

2010 FRM[®] Examination STUDY GUIDE

THE CERTIFICATION RECOGNIZED BY RISK MANAGEMENT
PROFESSIONALS WORLDWIDE.

Topic Outline, Readings, Test Weightings

The Study Guide sets forth primary topics and subtopics under the five risk-related disciplines covered in the FRM exam. The topics were selected by the FRM Committee as topics that risk managers who work in practice today have to master. The topics are reviewed yearly to ensure the FRM exam is kept timely and relevant.

FRM Examination Approach

The FRM exam is a practice-oriented examination. Its questions are derived from a combination of theory, as set forth in the readings, and "real-world" work experience. Candidates are expected to understand risk management concepts and approaches and how they would apply to a risk manager's day-to-day activities.

The FRM examination is also a comprehensive examination, testing a risk professional on a number of risk management concepts and approaches.

It is very rare that a risk manager will be faced with an issue that can immediately be slotted into one category. In the real world, a risk manager must be able to identify any number of risk-related issues and be able to deal with them effectively.

Readings

Questions for the FRM examination are derived from the readings listed under each topic outline. These readings were selected by the FRM Committee to assist candidates in their review of the subjects covered by the exam. It is strongly suggested that candidates review these readings in depth prior to sitting for the exam.

The Financial Risk Manager Handbook, 5th Edition, by Philippe Jorion (New York: Wiley & Sons, 2009), covers most of the FRM examination topics at the appropriate level. However, please note that the FRM Handbook was designed to help candidates review the material and is not a textbook. Alone, the FRM Handbook is not sufficient to prepare a candidate to pass the examination. The FRM Handbook includes an interactive CD with questions and answers from previous FRM exams to assist candidates with their exam preparation.

FRM Course Providers

Some candidates may want to more formally review the materials with FRM Course Providers. Course Providers are listed on the GARP website. GARP does not endorse any Course Provider but merely lists them as a service to FRM candidates.

FRM PART I — TOPICS AND READINGS

Foundations of Risk Management Part I Exam Weight **20%**

- Creating value with risk management
- Market efficiency, equilibrium and the Capital Asset Pricing Model (CAPM)
- Performance measurement and attribution
- Sharpe ratio and information ratio
- Tracking error
- Factor models and Arbitrage Pricing Theory
- Risk management failures
- Case studies
- Ethics

Readings for Foundations of Risk Management

1. Philippe Jorion, *Value at Risk: The New Benchmark for Managing Financial Risk, 3rd Edition* (New York: McGraw-Hill, 2007).
 - Chapter 1 The Need for Risk Management
2. Noel Amenc and Veronique Le Sourd, *Portfolio Theory and Performance Analysis* (West Sussex, England: Wiley, 2003).
 - Chapter 4 The Capital Asset Pricing Model and Its Application to Performance Measurement
3. Richard Grinold and Ronald Kahn, *Active Portfolio Management: A Quantitative Approach for Producing Superior Returns and Controlling Risk, 2nd Edition* (New York: McGraw-Hill, 1999).
 - Chapter 7 Expected Returns and the Arbitrage Pricing Theory
4. René Stulz, *Risk Management & Derivatives* (Florence, KY: Thomson South-Western, 2002).
 - Chapter 2 Investors and Risk Management
 - Chapter 3 Creating Value with Risk Management
5. René Stulz, "Risk Management Failures: What are They and When Do They Happen?" Fisher College of Business Working Paper Series (Oct. 2008).
6. Steve Allen, *Financial Risk Management: A Practitioner's Guide to Managing Market and Credit Risk* (New York: John Wiley & Sons, 2003).
 - Chapter 4 Financial Disasters
7. GARP Code of Conduct <http://www.garp.com/about/GARPCodeofConduct.aspx>.

Quantitative Analysis Part I Exam Weight..... **20%**

- Probability distributions
- Mean, standard deviation, correlation, skewness, and kurtosis
- Estimating parameters of distributions
- Linear regression
- Statistical inference and hypothesis testing
- Estimating correlation and volatility: EWMA, GARCH models
- Maximum likelihood methods
- Volatility term structures
- Simulation methods

Readings for Quantitative Analysis

8. Damodar Gujarati, *Essentials of Econometrics, 3rd Edition* (New York: McGraw-Hill, 2006).
 - Chapter 1 The Nature and Scope of Econometrics
 - Chapter 2 Review of Statistics: Probability and Probability Distributions
 - Chapter 3 Characteristics of Probability Distributions
 - Chapter 4 Some Important Probability Distributions
 - Chapter 5 Statistical Inference: Estimation and Hypothesis Testing
 - Chapter 6 Basic Ideas of Linear Regression: The Two Variable Model
 - Chapter 7 The Two Variable Model: Hypothesis Testing
 - Chapter 8 Multiple Regression: Estimation and Hypothesis Testing
9. Jorion, *Value at Risk, 3rd Edition*.
 - Chapter 12 Monte Carlo Methods
10. John Hull, *Options, Futures, and Other Derivatives, 7th Edition* (New York: Prentice Hall, 2009).
 - Chapter 21 Estimating Volatilities and Correlations
11. Svetlozar Rachev, Christian Menn, and Frank Fabozzi, *Fat-Tailed and Skewed Asset Return Distributions: Implications for Risk Management, Portfolio Selection and Option Pricing* (Hoboken, NJ: Wiley, 2005).
 - Chapter 2 Discrete Probability Distributions
 - Chapter 3 Continuous Probability Distributions
12. Linda Allen, Jacob Boudoukh and Anthony Saunders, *Understanding Market, Credit and Operational Risk: The Value at Risk Approach* (Oxford: Blackwell Publishing, 2004).
 - Chapter 2 Quantifying Volatility in VaR Models

Financial Markets and Products Part I Exam Weight 30%

- Clearing house mechanisms, structural hubs, exchanges
- Netting, collateral and downgrade triggers
- Futures, forwards, swaps, and options
- Derivatives on fixed-income securities, interest rates, foreign exchange, equities, and commodities
- Measuring portfolio exposures
- American options, effects of dividends, early exercise
- Trading strategies with derivatives
- Minimum variance hedge ratio
- Cheapest to deliver bond, conversion factors
- Commodity derivatives, cost of carry, lease rate, convenience yield
- Basis risk
- Foreign exchange risk
- Corporate bonds
- Debt equity swaps, loan sales

Readings for Financial Markets and Products

13. Hull, *Options, Futures, and Other Derivatives, 7th Edition.*

- Chapter 1 Introduction
- Chapter 2 Mechanics of Futures Markets
- Chapter 3 Hedging Strategies Using Futures
- Chapter 4 Interest Rates
- Chapter 5 Determination of Forward and Futures Prices
- Chapter 6 Interest Rate Futures
- Chapter 7 Swaps
- Chapter 9 Properties of Stock Options
- Chapter 10 Trading Strategies Involving Options

14. Robert McDonald, *Derivatives Markets, 2nd Edition* (Boston: Addison-Wesley, 2006).

- Chapter 6 Commodity Forwards and Futures

15. Helyette Geman, *Commodities and Commodity Derivatives: Modeling and Pricing for Agriculturals, Metals and Energy* (West Sussex, England: Wiley, 2005).

- Chapter 1 Fundamentals of Commodity Spot and Futures Markets: Instruments, Exchanges and Strategies

16. Anthony Saunders and Marcia Millon Cornett, *Financial Institutions Management: A Risk Management Approach, 6th Edition* (New York: McGraw-Hill, 2008).
- Chapter 14 Foreign Exchange Risk
 - Appendix 15A Mechanisms for Dealing with Sovereign Risk Exposure
17. Frank Fabozzi, *The Handbook of Fixed Income Securities, 7th Edition* (New York: McGraw Hill, 2005).
- Chapter 13 Corporate Bonds

Valuation and Risk Models Part I Exam Weight **30%**

- Value-at-Risk (VaR)
 - Definition and methods
 - Delta-normal valuation, full revaluation, historical simulation, Monte Carlo simulation methods
- Applications of VaR for market, credit and operational risk
- VaR of linear and non-linear derivatives
- VaR for fixed income securities with embedded options
- Term structure of interest rates
- Discount factors, arbitrage, yield curves
- Bond prices, spot rates, forward rates
- DV01, duration and convexity, duration based hedging
- Credit rating agencies, credit ratings
- Credit transition matrices
- Sovereign risk and country risk evaluation
- Binomial trees
- Black-Scholes-Merton model
- Greeks
- Stress testing and scenario analysis

Readings for Valuation and Risk Models

18. Allen, Boudoukh and Saunders, *Understanding Market, Credit and Operational Risk: The Value at Risk Approach*.
- Chapter 3 Putting VaR to Work
 - Chapter 5 Extending the VaR Approach to Operational Risks
19. Hull, *Options, Futures, and Other Derivatives, 7th Edition*.
- Chapter 11 Binomial Trees
 - Chapter 13 The Black-Scholes-Merton Model
 - Chapter 17 The Greek Letters

20. **Bruce Tuckman, *Fixed Income Securities, 2nd Edition* (Hoboken, NJ: Wiley & Sons, 2002).**
 - Chapter 1 Bond Prices, Discount Factors, and Arbitrage
 - Chapter 2 Bond Prices, Spot Rates, and Forward Rates
 - Chapter 3 Yield to Maturity
 - Chapter 5 One Factor Measures of Price Sensitivity

21. **Jorion, *Value at Risk, 3rd Edition*.**
 - Chapter 14 Stress Testing

22. **Caouette, Altman, Narayanan, and Nimmo, *Managing Credit Risk, 2nd Edition*.**
 - Chapter 6 The Rating Agencies
 - Chapter 23 Country Risk Models

23. **Arnaud de Servigny and Olivier Renault, *Measuring and Managing Credit Risk* (New York: McGraw-Hill, 2004).**
 - Chapter 2 External and Internal Ratings

24. **Saunders and Cornett, *Financial Institutions Management, 6th Edition*.**
 - Chapter 15 Sovereign Risk (excluding Appendix 15A)

25. **Michael Ong, *Internal Credit Risk Models: Capital Allocation and Performance Measurement* (London: Risk Books, 2003).**
 - Chapter 4 Loan Portfolios and Expected Loss
 - Chapter 5 Unexpected Loss

26. **Kevin Dowd, *Measuring Market Risk, 2nd Edition* (West Sussex, England: Wiley, 2005).**
 - Chapter 2 Measures of Financial Risk

27. **John Hull, *Risk Management and Financial Institutions, 2nd Edition* (Boston: Prentice Hall, 2010).**
 - Chapter 18 Operational Risk

28. **“Principles for Sound Stress Testing Practices and Supervision” (Basel Committee on Banking Supervision Publication, Jan 2009). Article available at www.garpdigitallibrary.org.**

FRM PART II — TOPICS AND READINGS

Market Risk Measurement and Management Part II Exam Weight **25%**

- Volatility smiles and volatility term structures
- Exotic options
- Duration and convexity of fixed income securities
- Term structure models
- Backtesting VaR
- Mapping financial instruments to risk factors
- Expected shortfall and coherent risk measures
- Extreme value theory
- Copulas and tail dependence
- Mortgages and mortgage-backed securities (Underwriting mortgages, Prepayment models, Risks in mortgages and mortgage-backed securities, Valuation of mortgage-backed securities)

Readings for Market Risk Measurement and Management

29. Hull, *Options, Futures, and Other Derivatives, 7th Edition*.

- Chapter 18 Volatility Smiles
- Chapter 24 Exotic Options

30. Tuckman, *Fixed Income Securities, 2nd Edition*.

- Chapter 6 Measures of Price Sensitivity Based on Parallel Yield Shifts
- Chapter 7 Key Rate and Bucket Exposures
- Chapter 9 The Science of Term Structure Models
- Chapter 21 Mortgage-Backed Securities

31. Jorion, *Value at Risk, 3rd Edition*.

- Chapter 6 Backtesting VaR
- Chapter 11 VaR Mapping

32. Kevin Dowd, *Measuring Market Risk, 2nd Edition* (West Sussex, England: Wiley, 2005).

- Chapter 3 Estimating Market Risk Measures
- Chapter 4 Non-parametric Approaches
- Chapter 5 Appendix ... Modeling Dependence: Correlations and Copulas
- Chapter 7 Parametric Approaches (II): Extreme Value

33. Frank Fabozzi, *Handbook of Mortgage Backed Securities, 6th Edition* (New York: McGraw Hill, 2006).

- Chapter 1 An Overview of Mortgages and the Mortgage Market
- Chapter 31 Valuation of Mortgage-Backed Securities

Credit Risk Measurement and Management Part II Exam Weight..... 25%

- Subprime mortgages and subprime securitization
- Counterparty risk and OTC derivatives
- Credit derivatives, credit default swaps and credit-linked notes
- Structured finance, securitization, tranching and subordination
- Collateralized Debt Obligations (pricing and risk management)
- Probability of default, loss given default and recovery rates
- Credit scoring
- Credit spreads
- Expected and unexpected loss
- Contingent claim approach and the KMV Model
- Default and default-time correlations
- Portfolio credit risk
- Credit risk management models
- Risk mitigation techniques (including netting, rating triggers, and collateral)

Readings for Credit Risk Measurement and Management

34. Adam Ashcroft and Til Schuermann, "Understanding the Securitization of Subprime Mortgage Credit," Federal Reserve Bank of New York Staff Reports, no. 318 (March 2008). Article available at www.garpdigitallibrary.org.
35. Eduardo Canabarro and Darrell Duffie, "Measuring and Marking Counterparty Risk" in *ALM of Financial Institutions*, ed. Leo Tilman (London: Euromoney Institutional Investor, 2003). Article available at www.garpdigitallibrary.org.
36. Darrell Duffie, "Innovations in Credit Risk Transfer: Implications for Financial Stability" (July 2008) Article available at www.garpdigitallibrary.org.
37. Christopher Culp, *Structured Finance and Insurance: The Art of Managing Capital and Risk* (Hoboken, NJ: Wiley & Sons, 2006).
- Chapter 12 Credit Derivatives and Credit-Linked Notes
 - Chapter 13 The Structuring Process
 - Chapter 16 Securitization
 - Chapter 17 Cash Collateralized Debt Obligations
38. de Servigny and Renault, *Measuring and Managing Credit Risk*.
- Chapter 3 Default Risk: Quantitative Methodologies
 - Chapter 4 Loss Given Default

39. Hull, *Options, Futures, and Other Derivatives, 7th Edition.*

- Chapter 22 Credit Risk
- Chapter 23 Credit Derivatives

40. Allen, Boudoukh and Saunders, *Understanding Market, Credit and Operational Risk.*

- Chapter 4 Extending the VaR Approach to Non-tradable Loans

41. Stulz, *Risk Management & Derivatives.*

- Chapter 18 Credit Risks and Credit Derivatives

42. Ong, *Internal Credit Risk Models: Capital Allocation and Performance Measurement.*

- Chapter 6 Portfolio Effects: Risk Contributions and Unexpected Losses

43. "Studies on credit risk concentration: an overview of the issues and a synopsis of the results from the Research Task Force project" (Basel Committee on Banking Supervision Publication, November 2006). Article available at www.garpdigitallibrary.org.**Operational and Integrated Risk Management Part II Exam Weight 25%**

- Definition of risk capital
- Allocation of risk capital across the firm
- Firm-wide risk measurement and management
- Correlations across market, credit, and operational risk
- Evaluating the performance of risk management systems
- Regulation and the Basel II Accord
 - Minimum capital requirements, Credit concentration risk
 - Liquidity risk, Stress testing
- Implementation and model risk
- Liquidity risk
- Economic capital and risk aggregation

Readings for Operational and Integrated Risk Management**44. Michel Crouhy, Dan Galai and Robert Mark, *Risk Management* (New York: McGraw-Hill, 2001).**

- Chapter 14 Capital Allocation and Performance Measurement

45. Dowd, *Measuring Market Risk, 2nd Edition.*

- Chapter 14 Estimating Liquidity Risks
- Chapter 16 Model Risk

46. Ellen Davis (editor), *Operational Risk: Practical Approaches to Implementation* (London: Risk Books, 2005).
 - Chapter 12 Aligning Basel II Operational Risk and Sarbanes-Oxley 404 Projects, by Nick Bolton and Judson Berkey.
47. Andrew Kuritzkes, Til Schuermann and Scott M. Weiner. "Risk Measurement, Risk Management and Capital Adequacy in Financial Conglomerates," in *Brookings-Wharton Papers on Financial Services* Robert E. Litan and Richard Herring (eds) (Brookings Institutional Press, Washington, DC: 2003). Article available at www.garpdigitallibrary.org.
48. Brian Nocco and René Stulz, "Enterprise Risk Management: Theory and Practice," *Journal of Applied Corporate Finance* 18, No. 4 (2006): 8–20. Article available at www.garpdigitallibrary.org.
49. Falko Aue and Michael Kalkbrener, 2007, "LDA at Work", Deutsche Bank White Paper. Article available at www.garpdigitallibrary.org.
50. Til Schuermann and Andrew Kuritzkes, "What We Know, Don't Know and Can't Know About Bank Risk: A View from the Trenches." Article available at www.garpdigitallibrary.org.
51. "Principles for Sound Liquidity Risk Management and Supervision" (Basel Committee on Banking Supervision Publication, September 2008). Article available at www.garpdigitallibrary.org.
52. "Range of practices and issues in economic capital modeling" (Basel Committee on Banking Supervision Publication, March 2009). Article available at www.garpdigitallibrary.org.

Readings for Basel Reference

Candidates are expected to understand the objective and general structure of the Basel II Accord and general application of the various approaches for calculating minimum capital requirements. Candidates are not expected to memorize specific details like risk weights for different assets.

53. "Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework – Comprehensive Version" (Basel Committee on Banking Supervision Publication, June 2006). Article available at www.garpdigitallibrary.org.
54. "Supervisory guidance for assessing banks' financial instrument fair value practices" (Basel Committee on Banking Supervision Publication, April 2009). Article available at www.garpdigitallibrary.org.
55. "Guidelines for computing capital for incremental risk in the trading book - final version" (Basel Committee on Banking Supervision Publication, July 2009). Article available at www.garpdigitallibrary.org.
56. "Revisions to the Basel II market risk framework – final version" (Basel Committee on Banking Supervision Publication, July 2009). Article available at www.garpdigitallibrary.org.

Risk Management and Investment Management Part II Exam Weight **15%**

- Portfolio construction
- Risk decomposition and performance attribution
- Risk budgeting
- Setting risk limits
- Hedge fund risk management
- Risk-return metrics specific to hedge funds
- Risks of specific strategies (fixed-income arbitrage, merger arbitrage, convert arbitrage, equity long/short-market neutral, macro, distressed debt, emerging markets)
- Asset illiquidity, valuation, and risk measurement
- The use of leverage and derivatives and the risks they create
- Measuring exposures to risk factors (dynamic strategies, leverage, derivatives, style drift)
- Pension fund risk management

Readings for Risk Management and Investment Management

57. Grinold and Kahn, *Active Portfolio Management: A Quantitative Approach for Producing Superior Returns and Controlling Risk, 2nd Edition*.
- Chapter 14 Portfolio Construction
 - Chapter 17 Performance Analysis
58. Lars Jaeger (ed), *The New Generation of Risk Management for Hedge Funds and Private Equity Investments* (London: Euromoney Institutional Investor, 2003).
- Chapter 6 Funds of Hedge Funds, by Sohail Jaffer
 - Chapter 27 Style Drifts: Monitoring, Detection and Control, by Pierre Yves Moix
59. Lars Jaeger, *Through the Alpha Smoke Screens: A Guide to Hedge Fund Returns* (New York: Institutional Investor Books, 2005).
- Chapter 5 Individual Hedge Fund Strategies
60. Jorion, *Value at Risk, 3rd Edition*.
- Chapter 7 Portfolio Risk: Analytical Methods
 - Chapter 17 VaR and Risk Budgeting in Investment Management
61. René Stulz, "Hedge Funds: Past, Present and Future." Article available at www.garpdigitallibrary.org.
62. Robert Litterman and the Quantitative Resources Group, *Modern Investment Management: An Equilibrium Approach* (Hoboken, NJ: John Wiley & Sons: 2003).
- Chapter 17 Risk Monitoring and Performance Measurement

63. Leslie Rahl (editor), *Risk Budgeting: A New Approach to Investing* (London: Risk Books, 2004).
- Chapter 6 Risk Budgeting for Pension Funds and Investment Managers Using VaR, by Michelle McCarthy
64. Manmohan Singh and James Aitken, "Deleveraging after Lehman – Evidence from Reduced Rehypothecation," (March 2009).
65. Stephen Dimmock and William Gerken, "Finding Bernie Madoff: Detecting Fraud by Investment Managers," (December 2009).

Current Issues in Financial Markets Part II Exam Weight..... 10%

- Causes and consequences of the current crisis
- Subprime mortgage design
- Mortgages and securitization, subprime CDOs
- Liquidity crises
- Use and limitations of VaR
- Hedge funds and systemic risk

Readings for Current Issues in Financial Markets

66. Gary Gorton, "The Panic of 2007," (August 2008). Article available at www.garpdigitallibrary.org.
67. Raghuram Rajan, "Has Financial Development Made The World Riskier?" (September 2005). Article available at www.garpdigitallibrary.org.
68. Senior Supervisory Group, "Observations on Risk Management Practices during the Recent Market Turbulence," (March 2008). Article available at www.garpdigitallibrary.org.
69. UBS, "Shareholder Report on UBS's Write-Downs," (April 2008). Article available at www.garpdigitallibrary.org.
70. Martin Hellwig, "Systemic Risk in the Financial Sector: An Analysis of the Subprime-Mortgage Financial Crisis." Article available at www.garpdigitallibrary.org.
71. Carmen Reinhart and Kenneth Rogoff, "This Time is Different: A Panoramic View of Eight Centuries of Financial Crises." Article available at www.garpdigitallibrary.org.
72. Darrell Duffie, "The Failure Mechanics of Dealer Banks." Article available at www.garpdigitallibrary.org.

2010 FRM Committee Members

The following individuals were members of the Committee responsible for developing the 2010 FRM Study Guide:

- *Dr. René Stulz, Chairman, FRM Committee . . . Ohio State University*
- *Richard Apostolik Global Association of Risk Professionals*
- *Juan Carlos Garcia Cespedes Banco Bilbao Vizcaya Argentaria*
- *Dr. Christopher Donohue Global Association of Risk Professionals*
- *Hervé Geny ICAP*
- *Dr. Satyajit Kamik, FRM Global Association of Risk Professionals*
- *Kai Leifert, FRM Northern Trust Global Investments*
- *Steve Lerit, CFA New York Life Investment Management*
- *Ruixia Liu Industrial and Commercial Bank of China*
- *Michelle McCarthy Russell Investments*
- *Michael B. Miller, FRM Tremblant Capital Group*
- *Ezra Uzi Moualem, FRM The Financial Institute of Israel & ZRisk*
- *Dr. Victor Ng Goldman Sachs & Co*
- *Dr. Elliot Noma Garrett Asset Management*
- *Robert Scanlon Standard Chartered Bank*
- *Serge Sverdlov Microsoft Corporation*
- *Alan Weindorf Visa*

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**Global Association of
Risk Professionals**

111 Town Square Place
Suite 1215
Jersey City, New Jersey 07310
USA
+ 1 201.719.7210

Minster House, 1st Floor
42 Mincing Lane
London EC3R 7AE
UK
+ 44 (0) 20 7397 9631

www.garp.org