Types of Assets

- This can take many possible forms:
  - **Stocks**: buy a fraction of a corporation
  - **Bonds**: lend cash for repayment in the future
  - **Options**: right to buy or sell an asset at a given price in the future
  - **Mutual Funds**: buy a share of a pool of assets
  - **Futures**: contract to deliver a commodity

- We will focus on two: *stocks* and *bonds*
Two Basic Types of Assets

- Stocks (equities):
  - Share in the ownership of a corporation
  - No expiration; receive dividends (no set time)

Apple Inc. (AAPL)

100.77 -0.19 (-0.19%)

Real-time: 2:27PM EDT
NASDAQ real-time data - Disclaimer
Currency in USD

Range 100.58 - 102.14
52 week 66.57 - 103.74
Open 101.80
Vol / Avg. 36.57M/59.72M
Mkt cap 601.55B
P/E 16.27
Div/yield 0.47/1.87
EPS 6.19
Shares 5.99B
Beta 0.90
Inst. own 62%

Compare: Enter ticker here Add
Dow Jones Nasdaq HTCKF MSFT SNDK SSNNF HPQ

Zoom: 1d 5d 1m 3m 6m YTD 1y 5y 10y All
Jan 02, 2014 - Sep 22, 2014 +20.73 (25.86%)
Two Basic Types of Assets

- Bonds (debt):
  - Corporate, municipal and federal govt debt
  - Used to pay for big projects or meet short term cash needs
  - Offers a steady, certain payout unless the entity goes bankrupt
- Important parts:
  - Maturity: Date of payout
  - Face Value: Dollar payment at maturity
  - Coupons: Payments before maturity
  - Callability, seniority, covenants, etc.
  - Rating (external): Measure of risk
Two Basic Types of Assets
Comparison: Stocks and Bonds

- Stocks:
  - No maturity (easier to hold long term)
  - Voting rights
  - Con: Double taxation of dividends

- Bonds:
  - More predictable cash flow (maybe)
  - Tax advantage
Present Value: The Time Value of Money

- To compare investments, we use the concept of present value.

- The present value of a future sum: the amount that would be needed today to yield that future sum at prevailing interest rates.

- The expected present value of a future sum: the present value of a future sum taking into account uncertainty over the amount to be received.
Present Value Example

- Suppose the market interest rate is 5%, so that you could get a 5% return on any of your savings
- Suppose someone owes you $2100 one year from today
- What is the present value of that debt?
Expected Present Value Example

- Suppose the market interest rate is still 5%
- Suppose someone owes you $3000 one year from today, **but** you think there is a 18% chance they will end up only paying you half
- What is the expected present value of that debt?
Quick Aside on Risk Preference

- The preceding example assumes that the investor is risk neutral.

- We may think that most people are risk averse.
  - Then the riskier the investment, the less they value it.

- Alternatively, people could be risk loving.
  - The riskier the investment, the better.

- Economists typically assume people are risk averse and that businesses are risk neutral.
Value of Each Asset

- The expected present value of a bond is:

\[
\text{EPV of Bond} = \text{EPV of Coupon Payments} + \text{EPV of Maturity Payment}
\]

- The expected present value of a stock is:

\[
\text{EPV of Stock} = \text{EPV of Dividends} + \text{EPV of Sale Price}
\]
Asset Pricing

- By a “no arbitrage” argument, asset prices are equal to their expected present value.
- There are enough big investment banks that are (roughly) risk neutral that would arbitrage away any difference between the price and EPV.
Asset Pricing Examples

Corporate Bond

- Maturity: 5 Years from now
- Face Value: $1000
- Coupons: $100 per year
- Risk: Corporation has a 12% per year risk of default
- Market Interest rate: 10%

What is the price of the bond?
Asset Pricing Examples

Stock

- Expected dividend: $5 per year
- Expected price 3 years from now: $100
- Market interest rate: 10%

What is the price of the stock today?
Availability of Investment

- Obviously, these are things that banks, hedge funds and sophisticated investors buy/sell
- However, it’s easy to buy/sell financial assets on your own
  - Around 60% of Americans own stock
- Simply go to a broker’s website to choose an asset to buy (Vanguard, Fidelity, E-Trade, etc.)
- ... What then shall you buy?
Where the Rubber Meets the Road

- Most common large investment decision for Americans: Retirement.

- **Old Model of Retirement**: “Defined Benefit”
  - Your employer pays you X% of your working salary in retirement for as long as you live
  - Largely abandoned: too expensive, too many problems if the employer goes bankrupt

- **New Model of Retirement**: “Defined Contribution”
  - You and your employer both put aside Y% of your income each month, which is invested
  - You decide how it should be invested
Retirement Savings Account

- **401(k) Retirement Plan**
  - “Tax deferred” retirement savings account
  - Suppose you make $5000 per month (pre-tax) and contribute 10% to your 401(k)
  - Then you only pay taxes on $4500 of income each month
  - When you retire you can then withdraw money from the account to meet your needs
  - When withdrawn, you pay income tax on the money then
  - Much better than paying with after-tax funds
Other Types of Accounts

- 403(b) Retirement Plan
  - Same as 401(k) but for non-profits

- Traditional IRA
  - Similar idea to 401(k), but not through employer
  - Contribution caps
  - Can withdraw for other things: home, education
  - Phased out at higher income levels

- Roth IRA
  - Same as traditional IRA, but pay taxes up front and *not* when withdrawn
Scenario: 401(k) Options

- You have your first job that has a benefits package
- Job includes a 401(k) “matching” program: if you contribute 7.5%, your employer matches 7.5%
- Now sitting in HR with a blank form and a huge list of options to invest in
- ...what should you pick?
- Most popular item: mutual funds
Mutual Funds

- A mutual fund is a pool of many underlying assets

- Examples:
Investment Risks

- Two types of investment risks:
  - **Market Risk**
    - The risk that some event happens that change the returns on all assets at once
    - Examples: Tech bubble, recessions, oil shocks
  - **Portfolio Risk**
    - The risk that the particular assets in your portfolio have returns different than the market average
    - Examples: company has a bad year, makes a bad investment, is sued, has a product recall
Diversification

- Market risk is hard to avoid, since it affects all assets at once
- Portfolio risk can, by definition, be avoided by holding a large variety of assets
- The elimination of portfolio risk is called *diversification*
  - By having many different assets, big losses in one asset does not have a big effect on the whole portfolio
  - Neither do big gains
Risk-Return Tradeoff

- Beyond these systematic risks, you can choose to take more or less risk
- Higher return assets tend to have higher risk
  - Stocks have higher returns than bonds, but are much riskier
What, then, should you invest in?

- Standard advice:
  - Take risks when you’re young, then make it safer as you approach retirement
  - Practical: invest mostly in stocks when young, and move over to bonds as you get older

- Personally, I think this is wrong

- My advice:
  - Invest in nothing but stocks all the time forever
  - Need to be willing to stomach years with -50% returns or worse
Two possibilities

- Why does the standard advice tell you to reduce your risk near retirement?
  - Don’t want to lose all your retirement right when you retire
- On the other hand, stocks have MUCH higher returns than bonds
Look at Historical Returns

How much would I have today if I invested $1 in 1927 in each of these assets?

Cumulative real returns from the S&P 500, 10 year US treasury bonds and gold bullion.

Sources: Minneapolis Fed website (CPI series), nma.org (Gold prices), and the website of Aswath Damodaran (Stock and Bond returns).
Look at Historical Returns

Real returns by year for each asset

- Stocks
- Bonds
- Gold

Graph showing the real returns by year for stocks, bonds, and gold from 1927 to 2012.
Practical Example

- Imagine a college graduate who is just starting to work
- Let’s imagine her lifetime income follows the average for a college graduate
- Assume she invests 15% of her income over her whole working life in a 401(k)
- Let’s look at different investment strategies and decide which is best
Average Lifetime Income Profile

Real Lifetime Pre-Tax Labor Income

- $40,000
- $45,000
- $50,000
- $55,000
- $60,000
- $65,000
- $70,000
- $75,000
- $80,000
- $85,000
- $90,000
Two Assets

- To simplify what we’re doing, we’ll examine the choice between two assets

- **10 Year Treasury Security**
  - Low return, essentially no risk

- **S&P 500 Mutual Fund (Index Fund)**
  - Tracks the returns on the S&P 500
  - S&P 500 is an index that tracks the returns on the 500 largest companies that are listed on the New York Stock Exchange (or NASDAQ)
  - Much higher volatility and much higher average returns
Two Possible Rules

- We will compare the results of applying each of two investment rules

- **Reduce Risk with Age**
  - Invest in X% stock where \( X = 100 – \text{age} \)
  - Invest the rest in bonds

- **Stock only**
  - Invest 100% in stock all the time
Evaluation

- To evaluate these rules, use historical returns from 1926 – 2013
- Age 23 – 60 is a 38 year working life
- Look at each of the 51 windows of 38 years and see how each investment rule fares in each
- For example, if you worked from 1960-1997, who much would you have saved under each rule?
Average Lifetime Income Profile
Average Lifetime Income Profile

Worst Case Scenario: 12% worse

Best Case Scenario: 160% better

Average: 67% better
Results

- In the 51 windows, only 1 had better results under the common rule than under 100% stock
  - That was when you retire in 2008 at the depth of the Great Recession
  - If that person delayed retirement by one year, even then the stock rule would have done better
- Given that the returns are almost always higher, the 100% stock rule seems like the better strategy
Risk-Return Tradeoff

- Something to think about: is the 100% stock portfolio actually riskier?
  - Has higher volatility
  - Essentially no “risk” that you will end up with less than under the alternative rule
Summary of my Investment Advice

- Invest only in *index funds*
  - Index funds are mutual funds that track stock market indices, like the S&P 500
  - Pro: Very low cost, eliminate portfolio risk
  - Con: No “extraordinary returns”, very passive strategy (no changing your portfolio in response to news)

- Keep 100% of your portfolio in those until (and through) retirement

- Lowest cost index fund (that I know of):
  - Vanguard: VFIAX (0.02% fee)
The Equity Premium

- Returns on stocks are higher than they are on bonds
- This is because the returns to stocks are so much more volatile than bonds
- Therefore, investors need to make more on average to be willing to take that risk
Equity Premium Puzzle

- However, the equity premium is HUGE
  - Real returns on stocks: 8.0%
  - Real returns on bonds: 2.3%
- This is difficult to rationalize
- Example:
  - Suppose you had a lottery ticket with a 50% chance of $50,000 or 50% chance of $100,000
  - How much would you be willing to sell it for?
- Answer implied by the size of the equity premium: $54,300
Equity Premium and Inequality


- The fact that the return on savings is so much higher than the growth of real wages implies that differences in wealth are magnified over time
  - \( r > g \)
  - Return on assets is greater than economic growth

- Empirically controversial that this is actually the cause of higher inequality, but it certainly contributes to it
Possible Explanations

- Most explanations have to do with why demand for bonds is so high
  - If demand for bonds is high, their returns are low

- Some explanations:
  - Big funds are **required** to hold only bonds
  - Social security, pension funds, big banks, etc.
  - Hence, low returns for bonds

- Not everyone is the same, there are a lot of very risk-averse people
  - They drive down the returns on bonds
Conclusions

- The size of the equity premium demonstrates why the 100% stock portfolio does so much better than the one with bonds.
- Also, this is an important component of the big increase in inequality.
- With such high returns on investment, those with money are able to have much higher wealth growth.