FRM Level 1 Lecture Notes

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Content I

Content II

Content III

- Exotic options
- Commodity forwards and futures
- 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

Content IV

Returns, spreads, and yields
Risk metrics and hedges
Country risk
External and internal ratings
Capital structure in banks
Operational risk
Stress testing

Outline

Introduction

- The FRM exam
- Key to success
- Study plan

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

Introduction
Study plan

- 2017 Level 1 exam: Sat. May 20 (4 weeks from now)
- Take your own background into consideration when planning
- Foundations of risk management:
  - 14 Key knowledge points; 20 questions; Mainly concepts/memorizations
- Quantitative analysis:
  - 15 key knowledge points; 20 questions; Mainly technical questions
  - Can be straightforward if you are from a technical background
- Financial markets and products:
  - 30 key points; 30 questions; concepts and technical;
  - Familiar for students from finance background
- Valuation and risk models:
  - 17 key points; 30 questions; concepts and technical;
- Practice
  - High importance! Should allocate at least 1.5-2 weeks
  - Past exam questions; GARP mock exam; Concept checker
  - This class will focus on summarizing knowledge points and solving exam questions

Outline

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

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?
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   - B Legal and regulatory risk
   - 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.

Corporate governance and risk management I

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

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

Corporate governance and risk management II

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

Enterprise risk management I

ERM

- Short comings of tradition risk management
- ERM: integrated and centralized risk management framework

ERM definitions

- Often defined as a process or activity to manage risks
- Committee of Sponsoring Organizations of the Treadway Commission (COSO)
- International Organization of Standardization (ISO 3000)
- *Risk is a variable that can cause deviation from an expected outcome. ERM is a comprehensive and integrated framework for managing key risks in order to achieve business objecrives, minimize unexpected earnings volatility, and maximize firm value*

Enterprise risk management II

ERM benefits and costs

- Increased organizational effectiveness
- Better risk reporting
- Improved business performance
- Can be time-consuming to implement and requires ongoing senior management support

The role of CRO

- Responsible for all risks facing a company; overall leadership for ERM
- Critical skills: (1) leadership, (2) power of persuasion, (3) ability to protect the firm's assets, (4) technical skills to understand all risks, and (5) consulting skills to educate the board and business functions on risk management.

Enterprise risk management III

Main components of a strong ERM framework

- Corporate governance
- Line management
- Portfolio management
- Risk transfer
- Risk analytics
- Data and technology resources
- Stakeholder management

Sample question

1. The basis of enterprise risk management (ERM) is that:
   A risks are managed within each risk unit but centralized at the senior management level.
   B the silo approach to risk management is the optimal risk management strategy.
   C risks should be managed and centralized within each risk unit.
   D it is necessary to appoint a chief risk officer to oversee most risks.

Sample question

1. The basis of enterprise risk management (ERM) is that:
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Risk trading and risk management by banks I

Optimal level of risk exposure

- methods:
  - Targeting a certain credit rating
  - Sensitivity or scenario analysis
  - Analysis of the adverse impacts on the value of a bank due to changes in interest rates, foreign exchange rates, inflation, *etc*
- goals:
  - Maximize shareholder value; while
  - Satisfying the constraints by regulators

Risk trading and risk management by banks II

Adding value by risk management

- Prevent taking excessive risk
- Flexible risk management system may allow the bank to take on profitable risks
- Requiring business units to take the perspective of the entire bank when making decisions regarding risks

Limitations of hedging

- Risk measurement technology limitations
- Hedging limitations
- Risk taker incentive limitations

Risk trading and risk management by banks III

Challenges in risk profile and performance

- Limited data exists on how the risk function operates in banks
- Risk function characteristics are affected by the bank's risk appetite
- It is possible that poor performance will occur even in the presence of strong governance

Financial disasters

Firms	Year	Key Reason
Chase Manhattan	1976	Misleading reporting
Kidder Peabody	1992	
Barings	1994	
Allied Irish Bank	1997-2002	
UBS	1997	
Scoiete Generale	2008	Large market movement
LTCM	1994	
Metallgesellschaft	1991	
Bankers Trust	1994	Customer conduct
JP Morgan, Citigroup and Enron	2001	

Sample question I

1. Hedging models at Long-Term Capital Management accounted for the:
   - I British law tax changes and large Japanese bank warrants.
   - II Incorrect valuation of long-dated options on equity baskets and inappropriate modeling of other long-dated options.

   - A I only
   - B II only
   - C Both I and II
   - D Neither I nor II

Sample question II

1. Hedging models at Long-Term Capital Management accounted for the:

   I British law tax changes and large Japanese bank warrants.

   II Incorrect valuation of long-dated options on equity baskets and inappropriate modeling of other long-dated options.

A I only
B II only
C Both I and II
D Neither I nor II

Outline

Quantitative Analysis

- The time value of money
- Probabilities
- Basic statistics
- Distributions
- Bayesian analysis
- Hypothesis testing and confidence intervals
- Correlation and copulas
- Linear regression
- Modeling and forecasting trend
- Characterizing cycles
- Modeling cycles: MA, AR and ARMA models
- Estimating volatilities and correlations for risk management
- Simulation methods

Outline

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
- Foreign exchange risk
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Valuation and risk models

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

Thank you!