lend out money.\(^6\)

\(^5\) Usually in the secondary market.

\(^6\) Banks help buyers of cash find sellers of cash.
To get at investment ideas, we are going to play *Acquire!*

1. Place pieces
2. Hotel! Founder gets share.
3. Hotels grow
5. Larger hotel takes over

Then will talk about various asset classes.
May want to start reading one or more of these:

- Markets pages of the *FT*;
- Money and Investing section of the *WSJ*;
- *The Economist* (best, funniest, but most reading).

I *highly* recommend two books:

- *Money Changes Everything* by Will Goetzmann.
- *Why Nations Fail* by Daron Acemoglu and James Robinson.

If your background is not strong in economics:

- *Economics in One Lesson* by Henry Hazlitt.
- Can also watch *Free to Choose* videos.

For silly/fun books:

- *Liar’s Poker* and *The Big Short*: Probably Michael Lewis’s only good books; however, they are amazing.
- *King of Oil* and *Metal Men*: Oddly fascinating.
We have covered the introduction; on to asset classes next time!

- Fundamentals: Asset Classes, Markets, Efficiency;
- Measuring: Returns, Risk, and Diversification;
- Valuation: Fixed Income, Yield Curves, Equity Valuation;
- Valuation II: Factor Models, Microfoundations, Global Investing, FX;
- Risk Alleviation: Futures, Options, Credit, Structured Products; and,
- All Together Now: Active Portfolios, Investment Firms, Crises.