Lecture Note Compilation: Econ 252: Financial Markets at Yale University

Number of Lectures: 23

Course Term: Spring 2011

Lecturer: Robert Shiller

Note: This is a condensed typed version of my lecture notes.

Lecture 1 – Introduction

- Finance is a pillar of civilized society and the structure through which we do things. It is about:
  - **allocating limited resources through space and time.**
  - incentivising people to do productive things
  - sponsoring ventures that bring together a lot of people.
  - managing risk.
- The G20 very involved in finance.
- Finance is a technology for doing things.
- Finance is just not about math. **It is about making things happen**-getting resources to fund something. Finance is a **technology**.
- Wealthy people must give back to society.
- **Risks are not as independent as you think – that is why we had a financial meltdown.**
- **Great Depression of 1939**
  - Economy spiralled down till 1933.
  - By 1933, 25% of the US population was unemployed.
  - Not just US, but whole world.
- **Insurance industry**
  - Uses law of large numbers.
  - Extensive use of probability theory.
  - Insurance industry goes back to ancient Rome.
- **Debt Market**
  - Very important.
  - Have to borrow money to buy items because we don't have sufficient funds available.

Lecture 2 – Risk and financial crisis

- **2008 financial crisis**
  - Both the stock market and the housing market collapsed.
  - Institutional collapses are seen as well.
- **A financial crisis isn't just an event – it is an accumulation of a lot of events.**
- **Return**
  - $Price_{t+1} - Price_t$ = Capital Gain
  - Returns between -100% and infinity.
  - Gross return is between 0 and infinity.

Return

- $Return_t = \frac{Price_{t+1} - Price_t + Dividend_t}{P_t}$
- $Gross\ Return = 1 + Return$

Expected Value, Mean, Average

$$E(x) = \mu_x = \sum_{i=1}^{\infty} prob(x = x_i)x_i$$

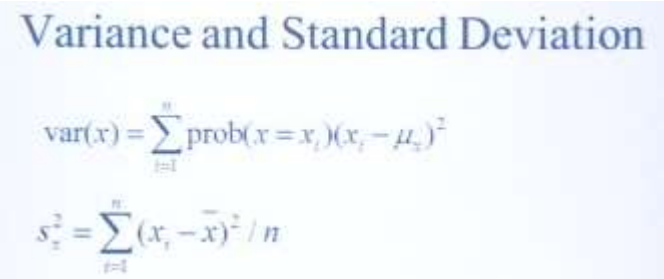
$$E(x) = \mu_x = \int_{-\infty}^{\infty} f(x)xdx$$

$\bar{x} = \sum_{i=1}^{n} x_i / n$ is the Arithmetic mean.

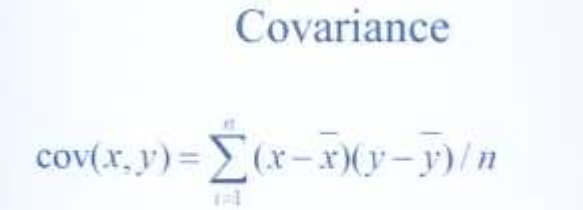
$G(x) = (\prod_{i=1}^{n} x_i)^{1/n}$ is the Geometric mean.

- For the geometric mean, gross returns have to be used. Otherwise we would get negative numbers and end up working with an imaginary number.
- **Geometric mean is the better measure of outcome of investments.**
  - **Scenario:** 50% in one year, 35% in following year and then -100%.
  - Gross return is correctly 0%.
  - The arithmetic is thus not a good measure of return.

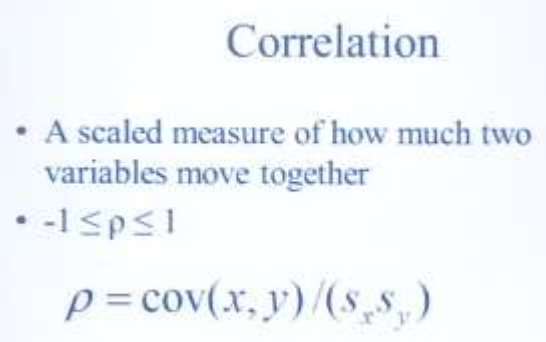
- **Variance and Standard Deviation**



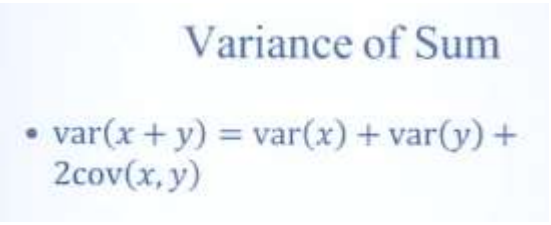
- **Covariance**
  - e.g. x is return on IBM Corporation and y is return on GM Corporation.
  - Covariance is a measure of how 2 different random variables move together.



- **Correlation**
  - **Correlation is scaled covariance.**



- **Variance of Sum**

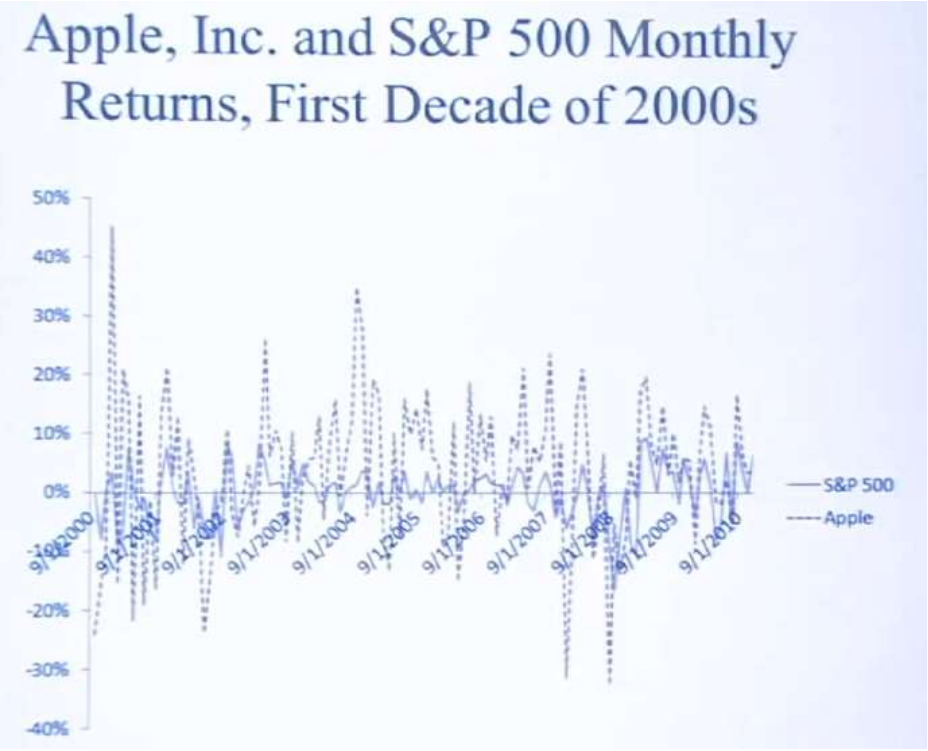


- **If RVs are independent**

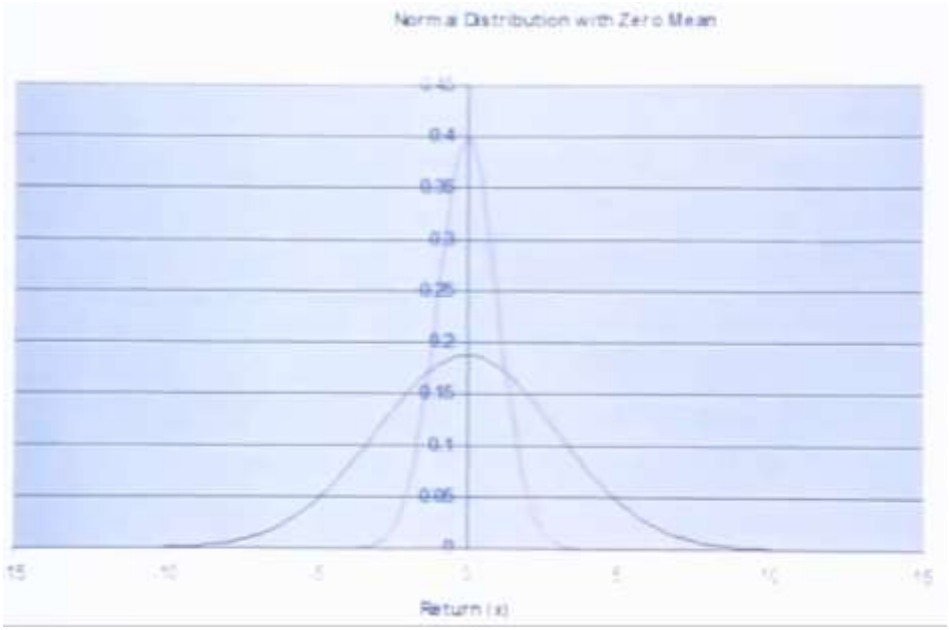
var(x1 + x2 + x3 + x4) = var(x1) + var(x2) + var(x3) + var(x4)

- **Stock Market level**

- **VaR (Value at Risk)**
  - e.g. 5% probability that we will lose $10m in a year.
  - Assumes independence or relative independence.
- **Apple Stock Analysis**



  - Enormous volatility between the months. Apple shows a magnified response to the stock market. It goes up and down approximately one and a half times as much as the stock market does on any given day.
  - Return = market return + idiosyncratic return
    - Apple has a lot of idiosyncratic return.
- **Outliers**
  - Markets exhibit fat-tailed distributions.



- **Stock Market**
  - On a typical day, the stock market moves up or down by a percent.

Lecture 3 – Technology and Invention in Finance

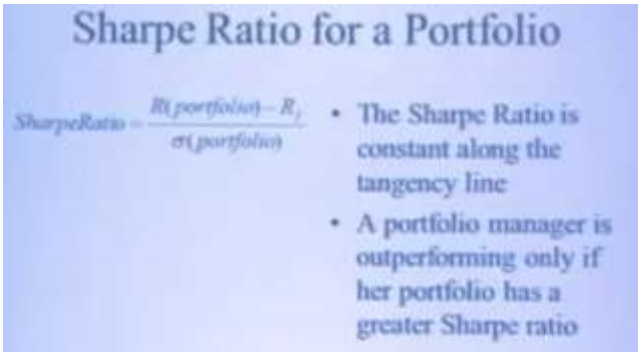
- Finance is a **form of engineering.** Finance is all about **inventions that solve problems.**
- Engineering requires a human element. People are imperfect.
- **Finance requires "Human Factors Engineering." Make it simple!!!!**
- **1970**
  - No options exchanges
  - No financial futures
  - No swaps
  - No electronic trading
- **Corporations**

- Really old invention.
- Corporation comes from the Latin word corpus, which is a body/slave.
- **Limited Liability Corporation:** Shareholder not liable for debts of company.
  - Took hold in 1811 in the state of New York.
  - Made it easier to start a company – no act of Congress needed.
  - New York became the financial hub.

- **Inflation Risk**
  - Measured by Consumer Price Index
  - **Most debts are nominal in nature.**
    - Written in a currency unit.
  - First indexed bond issued in Massachusetts in 1780 by the Massachusetts government.
  - Only reappeared later in 1997.
  - But still people buy 30-year nominal bonds. Nominal bond is risky.
- **Chile currency crisis**
  - Had currency called the **peso.** Inflated enormously. Gradually becoming worthless.
  - Chile switched to a currency called the **escudo** in 1960.
  - In 1975, they switched back to the **peso.**
- **Swap**
  - Financial contract invented by David Swensen.
  - **Example:** Party 1 : Euros for Dollars. Party 2: Dollars for Euros
- **Credit Default Swap**
  - **Parties:**
    - Protection buyer
    - Protection seller
  - **When bankruptcy of some kind occurs, the protection seller has to pay the protection buyer.**
  - 1980s
  - **It looks like insurance.** Get something like credit insurance - developed in 19th century.

Lecture 4 – Portfolio Diversification and Supporting Financial Institutions

- **Vereenigde Oost-Indische Compagnie (VOC) - 1602**
  - Start company with shares that you can buy.
  - Was listed on the Amsterdam Stock Exchange -oldest stock exchange in the world.
    - Initially only had one stock.
- **Equity Premium**
  - **The geometric annual average return on the US stock market was 6.8% per year corrected for inflation.**
  - Short-term government asset returns was only 2.8% per year.
  - Thus stocks have performed extremely well.
  - Equity Premium of 4%.
  - Every single country had an equity premium.
  - **Extra return is a risk premium.**
- **Diversification**
  - Don't put all your eggs in one basket. **Diversify**!
- **Mutual Fund**
  - Certain kind of investment company that is mutual.
  - Mutual means that that there is only one class of investors.
- **Beta**
  - The CAPM implies that the expected return on the ith asset is determined from its beta.
  - Beta is the regression slope coefficient when the return on the ith asset is regressed on the return on the market.
- **Sharpe Ratio**



Lecture 5 – Insurance, the Archetypal Risk Management Institution, its Opportunities and Vulnerabilities

- The idea of insurance (risk pooling) goes back to ancient Rome.
- **Basic types of insurance**
  - **Life Insurance:** insures against early death
  - **Health Insurance:**
  - **Property & Casualty Insurance:** Insuring your house or car.
- **Investment-oriented products**
  - **Annuities**
- **Insurance must cover full value of property to be meaningful.**
- Insurance contracts must be such that they prevent moral hazard from being excessive.
- **Need collection of statistics on risks.**
- **AIG**
  - Founded in Shanghai in 1919 by Cornelius van der Star (while still a British protectorate).
  - AIG was the biggest bailout in the subprime crisis.
  - Appointed Maurice "Hank" Greenberg as CEO.
  - Greenberg was forced out by Elliot Spitzer.
  - Bailout of $182bn came from TARP (Troubled Asset Relief Program).
    - TARP created under Bush administration.
    - Henry Paulson ran TARP.
  - Concern was about systematic risk.
    - If AIG went under all kind of things would go wrong.
    - Banks would fail.
  - AIG shareholders lost almost everything.
  - Government took preferred shares in the company at a very low price in exchange for helping the company survive.
- **Deposit insurance**
  - Bank accounts are insured by the FDIC (Federal Deposit Insurance Corporation) up to a limit ($200 000).
  - Meant to protect individual.
  - FDIC is a federal/national insurance program.

Lecture 6 - Guest Speaker: David Swensen

- **David Swensen is the inventor of the swap.** He is the Chief Investment Officer (CIO) of Yale's endowment and took over the endowment when the portfolio was less than a billion.
- In the mid 1908s, colleges and universities had on average (in mid 1980s):
  - 50% portfolio in US stocks
  - 40% portfolio in US bonds and cash
  - 10% alternatives
- **Diversification is a "free lunch."**
- The 90% that are in stocks and bonds (under many circumstances) **will respond to the same driver of returns, interest rates, in the same way.**
- **Endowments have a longer time horizon than any investor.**
- **Asset Allocation**
  - Which assets you are going to have in your portfolio and in what proportion. e.g.
  - How much in domestic stocks?
  - How much in foreign stocks?
  - How much in real estate?
  - If you're an institutional investor:
    - How much in venture capital?
    - How much in LBOs?
- **Market timing decision**
  - The most important tool.
- **Zero-sum game**= someone might overweight on Ford and underweight GM, whilst someone else might underweight on Ford and overweight GM.
- **Negative-sum game**= costs money to play the game, in the form of commissions and fees.
- **Performance returns of assets classes if invested in 1925 till end of 2009**
  - Treasury Bills (short-term loans to the US government --one of the least risky assets imaginable) 21 times your money
  - Treasury Bonds 86 times your money
  - Small stocks 12226 times your money (!)
  - Big stocks 2592 times your money

    - Benchmark inflation 12 times
    - **You get rewarded for accepting equity risk.**
    - Why not just invest in stocks? Because you can lose all your money in a financial crisis. You need to diversify to live through those inevitable periods.
- **Market Timing**
    - In every single category, the TWRR was greater than the DWRR.
    - That means, **investors (whether individual and institutional) systematically made perverse decisions of when to invest and disinvest** from mutual funds. They were buying in after a fund showed strong relative performance and selling after a fund showed poor relative performance.
- **10-year returns for various asset classes. Differences between 1st and 3rd quartile:**
    - **Bond Market** 0.5% per annum
        - Bonds are just math! Most easily analysed.
    - **Large cap stocks** 2% per annum
    - **Foreign stocks** 4% per annum
    - **Absolute Return Hedge Fund** 7.1% per annum (!)
    - **Real estate** 9.3% (!)
    - **LBO** 13.7% (!)
    - **Venture Capital** 43.2% (!)
- **Yale Model**
    - Yale is one step **removed from the security selection process.** Yale's job is to find the best hedge fund managers, best domestic equity managers and best buyout managers and put together partnerships that work for them and Yale.
- **Individuals have an almost zero chance of beating the market. Individuals should invest in index funds. They are low cost ways of mimicking the market.**
- 2 solutions to beating the market:
    - Most people and institutions are in the middle. You lose here.
    - **Be aggressively active or completely passive.**
- **Diversification**
    - One of the great things of having a diversified portfolio is that you can worry less about the relative level of valuation of various assets in which you invest.
    - **Yale rebalances**. e.g. if domestic equities have a a great relative performance, you sell them and buy other assets that showed poor relative performance.
- Yale has a long-standing commitment to venture capital.
- **Real estate, timber and other illiquid assets are appraised relatively infrequently**. Value does not change much. Stock prices are much more volatile.