FRM Level 1 Lecture Notes

v. 1.0.0

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Content I

Introduction

- The FRM exam
- Key to success

Foundations of risk management

- Overview
- Corporate risk management
- Corporate governance and risk management
- Enterprise risk management

Quantitative Analysis

- The time value of money
- Probabilities
- Basic statistics
- Distributions
- Bayesian analysis
- Hypothesis testing and confidence intervals
- Correlation and copulas
- Linear regression

Content II

- Modeling and forecasting trend
- Characterizing cycles
- Modeling cycles: MA, AR and ARMA models
- Estimating volatilities and correlations for risk management
- Simulation methods

Financial markets and products

- Mechanics of futures markets
- Hedging strategies using futures
- Interest rates
- Determination of forward and futures prices
- Interest rate futures
- Swaps
- Mechanics of option markets
- Properties of stock options
- Trading strategies involving options
- Exotic options
- Commodity forwards and futures

Content III

Foreign exchange risk
Central counterparties
Exchanges, OTC derivatives DPCs and SPVs
Corporate bonds
Mortgages and mortgage-backed securities
The rating agencies

Valuation and risk models

Quantifying volatility in VaR methods
Putting VaR to work
Measures of financial risk
Binomial trees
The Black-Scholes-Merton Model
Greek letters
Prices, discount factors and arbitrage
Spot, forward, and par rates
Returns, spreads, and yields
Risk metrics and hedges

Content IV

Country risk
External and internal ratings
Capital structure in banks
Operational risk
Stress testing

Outline

Introduction
- The FRM exam
- Key to success

Introduction
The FRM exam

- International professional certification offered by **GARP** (The Global Association of Risk Professionals).
- A certificate focus on risk management, 2 levels:
  - **Part 1**: tools used to assess financial risk : Foundations of Risk Management, Quantitative Analysis, Financial Markets and Products, Valuation and Risk Models
  - **Part 2**: Measurement and Management of: Market Risk, Credit Risk, Operational and Integrated Risk; Current Issues in Financial Markets
- Scoring and results:
  - All multiple choice questions
  - No penalties for wrong answers
  - Passing scores determined by FRM committee ($\sim$ 50%)
  - Exam results emailed six weeks after the exam, quartile results

Table: Part 1 exam contents and weights

Book	Knowledge Domains	Weight	# Questions
1	Foundations of Risk Management	20%	20
2	Quantitative Analysis	20%	20
3	Financial Markets and Products	30%	30
4	Valuation and Risk Models	30%	30

[a] 4 hours exam time

Plan and practice

- Begin studying early
- Study plan and stick to the plan
- **Practice exams**

Recourses

- Official books
- Schweser
- bbs.pinggu.org

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Overview I

Concepts

- **Risk**: uncertainty regarding losses/gain.
- **Risk management**: Activities aimed to reduce eliminate potential to incur expected loses.
- **Risk trading**: taking risk $\rightarrow$ generating incremental gains

Risk management process

1. Identify
2. Quantify and estimate
3. Determine collective effects/cost-benefit analysis
4. Develop risk mitigation strategy
5. Assess performance and amend risk mitigation strategy as needed

Overview II

Tools and procedures

- Quantitative measures: *e.g.* VaR, Expected shortfall, Exposures[a]
- Quantitative assessment: scenario analysis, stress testing,
- Enterprise risk management (ERM): integrative approach within an entire entity

[a] Will re-visit

Compare

- Expected & unexpected loss
- Risk & reward

Overview III

Types of risks

- Market risk: *e.g.* IR, FX, equity, commodity price, *etc*
- Credit risk: *e.g.* default, bankruptcy, downgrade and settlement
- Liquidity risk: *e.g.* funding/trading liquidity risk
- Operation risk: non-financial problems; challenging to quantify
- Legal and regulatory risk
- Business risk: uncertainty in business environment (supply/demand, business strategy)
- Strategic risk: associated with large new business investments
- Reputation risk

Sample question I

1. Examining the impact of a dramatic increase in interest rates on the value of a bond investment portfolio could be performed using which of the following tools?

   I Stress testing

   II Enterprise risk management

   A I only

   B II only

   C both I and II

   D Neither I nor II

2. In considering the major classes of risks, which risk would best describe an entity with weak internal controls that could easily be circumvented with a lack of segregation of duties?

   A Business risk

   B Legal and regulatory risk

   C Operational risk

   D Strategic risk

Sample question II

1. Examining the impact of a dramatic increase in interest rates on the value of a bond investment portfolio could be performed using which of the following tools?

   I Stress testing

   II Enterprise risk management

   A I only

   B II only

   C Both I and II

   D Neither I nor II

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   C Operational risk

   D Strategic risk

Hedging risk exposures – advantages and disadvantages

- Theoretical considerations
  - Assumptions of hedging: perfect competitive capital markets;
- Disadvantages:
  - Cost management's focus on core business
  - Compliance costs
  - May increase the variability of the firm's earnings
- Advantages:
  - Lowering cost of capital
  - Increase shareholders confidence (stable earnings/cash flows)
  - Controlled financial performance
  - Operational improvements within a firm
  - Taxation

Role of board of directors

- Set the firm's risk appetite
- Tools of risk management: e.g. risk tolerance, VaR, stress testing
- Risk and return goals

Hedging practice

- Clarification as to which risks are insurable, hedgeable, noninsurable, or nonhedgeable
- Can be performed for various risks factors
  - Pricing risk (e.g. production companies)
  - Foreign exchange
  - Interest rate
- Static vs dynamic hedging strategies
- Risk management instruments: Exchange traded, OTC

Sample question

1. Which of the following statements regarding exchange-traded and over-the-counter (OTC) financial instruments is correct?
   - A There is greater liquidity with exchange-traded financial instruments.
   - B There is greater customization with exchange-traded financial instruments.
   - C There is greater price transparency with OTC financial instruments.
   - D There is credit risk by either of the counterparties inherent in exchange-traded instruments.

Best practice in corporate governance

- Members with knowledge of the firm's business and industry
- Board watches out for the interests of all stakeholders
- Aware of any agency risks and takes steps to reduce them
- Board maintains its independence from management
- Board should consider the introduction of a chief risk officer

Best practice in risk management

- Focus on the economic performance over accounting performance
- Robust risk management process within the firm
- Ethics committee; Risk-adjusted performance
- Board should have a risk committee in place

Corporate governance and risk management II

Role of the board of directors in governance

- The firm's risk management policies
- The firm's periodic risk management reports
- The firm's appetite and its impact on business strategy
- The firm's internal controls
- The firm's financial statements and disclosures
- The firm's related parties and related party transactions
- Any audit reports from internal or external audits
- Corporate governance best practices for the industry
- Risk management practices of competitors and the industry

Concepts

- Risk appetite: tolerance (especially willingness) to accept risk
- Role of Audit committee, risk advisory director, risk management committee and compensation committee
- Functional units within a firm
    1. senior management
    2. risk management
    3. trading room management
    4. operations
    5. finance

Sample question I

1. Which of the following statements regarding the firm's risk appetite and/or its business strategy is most accurate?
   - A The firm's risk appetite does not consider its willingness to accept risk.
   - B The board needs to work with management to develop the firm's overall strategic plan.
   - C Management will set the firm's risk appetite and the board will provide its approval of the strategic plan.
   - D Management should obtain the risk management team's approval once the business planning process is finalized.

Sample question II

1. The various responsibilities surrounding the profit and loss (P&L) statement illustrate the importance of understanding the interdependence of managing risk within a firm. Within an investment bank, which functional unit is most likely to provide final approval of the P&L?
   - A Finance
   - B Operations
   - C Senior management
   - D Trading room management

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Thank you!