Q. What is an investment?
Real Assets Versus Financial Assets

• Real Assets
  – Determine the productive capacity and net income of the economy
  – Examples: Land, buildings, machines, knowledge used to produce goods and services
  – Q: more examples?

• Financial Assets
  – Claims on real assets, do not contribute directly to the productive capacity of the economy.
  – Q: Examples?
<table>
<thead>
<tr>
<th>Assets</th>
<th>$ Billion</th>
<th>% Total</th>
<th>Liabilities and Net Worth</th>
<th>$ Billion</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Real assets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real estate</td>
<td>$20,026</td>
<td>29.8%</td>
<td>Mortgages</td>
<td>$10,652</td>
<td>15.8%</td>
</tr>
<tr>
<td>Consumer durables</td>
<td>4,601</td>
<td>6.8%</td>
<td>Consumer credit</td>
<td>2,476</td>
<td>3.7%</td>
</tr>
<tr>
<td>Other</td>
<td>221</td>
<td>0.3%</td>
<td>Bank and other loans</td>
<td>253</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>Total real assets</strong></td>
<td>$24,847</td>
<td>37.0%</td>
<td>Security credit</td>
<td>148</td>
<td>0.2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other</td>
<td>541</td>
<td>0.8%</td>
</tr>
<tr>
<td><strong>Total liabilities</strong></td>
<td></td>
<td></td>
<td></td>
<td>$14,068</td>
<td>20.9%</td>
</tr>
<tr>
<td><strong>Financial assets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deposits</td>
<td>$7,760</td>
<td>11.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life insurance reserves</td>
<td>1,198</td>
<td>1.8%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pension reserves</td>
<td>10,656</td>
<td>15.9%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate equity</td>
<td>6,266</td>
<td>9.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity in noncorp. business</td>
<td>6,996</td>
<td>10.4%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual fund shares</td>
<td>3,741</td>
<td>5.6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt securities</td>
<td>4,327</td>
<td>6.4%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1,418</td>
<td>2.1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total financial assets</strong></td>
<td>$42,361</td>
<td>63.0%</td>
<td><strong>Net worth</strong></td>
<td>$53,140</td>
<td>79.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$67,208</td>
<td>100.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$67,208</td>
<td>100.0%</td>
<td></td>
<td>$67,208</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 1.1
Balance sheet of U.S. households
Note: Column sums may differ from total because of rounding error.
<table>
<thead>
<tr>
<th>Assets</th>
<th>$ Billion</th>
<th>% Total</th>
<th>Liabilities and Net Worth</th>
<th>$ Billion</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Real assets</strong></td>
<td></td>
<td></td>
<td><strong>Liabilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real estate</td>
<td>$18,608</td>
<td>24.4%</td>
<td>Mortgages</td>
<td>$9,907</td>
<td>13.0%</td>
</tr>
<tr>
<td>Consumer durables</td>
<td>4,821</td>
<td>6.3%</td>
<td>Consumer credit</td>
<td>2,495</td>
<td>3.3%</td>
</tr>
<tr>
<td>Other</td>
<td>345</td>
<td>0.5%</td>
<td>Bank and other loans</td>
<td>195</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>Total real assets</strong></td>
<td>$23,774</td>
<td>31.2%</td>
<td>Security credit</td>
<td>268</td>
<td>0.4%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other</td>
<td>568</td>
<td>0.7%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Total liabilities</strong></td>
<td>$13,433</td>
<td>17.6%</td>
</tr>
<tr>
<td><strong>Financial assets</strong></td>
<td></td>
<td></td>
<td><strong>Net worth</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deposits</td>
<td>$8,688</td>
<td>11.4%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Life insurance reserves</td>
<td>1,203</td>
<td>1.6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pension reserves</td>
<td>13,950</td>
<td>18.3%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate equity</td>
<td>9,288</td>
<td>12.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity in noncorp. business</td>
<td>7,443</td>
<td>9.8%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual fund shares</td>
<td>5,191</td>
<td>6.8%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt securities</td>
<td>5,120</td>
<td>6.7%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1,641</td>
<td>2.2%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total financial assets</strong></td>
<td>$52,524</td>
<td>68.8%</td>
<td></td>
<td>$62,866</td>
<td>82.4%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$76,298</td>
<td>100.0%</td>
<td></td>
<td>$76,298</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

**Table 1.1**

Balance sheet of U.S. households
Note: Column sums may differ from total because of rounding error.
Source: Flow of Funds Accounts of the United States, Board of Governors of the Federal Reserve System, June 2012.
Financial Assets

Three types:
• Fixed income or debt
• Common stock or equity
• Derivative securities (we’ll come back to this)
Fixed Income

• Payments fixed or determined by a formula

• Money market debt: short term, highly marketable, usually low credit risk

• Capital market debt: long term bonds, can be safe or risky
Common Stock and Derivatives

- **Common Stock** is equity or ownership in a corporation.
  - Payments to stockholders are not fixed, but depend on the success of the firm

- **Derivatives**
  - Value derives from prices of other securities, such as stocks and bonds
  - Used to transfer risk
How About Commodities?

• Examples: energy, precious metals, base metals, agricultural, soft, other
• Arbitrage more difficult (geography/logistics)
• Physical vs paper (financial)

Q. Gold?

• Fin. instruments: futures and derivatives, structure products and hybrids

Q. Who trades commodities?

• Commodities are an asset class (see here and here)
Financial Markets and the Economy

- Information Role: Capital flows to companies with best prospects

- Consumption Timing: Use securities to store wealth and transfer consumption to the future
Financial Markets and the Economy

- Allocation of Risk: Investors can select securities consistent with their tastes for risk
- Q: what is your risk appetite? (let’s play a game)
- Separation of Ownership and Management
  - agency problems
  - how to mitigate?
    - Tie managers' income to the success of the firm
    - Monitoring from the board of directors
    - Monitoring from the large outside investors and security analysts
Corporate Governance and Corporate Ethics

- Accounting Scandals
  - Examples – Enron, Rite Aid, HealthSouth
- Auditors – watchdogs of the firms (caveat)
- Analyst Scandals
  - Arthur Andersen
- Sarbanes-Oxley Act (2002)
  - Tighten the rules of corporate governance
  - Personal liability, independent structures
The Investment Process

• Portfolio
  – Q. Can you give a definition?

• Asset allocation
  – Choice among broad asset classes
  – Q. Can you name a few?

• Security selection
  – Choice of securities within each asset class
  – Security analysis to value securities and determine investment attractiveness
The Investment Process

- “Top-down” approach
  - First, asset allocation
  - Then, *security analysis* to evaluate which particular securities to be included in the portfolio

- “Bottom-up” approach
  - Investment based solely on the price-attractiveness, which may result in unintended heavy weight of a portfolio in only one or another sector of the economy
Markets are Competitive

• Risk-Return Trade-Off
  • Higher-risk assets are priced to offer higher expected returns than lower-risk assets

• Efficient Markets:
  – No-free-lunch rule:
    • In fully efficient markets when prices quickly adjust to all relevant information, there should be neither underpriced nor overpriced securities
Markets are Competitive (cont.)

– Passive Management
  • Hold a highly diversified portfolio
  • No attempt to find undervalued securities
  • No attempt to time the market

– Active Management
  • Finding mispriced securities
  • Timing the market
The Players

- Business Firms – net borrowers
- Households – net savers
- Governments – can be both borrowers and savers

Q. Examples?
The Players (cont.)

• Financial Intermediaries: they pool and invest funds
  – Investment Companies
  – Banks
  – Insurance companies
  – Credit unions
Investment & Commercial Banks

**Investment Banking**

- Underwrite new stock and bond issues
- Sell newly issued securities to public in primary market (IPO)
- Investors trade previously issued securities among themselves in the secondary markets

**Commercial Banking**

- Take deposits
- Make loans
- The 3-6-3 rule is gone
Antecedents of the Crisis:

- "The Great Moderation": a time in which the U.S. had a stable economy with low interest rates and a tame business cycle with only mild recessions

- Historic boom in housing market
Figure 1.3 The Case-Shiller Index of U.S. Housing Prices

Index (January 2000 = 100)
Changes in Housing Finance

**Old Way**
- Local thrift institution made mortgage loans to homeowners
- Thrift’s major asset: a portfolio of long-term mortgage loans
- Thrift’s main liability: deposits
- “Originate to hold”

**New Way**
- **Securitization**: Fannie Mae and Freddie Mac bought mtg loans and bundled into large pools
- Mtg-backed securities are tradable claims against the underlying mortgage pool
- “Originate to distribute” (more velocity)
Figure 1.4 Cash Flows in a Mortgage Pass-Through Security
Changes in Housing Finance (cont.)

- At first, Fannie Mae and Freddie Mac securitized *conforming* mortgages, which were lower risk and properly documented.
- Later, private firms began securitizing *nonconforming* “subprime” loans with higher default risk:
  - Little due diligence
  - Placed higher default risk on investors
  - Greater use of ARMs
Mortgage Derivatives

• Collateralized debt obligations (CDOs)
  – Mortgage pool divided into slices or *tranches* to concentrate default risk
  – Senior tranches: Lower risk, highest rating
  – Junior tranches: High risk, low or junk rating

• Problem: Estimated ratings *significantly* underestimated the inherent risk
Why was Credit Risk Underestimated?

• No one expected the entire housing market to collapse all at once
• Geographic diversification did not reduce risk as much as anticipated
• Agency problems with rating agencies
• Credit Default Swaps (CDS) did not reduce risk as anticipated
Credit Default Swap (CDS)

Q: What are CDS?

A CDS is an insurance contract against the default of the borrower.

Investors bought sub-prime loans and used CDS to insure their safety.
Credit Default Swap (CDS)

• Some big swap issuers did not have enough capital to back their CDS when the market collapsed.

• Consequence: CDO insurance failed

“Hedging moves risk, does not eliminate it”
Rise of Systemic Risk

- Systemic Risk: a potential breakdown of the financial system in which problems in one market spill over and disrupt others.
  - One default may set off a chain of further defaults
  - Waves of selling may occur in a downward spiral as asset prices drop (domino effect)
  - Potential contagion from institution to institution, and from market to market
Rise of Systemic Risk (Ctd.)

• Banks had a mismatch between the maturity and liquidity of their assets and liabilities.
  – Liabilities were short and liquid
  – Assets were long and illiquid
  – Constant need to refinance the asset portfolio
• Banks were very highly levered, giving them almost no margin of safety.
Figure 1.1 Short-Term LIBOR and Treasury-Bill Rates and the TED Spread

Interest Rates (%)
Figure 1.1 Short-Term LIBOR and Treasury-Bill Rates and the TED Spread
• Investors relied too much on “credit enhancement” through structured products like CDS

• CDS traded mostly “over the counter”, so less transparent, bilateral margin requirements (ISDA+CSA)

• Opaque linkages between financial instruments and institutions

• Gross systemic position – no net down
Timeline of the crisis

• 2000-2006: Sharp increase in housing prices caused many investors to believe that continually rising home prices would bail out poorly performing loans

• 2004: Interest rates began rising (remember those ARMs?)

• 2006: Home prices peaked (read: prices - so did equity - fell afterwards)
Timeline of the crisis

• 2007: Housing defaults and losses on mortgage-backed securities surged
• 2007: Bear Stearns announces trouble at its subprime mortgage–related hedge funds
• 2008: Troubled firms include Bear Stearns, Fannie Mae, Freddie Mac, Merrill Lynch, Lehman Brothers, and AIG
  – Money market breaks down
  – Credit markets freeze up
  – Contagion to other markets
  – Federal bailout to stabilize financial system (TARP)
The Dodd-Frank Reform Act

• Mechanisms to mitigate systemic risk
  – Stricter rules for bank capital, liquidity, and risk management practices
  – Increased transparency, especially in derivatives markets (e.g.: standardize CDS contracts so they can trade in centralized exchanges or clearinghouses)
  – Office of Credit Ratings within the SEC to oversee the credit rating agencies
CHAPTER 2

Asset Classes and Financial Instruments
Asset Classes

• Money market instruments

• Capital market instruments
  – Bonds
  – Equity Securities
  – Derivative Securities

• Let’s not forget commodities
The Money Market

• Subsector of the fixed-income market: Securities are short-term, liquid, low risk, and often have large denominations

• Money market mutual funds allow individuals to access the money market.
Table 2.1 Major Components of the Money Market

<table>
<thead>
<tr>
<th>Component</th>
<th>$ Billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repurchase agreements</td>
<td>$1,141</td>
</tr>
<tr>
<td>Small-denomination time deposits and savings</td>
<td>7,202</td>
</tr>
<tr>
<td>Large-denomination time deposits*</td>
<td>1,603</td>
</tr>
<tr>
<td>Treasury bills</td>
<td>1,478</td>
</tr>
<tr>
<td>Commercial paper</td>
<td>1,445</td>
</tr>
<tr>
<td>Money market mutual funds</td>
<td>2,645</td>
</tr>
</tbody>
</table>

*Small denominations are less than $100,000.

Money Market Securities

- Treasury bills: Short-term debt of the U.S.
  - Maturities in weeks (4, 13, 26, 52)
  - Tax-free
  - Bid and asked price
  - Bank \textit{discount} method:
    \[
    Price = \text{Face} \times (1 - \text{discount} \times \frac{\text{act}}{360})
    \]

- Certificates of Deposit (CDs): Time deposit with a bank (\textit{example})

- Commercial Paper: Short-term (<270 days), unsecured debt of a company
Money Market Securities

• **Bankers’ Acceptances**: An order to a bank by a customer to pay x money on a future date (~6m) (think of a postdated check)

• **Eurodollars**: dollar-denominated time deposits in banks outside the U.S. (not just Europe)

• **Repos and Reverses**: Short-term loan backed by government securities (and more).

• **Fed Funds**: Very short-term loans between banks. Paid often on cash collateral (note on 2008 crisis)
Yields on Money Market Instruments

• Except for Treasury bills, money market securities are not free of default risk

• Both the premium on bank CDs and the TED spread have often become greater during periods of financial crisis

• During the credit crisis of 2008, the federal government offered insurance to money market mutual funds after some funds experienced losses
Spread 3-month CD vs TBills
The Bond Market (Fixed Income)

- T-Notes (<10y) and T-Bonds (10-30y)
- Inflation-Protected T-Bonds (“TIPS”)
- Federal Agency Debt (“agencies”)
- International Bonds or Eurobonds
- Municipal Bonds (“munis”)
- Corporate Bonds (“corporates”)
- Mortgages and Mortgage-Backed Securities (“RMBS” vs. “CMBS”)
Treasury Notes and Bonds

• Maturities
  – Notes: maturities up to 10 years
  – Bonds: maturities from 10-30 years
• Notes are sold in increments of $100
  (some textbooks report $1,000)
• Interest paid semiannually
• Quotes – percentage of par
• Prices are in increments of 1/32
  (e.g. 107:11 = 107 + 11/32)

http://www.treasurydirect.gov/indiv/research/indepth/tnotes/res_tnote.htm
http://www.treasurydirect.gov/indiv/research/indepth/tbonds/res_tbond.htm
Municipal Bonds

- Issued by state and local governments
- Interest is federal and sometimes state and local tax exempt
- Historically near-zero default rate, different story in recent years (recent examples?)
- Types:
  - **General obligation** bonds: Backed by taxing power of issuer
  - **Revenue** bonds: backed by project’s revenues or by the municipal agency operating the project.
Figure 2.4 Tax-Exempt Debt Outstanding

- Industrial revenue bonds
- General obligation

$ Billion

Years: 1979 to 2012
Municipal Bond Yields

- To choose between taxable and tax-exempt bonds, compare after-tax returns.
- Let \( t \) be the investor’s *marginal* tax rate
- Let \( r \) be the before-tax return on the taxable bond and \( r_m \) denote the municipal bond rate.
- Investors prefer the taxable bond rate if \( r (1 - t) > r_m \) otherwise, they prefer the municipal bond
The equivalent taxable yield is simply the tax-free rate $r_m$, divided by $(1-t)$. 

![Table 2.2 Tax-Exempt Yield Table](image)
Corporate Bonds

- Issued by corporations
- Semi-annual interest payments
- Subject to larger default risk than government securities
- Options in corporate bonds
  - Callable
  -Convertible
Mortgage-Backed Securities

- Proportional ownership of a mortgage pool or a specified obligation secured by a pool
- Produced by securitizing mortgages
  - Mortgage-backed securities are called pass-throughs because the cash flows produced by homeowners paying off their mortgages are passed through to investors.
Mortgage-Backed Securities

• Most mortgage-backed securities were issued by Fannie Mae and Freddie Mac.

• Traditionally, pass-throughs were comprised of conforming mortgages, which met standards of credit worthiness.
Mortgage-Backed Securities

- Eventually, “Private-label” issuers securitized large amounts of subprime mortgages, made to financially weak borrowers.
- Finally, Fannie and Freddie were allowed and even encouraged to buy subprime mortgage pools.
- September, 2008: Fannie and Freddie got taken over by the federal government.
Fig 2.6
Mortgage-Backed Securities Outstanding

$ Billions

- Private issuers
- Federal agencies

Years:
- 1979
- 1982
- 1985
- 1988
- 1991
- 1994
- 1997
- 2000
- 2003
- 2006
- 2009
- 2012
Equity Securities

• Common stock: Ownership
  – Residual claim
  – Limited liability
• Preferred stock: ~Perpetuity
  – Fixed dividends (discretionary, but...)
  – Cumulative, priority over common
  – Non-tax deductible for issuer, but 70% deductible for buyer (Q: who buys it?)
• American Depository Receipts: foreign companies traded in the US
  Example: Barclays (BCS)
Stock Market Indexes (or Indices?)

- **Dow Jones Industrial Average**
  - Includes 30 large blue-chip corporations
  - Computed for a long time
  - Price-weighted average
Example 2.2 Price-Weighted Average

Portfolio: Initial value = $25 + $100 = $125
Final value = $30 + $90 = $120
(note: A was +20%, B was -10%)
%change in portf. value = -5/125 = -4%

Index: Initial index value  (25+100)/2 = 62.5
Final index value  (30 + 90)/2 = 60
%change in index = -2.5/62.5 = -4%

Price-Weighted indices favor large price stocks
Standard & Poor’s Indexes

• S&P 500
  – Broadly based index of 500 firms
  – Market-value-weighted index
  – Adjusted for No dividends
  – Other: Must be US, Mkt Cap>5bn, public float≥50%, must be liquidly traded, etc. (see http://www.wikinvest.com/index/S%26P_500_(SPX))

• Investors can base their portfolios on indices:
  – Buy an index mutual fund
  – Buy Exchange Traded Funds (ETFs; e.g. SPY)
Other Equity Indexes

**U.S. Indices**
- NYSE Composite
- NASDAQ Composite
- Wilshire 5000

**Foreign Indices**
- Nikkei (Japan)
- FTSE (U.K.; “footsie”)
- DAX (Germany)
- CAC40 (France)
- Hang Seng (Hong Kong)
- TSX (Canada)
Commodities as an asset class

- Hedge against inflation
- Commodity-linked stocks
- Commodity ETFs
- Exposure to single commodity or to sector or broad indices. Example – GSCI:
  - World wide production based
  - Includes energy, industrial/precious metals, agricultural and livestock
  - Linked to futures prices settlements
Derivatives Markets

- Options and futures provide payoffs that depend on the values of other assets such as commodity prices, bond and stock prices, or market index values.

- A derivative is a security that derives its value from the values of another asset.
Options

• **Call**: Right to *buy* underlying asset at the strike or exercise price.
  – Value of calls decrease as strike price increases

• **Put**: Right to *sell* underlying asset at the strike or exercise price.
  – Value of puts increase with strike price

• Value of both calls and puts generally increases with time until expiration.
Futures Contracts

• A futures contract calls for delivery of an asset (or in some cases, its cash value) at a specified delivery or maturity date for an agreed-upon price, called the futures price, to be paid at contract maturity.

• Long position: Take delivery at maturity

• Short position: Make delivery at maturity
<table>
<thead>
<tr>
<th><strong>Option</strong></th>
<th><strong>Futures Contract</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Right, but not obligation, to buy or sell; option is exercised only when profitable</td>
<td>Obliged to make or take delivery. Long position must buy at the futures price, short position must sell at futures price</td>
</tr>
<tr>
<td>Options must be purchased</td>
<td>Futures contracts are entered into without cost</td>
</tr>
<tr>
<td>The premium is the price of the option itself</td>
<td>Daily cash flows</td>
</tr>
</tbody>
</table>