All About Risk

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Accouncements

- Board
- "Options in Excel" Workshop
  - Saturday, 02/21/2009
  - 1:30PM EST
  - KMEC 5-140

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Agenda

- Definitions
  - Example
- Theories & Markets
  - Types of Risk
  - Current Management
  - Downfall of "rare" events
- Examples & Applications
- Final Thoughts

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Definitions

- What is risk?
  - Concept that deals with the probability of events occurring
  - *Riscium* – legal problems and costs of loss and damage (e.g. sea trade)
  - Risk = P(Event) * Impact(Event)
    - P(x) = Probability of "x" occurring
    - Risk = P(accident) * Deaths(accident)
    - Risk = P(ITM Option) * Payoff(ITM Option)

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Definitions

- Finance ~ Risk = Vol(Returns)
  - Risk = Actual value differs from expected
- Risk vs Uncertainty
  - Uncertainty – lack of certainty with understanding that there exist other possibilities of outcomes
    - E.g. "there is a 90% chance that the market will go up tomorrow" → uncertainty is 10%

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Definitions

- Risk – state of uncertainty with understanding that at least one outcome involves a loss
  - E.g. "there is a 90% change that my investment will hemorrhage money today"
- Qualitative vs Quantitative
  - Both are manageable, but as quants we want to quantify as many qualitative risks as possible

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Theories & Markets - Types

- Financial Risks
  - Assets (Idiosyncratic)
    - Sensitivity to change in inputs
      - Options = {S,K,σ,r,τ,q}
      - Equities = Valuation parameters (WACC,…)
      - Bonds = Yields
    - Counterparty / Clearing / Default risks
      - SWAPS = OTC, ISDA regulations
      - Futures = MtM daily
      - Bonds = Default risk

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Theories & Markets - Types

- Market (systematic)
  - Financial system (BASEL, GAAP, Exchanges, Fed, BIS, Treasury, etc…)
- Health & insurance – Actuarial Science

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Theories & Markets - R Mgmt

- Basic Instruments
  - "DV01" – Fixed Income
  - Delta – Equities
- Options
  - Greeks

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Theories & Markets - Downfall

1. "risk management should not be entirely predicated on historical data"
   - Past doesn't predict the future
2. "too many…investors outsourced their risk management"
   - Investors didn't know their positions
   - Investors trusted 'black box' management
3. "size matters"
   - Consequences of miscalcuations

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Theories & Markets - Downfall

4. "incorrectly assumed that positions could be fully hedged"
   - Risk for some things are infinite
5. "models failed to capture the risk inherent in off-balance sheet activities"
   - Whats OBS? Options! SIV hides stuff too
6. "complexity…growth in new instruments outstrip[ed] the operational capacity to manage them"

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Theories & Markets - Downfall

7. "financial institutions did not account for asset values accurately enough"
   - MtM overstated position values

[#1-7 are quotes from lloyd bankfein, ceo of goldman sachs]

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Theories & Markets - Downfall

- Fixes
  - Compensation for risk managers
  - MtM lower; risk manager wins debate
  - Communal rating/auditing committee
    - Rating agencies conflict of interest
    - Auditor conflict of interest
  - More rigorous stress testing
  - More attention to correlated events

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Examples & Applications

- Black-Scholes Greeks
- Duration, Convexity
- VAR = DEAR * N
- Default Risk
- CAPM / Modern Portfolio Theory
- Soverign Risk
- Correlation of Risky Events
- Capital Requirements
- Prepayment Risk (Mortgages)

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Final Thoughts (Presentation)

- Trading is really about risk management
- You can never completely hedge
  - …even if you are in cash
- Cant catch a cab in the rain
- Workshop on Saturday!!!

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