Introduction to Financial Risk Management

Xiaodong Zhu

September 9, 2011
Risk: everywhere, all the time

• Disease
• War
• Weather changes
• Natural disasters
• Political instability
• …
Traditional Risk Management: Insurance

• Sharing, diversifying risk
• Informal:
  help within family and among neighbors
gift giving
...
• Formal:
  insurance policy issued by companies
Limits to Traditional Insurance

- Risk sharing within a restricted group
- Only works for low correlation risk
- Relatively small capacity in risk covering
  
  Estimated losses of 9/11: 50 billion US$
  Capital of US property insurance industry: 100 billion
Modern Risk Management

• Using financial market to diversify and manage risk
  • Capital of US property insurance industry: 100 billion
  • Capitalization of NYSE: 4500 billion

• Using financial derivatives as the main tools
  • Futures, forwards, options, swaps, …
  • Market value of financial derivatives outstanding: 3800 billion
Development of Derivatives Market

• Started in the 70s
• Driving forces:
  • Collapse of fixed exchange rate system
  • Oil crisis
  • Inflation induced interest rate risk
  • Black-Scholes
Application of Derivatives

Two examples

• Interest rate risk of S&L
• Catastrophe risk of property insurance companies
Example One

• Saving and Loans:

  Asset: long-term loans, fixed interest rate
  Liability: short-term deposits, floating rate
  Risk: rise of short-term rate

• Risk management strategy: interest rate swaps
Interest Rate Swaps

fixed rate

Saving&Loans ←—— Investment Bank

floating rate
Example 2

- Catastrophe risk (earthquakes, hurricanes, floods, terrorism)
  - Small probability of happening
  - Once happened, huge losses
  - Enormous capital reserves required for Insurance Co.

- Risk management strategy: Cat Bonds
CAT BONDS

• 500 million potential losses
• 2% probability
• Expected loss: 10 million
• premium=expected loss+transaction fee=11 million

• Interest rate on treasury 5%
Cat Bonds (continued)

• Issue 500 million bonds
  – If no CAT event, interest rate 7%
  – If CAT event, all liability canceled

• Investing the 500 million in treasury securities
  – interest income: 25 million
  – premium: 11 million
  – interest payment: 35 million
  – profit: 1 million
Financial Innovations: Good or Bad?

• Good: help to manage risk more effectively and to intermediate funds to profitable investment projects.

• Bad: help to evade regulation and excess risk taking, which may result in financial crisis