

2008 FRM[®] Examination

Study Guide

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, 4th edition*, by Philippe Jorion (New York: Wiley & Sons, 2007), 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.** An interactive CD with questions and answers from previous FRM exams, and the 2008 FRM Core Readings Course Pack are also available 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 Committee Members

No member of the GARP FRM Committee is permitted to receive royalties on books he or she has written that are part of this Study Guide. Any royalties must either be paid to GARP in support of the examination’s cost or be given to a charity.

Study Outline, Test Weightings, Readings

I. Quantitative Analysis – 10%

- Probability distributions
- Mean, standard deviation, correlation, skewness, and kurtosis
- Estimating parameters of distributions
- Hypothesis testing
- Linear regression and correlation
- Statistical properties and forecasting of correlation, covariance, and volatility
- Monte Carlo analysis
- Extreme value theory; basic principles

Quantitative Analysis Readings:

1. Linda Allen, Jacob Boudoukh, Anthony Saunders, *Understanding Market, Credit and Operational Risk: The Value At Risk Approach* (Oxford: Blackwell Publishing, 2004).
 - Chapter 2 – Quantifying Volatility in VaR Models
2. Damodar N Gujarati, *Essentials of Econometrics, 3rd Edition* (New York: McGraw-Hill, 2006).
 - Chapter 1 – The Nature and Scope of Econometrics
 - Chapter 2 – Review of Statistics I: 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
3. Paul Wilmott, *Paul Wilmott Introduces Quantitative Finance, 2nd Edition* (New York: Wiley & Sons, 2007).
 - Chapter 22 – Value at Risk
 - Appendix A – All the Math You Need ... and No More (An Executive Summary)

NOTE: Candidates should not memorize formulas of distributions but should understand when it is appropriate to use a particular type of distribution.

II. Market Risk Measurement and Management – 30%

- Interest rates and bond pricing
- Interest rate, foreign exchange, equity, and commodity risks
- Derivatives on fixed-income securities, interest rates, foreign exchange, equities, and commodities
- Valuation and risk analysis of futures, forwards, swaps, and options
- Identifying and measuring risk exposures
- Value-at-Risk:
 1. Definition, delta-normal, historical simulation, Monte Carlo
 2. Implementation
 3. Limitations and alternative risk measures, e.g., conditional Value-at-Risk
- Stress testing
- Emerging market risks including currency crises
- Measuring and managing corporate exposures, including cash-flow-at-risk and earnings-at-risk

Market Risk Measurement and Management Readings:

1. John Hull, *Options, Futures, and Other Derivatives, 6th Edition* (New York: Prentice Hall, 2006).
 - Chapter 3 – Hedging Strategies using Futures
 - 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
 - Chapter 11 – Binomial Trees
 - Chapter 13 – The Black-Scholes-Merton Model
 - Chapter 15 – The Greek Letters
 - Chapter 16 – Volatility Smiles
 - Chapter 22 – Exotic Options
2. Philippe Jorion, *Value-at-Risk: The New Benchmark for Managing Financial Risk, 3rd Edition* (New York: McGraw-Hill, 2007).
 - Chapter 10 – VaR Methods
 - Chapter 11 – VaR Mapping
 - Chapter 14 – Stress Testing
 3. Robert L. McDonald, *Derivatives Markets*, (Boston: Addison-Wesley, 2003).
 - Chapter 6 – Commodity Forwards and Futures
 4. Anthony Saunders and Marcia Millon Cornett, *Financial Institutions Management: A Risk Management Approach, 5th Edition* (New York: McGraw-Hill, 2005).
 - Chapter 15 – Foreign Exchange Risk
 5. René Stulz, *Risk Management & Derivatives* (Mason, Ohio: South-Western, 2003).
 - Chapter 4 – A Firm-Wide Approach to Risk Management
 - Chapter 8 – Identifying and Managing Cash Flow Exposures
 - Chapter 15 – The Demand and Supply for Derivative Products
 6. Bruce Tuckman, *Fixed Income Securities, 2nd Edition* (Hoboken: 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 4 – Generalizations and Curve Fitting
 - Chapter 5 – One-Factor Measures of Price Sensitivity
 - 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

III. Credit Risk Measurement and Management – 25%

- **Bankruptcy and default**
- **Credit spreads**
- **Probability of default**
- **Loss given default and recovery rates**
- **Expected and unexpected loss**
- **Credit scores**
- **External credit ratings**
- **Internal credit ratings**
- **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)**
- **Credit default swaps**
- **Securitization**
- **Special purpose vehicles**
- **Collateralized Debt Obligations (pricing and risk management)**
- **Counterparty risk**

Credit Risk Measurement and Management Readings:

1. Adam Ashcroft and Til Schuermann, "Understanding the Securitization of Subprime Mortgage Credit", 2007. Copy of article is available at www.GARPDigitalLibrary.org.
2. Eduardo Canabarro and Darrell Duffie, "Measuring and Marking Counterparty Risk" in *ALM of Financial Institutions*, ed. Leo Tilman (London: Euromoney Institutional Investor, 2003). Copy of article is available at www.GARPDigitalLibrary.org.
3. Christopher Culp, *Structured Finance and Insurance: The Art of Managing Capital and Risk* (Hoboken: Wiley & Sons, 2006).
 - Chapter 16 – Securitization
4. Arnaud de Servigny and Olivier Renault, *Measuring and Managing Credit Risk*, (New York: McGraw-Hill, 2004).
 - Chapter 2 – External and Internal Ratings
 - Chapter 3 – Default Risk: Quantitative Methodologies
 - Chapter 4 – Loss Given Default
 - Chapter 6 – Credit Risk Portfolio Models
 - Chapter 7 – Credit Risk Management and Strategic Capital Allocation
5. Ashish Dev (editor), *Economic Capital*, (London: Risk Books, 2004).
 - Chapter 7 – Economic Capital for Counterparty Credit Risk, by Evan Picoult and David Lamb.
6. John Hull, *Risk Management and Financial Institutions*, (New York: Prentice Hall, 2006).
 - Chapter 13 – Credit Derivatives
7. Gunter Meissner, *Credit Derivatives, Application, Pricing and Risk Management*, (Malden, MA: Blackwell Publishing, 2005).
 - Chapter 3 – Synthetic Structures
8. Michael Ong, *Internal Credit Risk Models: Capital Allocation and Performance Measurement*, (London: Risk Books, 1999).
 - Chapter 4 – Loan Portfolios and Expected Loss
 - Chapter 5 – Unexpected Loss
 - Chapter 6 – Portfolio Effects: Risk Contributions and Unexpected Losses
9. Saunders, *Financial Institutions Management, 5th Edition*.
 - Chapter 11 – Credit Risk: Individual Loan Risk
 - Chapter 16 – Sovereign Risk
10. Stulz, *Risk Management & Derivatives*.
 - Chapter 18 – Credit Risks and Credit Derivatives

IV. Operational and Integrated Risk Management, Legal – 25%

- **Types of operational risk**
- **Workflow in financial institutions**
- **Insuring and hedging operational risk**
- **Severity and frequency distributions for operational risk**
- **Aggregated distributions**
 1. **Loss distributions**
 2. **Aggregating loss distributions**
- **Firm-wide risk measurement and management**
- **Correlations across market, credit, and operational risk**
- **Differences between market and operational VaRs**
- **Definition of risk capital**
- **Allocation of risk capital across the firm**
- **Basel II Accord**
- **Evaluating the performance of risk management systems**
- **Implementation risks of risk management**
- **Legal risk**
- **Liquidity risk**

Operational and Integrated Risk Management, Legal Readings:

1. Allen, Boudoukh, and Saunders, *Understanding Market, Credit and Operational Risk*.
 - Chapter 5 – Extending the VaR Approach to Operational Risk
2. Falko Aue and Michael Kalkbrener, 2007, “LDA at Work”, Deutsche Bank White Paper. Copy of the article is available at www.GARPDigitalLibrary.org.
3. Klaus Boecker and Claudia Kluppelberg, 2007, “Operational VaR: a Closed-Form Approximation.” Copy of the article is available at www.GARPDigitalLibrary.org.
4. Michael Crouhy, Dan Galai, and Robert Mark, *Risk Management* (New York: McGraw-Hill, 2001).
 - Chapter 14 – Capital Allocation and Performance Measurement
5. Christopher Culp, *The Risk Management Process: Business Strategy and Tactics* (Hoboken: Wiley & Sons, 2001).
 - Chapter 17 – Identifying, Measuring, and Monitoring Liquidity Risk
6. 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
7. de Servigny and Renault, *Measuring and Managing Credit Risk*.
 - Chapter 10 – Regulation
8. Kevin Dowd, *Measuring Market Risk*, 2nd ed., (West Sussex: Wiley & Sons, 2005).
 - Chapter 16 - Model Risk
9. Reto Gallati, *Risk Management and Capital Adequacy* (New York: McGraw-Hill, 2003).
 - Chapter 6 – Case Studies
10. Andrew Kuritzkes, Til Schuermann and Scott M. Weiner. "Risk Measurement, Risk Management and Capital Adequacy in Financial Conglomerates." Brookings-Wharton Papers on Financial Services: 2003. Ed. Robert E. Litan and Richard Herring. Washington D.C.: Brookings Institutional Press, 2003. Copy of article is available at www.GARPDigitalLibrary.org.
11. Brian W. Nocco and René M. Stulz, 2006, “Enterprise Risk Management: Theory and Practice,” *Journal of Applied Corporate Finance* 18 (4), 8 – 20. Copy of the article is available at www.GARPDigitalLibrary.org.
12. Saunders, *Financial Institutions Management*, 5th Edition.
 - Chapter 14 – Technology and Other Operational Risks
13. Stulz, *Risk Management & Derivatives*.
 - Chapter 2 – Investors and Risk Management
 - Chapter 3 – Creating Value with Risk Management
14. Counterparty Risk Management Policy Group II, July 2005. “Toward Greater Financial Stability: A Private Sector Perspective. The Report of the Counterparty Risk Management Policy Group II”. Copy of the full report is available at www.GARPDigitalLibrary.org.
 - Section I: Introduction
 - Section II: Executive Summary and Recommendations
 - Section III: Risk Management and Risk-Related Disclosure Practices

Basel Reference Readings:

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 such as risk weights for different assets.

1. “Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework – Comprehensive Version” (Basel Committee on Banking Supervision Publication, June 2006). Copy of the article is available at www.GARPDigitalLibrary.org.
2. “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). Copy of the article is available at www.GARPDigitalLibrary.org.
3. “An Explanatory Note on the Basel II IRB Risk Weight Functions” (Basel Committee on Banking Supervision Publication, July 2005). Copy of the article is available at www.GARPDigitalLibrary.org.

V. Risk Management and Investment Management – 10%

Traditional investment risk management

- Return metrics (Sharpe ratio, information ratio, VaR, relative VaR, tracking error, survivorship bias)
- Implementing VaR
- Benchmarking asset mixes
- Risk decomposition and performance attribution
- Risk budgeting
- Tracking error
- Setting risk limits
- Risk of alpha transfer strategies
- Risk management issues of pension funds

Hedge fund risk management

- Risk-return metrics specific to hedge funds (drawdown, Sortino ratio)
- 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)
- Correlations among hedge funds and between hedge funds and other assets

Risk Management and Investment Management Readings:

1. Noel Amenc and Veronique Le Sourd, *Portfolio Theory and Performance Analysis* (Sussex: Wiley & Sons, 2003).
 - Chapter 4 – The Capital Asset Pricing Model and Its Application to Performance Measurement
2. 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 17 – Performance Analysis
3. Lars Jaeger (editor), *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
4. Lars Jaeger, *Through the Alpha Smoke Screens: A Guide to Hedge Fund Returns*, (London: Euromoney, 2005).
 - Chapter 5 – Individual Hedge Fund Strategies
5. Jorion, *Value at Risk, 3rd Edition*.
 - Chapter 7 – Portfolio Risk: Analytical Methods
 - Chapter 17 – VaR and Risk Budgeting in Investment Management
6. Jasmina Hasanhodzicy and Andrew Lo, "Can Hedge-Fund Returns be Replicated?: The Linear Case". (Aug. 2006). Available at SSRN: <http://ssrn.com/abstract=924565>. Copy of article available at www.GARPDigitalLibrary.org.
7. Amir E. Khandani and Andrew Lo, "What happened to the Quants in August 2007?" (Nov. 4, 2007). Available at SSRN: <http://ssrn.com/abstract=1015987>. Copy of article available at www.GARPDigitalLibrary.org.
8. President's Working Group on Financial Markets, "Agreement among PWG and U.S. Agency Principals on Principles and Guidelines Regarding Private Pools of Capital", February 2007. Copy of the article is available at www.GARPDigitalLibrary.org.
9. René M. Stulz, "Hedge Funds: Past, Present and Future". Forthcoming in the *Journal of Economic Perspectives*, Spring 2007. Copy of article available at www.GARPDigitalLibrary.org.

2008 FRM Committee members: the following individuals were members of the Committee responsible for developing the 2008 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; Kai Leifert, Credit Suisse Asset Management; Steve Lerit, CFA, New York Life Investment Management; Michelle McCarthy, Washington Mutual Bank; Dr. Susan Mangiero, BVA, LLC; Michael B. Miller, Fortress Investment Group; Ezra Uzi Moualem, The Financial Institute of Israel; Dr. Victor Ng, Goldman, Sachs & Co; Dr. Elliot Noma, Asset Alliance Corporation; Robert Scanlon, Standard Chartered Bank; Serge Sverdlov, Microsoft Corporation; Alan Weindorf, Financial Consultant.