Introduction to Financial Risk Management

- **CATEGORIES OF RISK AND BUSINESS RISKS** (Holmes, 2002)
  - How to Deal with Risk: Avoid, Reduce, Retain, Transfer, and Share
  - Approaches to Managing Risk (Holmes, 2002, pp.8-9): Identification, Quantification, Managing/Responding, Monitoring/Controlling
  - Key Measures for Risk Management (Holmes, 2002, pp.9-10): sensitivity, volatility, downside measures such as VaR (Value at Risk)

- **FINANCIAL RISK MANAGEMENT** (Jorion, 2007)
  - Bond Fundamentals: Engineering Economics
  - Capital Market: Derivatives
    - Derivatives and Markets: Options, Securities, Equity, Commodities Markets...
    - Sources of Risk: Currency, Fixed-Income, Equity, and Commodity
  - Credit Risk Management
    - Estimate default probabilities, credit exposures, recovery rates
    - Measuring expected credit loss and Measuring credit VaR
  - Operational and Integrated Risk Management
  - Legal, Accounting, and Tax Risk Management: Basel Accord (Basel III)

Exhibit 1: Overview of financial instruments universe
VALUE AT RISK (VAR or VaR; Krause, 2003; 風險值；在险价值)

- Originally VaR was intended to measure the risks in derivatives markets
  - Downside measure
  - Widely applied in financial institutions to measure all kinds of financial risks

- The Basic Idea of VaR: Value of an Investment
  - Given the cumulative distribution function \( F(V) \) of the value of an investment \( V \) at the end of a time horizon \( \Delta T \), the value of the investment is below \( V^* \) with a probability of \( 1 - c \) satisfies the following relationship,

\[
\text{Prob}(V \leq V^*) = \int_{-\infty}^{V^*} dF(V) = 1 - c
\]

- The VaR relative to the benchmark of zero profit \( V_0 \) is: \( \text{VaR}^{\text{zero}}_{\Delta T} = V_0 - V^* \)
- The VaR relative to the expected outcome \( E[V] \) is: \( \text{VaR}^{\text{mean}}_{\Delta T} = E[V] - V^* \)

Definition of Value at Risk

- VaR in terms of returns
  - Define \( R^* \) and \( \mu \) such that \( V^* = (1 + R^*) \cdot V_0 \) and \( E[V] = (1 + \mu) \cdot V_0 \) then
  - The VaR relative to the benchmark of zero profit \( V_0 \) is: \( \text{VaR}^{\text{zero}}_{\Delta T} = -V_0 \cdot R^* \)
  - The VaR relative to the expected outcome \( E[V] \) is: \( \text{VaR}^{\text{mean}}_{\Delta T} = -V_0 \cdot (R^* - \mu) \)

Determination of the VaR with Normally Distributed Returns