

2015

FRM Exam Study Guide

**The designation recognized by risk
management professionals worldwide**

Topic Outline, Readings, Test Weightings

The Study Guide sets forth primary topics and subtopics covered in the FRM Exam Part I and Part II. The topics were selected by the FRM Committee as ones that risk managers who work in practice today have to master. The topics and their respective weightings are reviewed yearly to ensure the Exams are timely and relevant. The Study Guide also contains a full listing of all of the readings that are recommended as preparation for the FRM Exam Part I and Part II. Key concepts appear as bullet points at the beginning of each section and are intended to help candidates identify the major themes and knowledge areas associated with that section.

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.

FRM Exam Approach

The FRM Exams are practice-oriented. The 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. It is 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. As such, the Exams are comprehensive in nature, testing a candidate on a number of risk management concepts and approaches.

Readings

Questions for the FRM Exams are related to and supported by 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 Exams. It is strongly suggested that candidates review these readings in depth prior to sitting for each exam. All of the readings listed in the FRM Study Guide are available through GARP. Further information can be found at the GARP website.

FRM Exam Prep Providers

Some candidates may want to more formally review the materials with FRM Exam Preparation Providers (EPPs). A list of EPPs that have registered with GARP can be found at the GARP website. GARP does not endorse any Exam Preparation Provider but merely lists them as a service to FRM candidates.

On the following pages, an asterisk after a reading title indicates that the reading is freely available on the GARP website.

FRM EXAM PART I

TOPICS

AND

READINGS

FOUNDATIONS OF RISK MANAGEMENT—PART I EXAM WEIGHT • 20%

- Basic risk types, measurement and management tools
 - Creating value with risk management
 - The role of risk management in corporate governance
 - Enterprise Risk Management (ERM)
 - Financial disasters and risk management failures
 - The Capital Asset Pricing Model (CAPM)
 - Risk-adjusted performance measurement
 - Multi-factor models
 - Information risk and data quality management
 - Ethics and the GARP Code of Conduct
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Readings for Foundations of Risk Management

1. Michel Crouhy, Dan Galai, and Robert Mark, *The Essentials of Risk Management, 2nd Edition* (New York: McGraw-Hill, 2014).
 - Chapter 1. Risk Management: A Helicopter View (Including Appendix 1.1. Typology of Risk Exposures)
 - Chapter 2. Corporate Risk Management: A Primer
 - Chapter 4. Corporate Governance and Risk Management
2. James Lam, *Enterprise Risk Management: From Incentives to Controls, 2nd Edition* (Hoboken, NJ: John Wiley & Sons, 2014).
 - Chapter 4. What is ERM?
3. “Implementing Robust Risk Appetite Frameworks to Strengthen Financial Institutions,” Institute of International Finance, June 2011. (Executive Summary—Section 4, pages 10–40)
4. Steve Allen, *Financial Risk Management: A Practitioner’s Guide to Managing Market and Credit Risk, 2nd Edition* (New York: John Wiley & Sons, 2013).
 - Chapter 4. Financial Disasters
5. John Hull, *Risk Management and Financial Institutions, 3rd Edition* (New York: John Wiley & Sons, 2012).
 - Chapter 6. The Credit Crisis of 2007
6. René Stulz, “Risk Management Failures: What are They and When Do They Happen?” Fisher College of Business Working Paper Series, October 2008.*
7. Edwin J. Elton, Martin J. Gruber, Stephen J. Brown and William N. Goetzmann, *Modern Portfolio Theory and Investment Analysis, 9th Edition* (Hoboken, NJ: John Wiley & Sons, 2014).
 - Chapter 13. The Standard Capital Asset Pricing Model

8. Noel Amenc and Veronique Le Sourd, *Portfolio Theory and Performance Analysis* (West Sussex, England: John Wiley & Sons, 2003).
 - Chapter 4. Applying the CAPM to Performance Measurement: Single-Index Performance Measurement Indicators (Section 4.2 only)
9. Zvi Bodie, Alex Kane, and Alan J. Marcus, *Investments, 10th Edition* (New York: McGraw-Hill, 2013).
 - Chapter 10. Arbitrage Pricing Theory and Multifactor Models of Risk and Return
10. Anthony Tarantino and Deborah Cernauskas, *Risk Management in Finance: Six Sigma and Other Next Generation Techniques* (Hoboken, NJ: John Wiley & Sons, 2009).
 - Chapter 3. Information Risk and Data Quality Management
11. “Principles for Effective Data Aggregation and Risk Reporting,” (Basel Committee on Banking Supervision Publication, January 2013).*
12. GARP Code of Conduct.*

QUANTITATIVE ANALYSIS—PART I EXAM WEIGHT • 20%

- Discrete and continuous probability distributions
 - Estimating the parameters of distributions
 - Population and sample statistics
 - Bayesian analysis
 - Statistical inference and hypothesis testing
 - Correlations and copulas
 - Estimating correlation and volatility using EWMA and GARCH models
 - Volatility term structures
 - Linear regression with single and multiple regressors
 - Time series analysis
 - Simulation methods
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Readings for Quantitative Analysis

13. Michael Miller, *Mathematics and Statistics for Financial Risk Management, 2nd Edition* (Hoboken, NJ: John Wiley & Sons, 2013).
 - Chapter 2. Probabilities
 - Chapter 3. Basic Statistics
 - Chapter 4. Distributions
 - Chapter 6. Bayesian Analysis (Pages 113-124 only)
 - Chapter 7. Hypothesis Testing and Confidence Intervals
14. John Hull, *Risk Management and Financial Institutions, 3rd Edition* (Boston: Pearson Prentice Hall, 2012).
 - Chapter 11. Correlations and Copulas
15. James Stock and Mark Watson, *Introduction to Econometrics, Brief Edition* (Boston: Pearson Education, 2008).
 - Chapter 4. Linear Regression with One Regressor
 - Chapter 5. Regression with a Single Regressor
 - Chapter 6. Linear Regression with Multiple Regressors
 - Chapter 7. Hypothesis Tests and Confidence Intervals in Multiple Regression
16. Francis X. Diebold, *Elements of Forecasting, 4th Edition* (Mason, Ohio: Cengage Learning, 2006).
 - Chapter 5. Modeling and Forecasting Trend (Section 5.4 only—Selecting Forecasting Models Using the Akaike and Schwarz Criteria)
 - Chapter 7. Characterizing Cycles
 - Chapter 8. Modeling Cycles: MA, AR, and ARMA Models
17. John Hull, *Options, Futures, and Other Derivatives, 9th Edition* (New York: Pearson Prentice Hall, 2014).
 - Chapter 23. Estimating Volatilities and Correlations for Risk Management
18. Dessislava Pachamanova and Frank Fabozzi, *Simulation and Optimization in Finance* (Hoboken, NJ: John Wiley & Sons, 2010).
 - Chapter 4. Simulation Modeling

FINANCIAL MARKETS AND PRODUCTS—PART I EXAM WEIGHT • 30%

- Structure and mechanics of OTC and exchange markets
 - Structure, mechanics, and valuation of forwards, futures, swaps and options
 - Hedging with derivatives
 - Interest rates and measures of interest rate sensitivity
 - Foreign exchange risk
 - Corporate bonds
 - Mortgage-backed securities
 - Rating agencies
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Readings for Financial Markets and Products

19. *The Institute for Financial Markets, Futures and Options* (Washington, DC: The Institute for Financial Markets, 2011).
 - Chapter 1. Introduction: Futures and Options Markets
 - Chapter 2. Futures Industry Institutions and Professionals
 - Chapter 7. Hedging with Futures and Options
20. John Hull, *Options, Futures, and Other Derivatives, 9th 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 10. Mechanics of Options Markets
 - Chapter 11. Properties of Stock Options
 - Chapter 12. Trading Strategies Involving Options
 - Chapter 26. Exotic Options
21. Robert McDonald, *Derivatives Markets, 3rd Edition* (Boston: Addison-Wesley, 2013).
 - Chapter 6. Commodity Forwards and Futures
22. Anthony Saunders and Marcia Millon Cornett, *Financial Institutions Management: A Risk Management Approach, 8th Edition* (New York: McGraw-Hill, 2014).
 - Chapter 13. Foreign Exchange Risk
23. Frank Fabozzi (editor), *The Handbook of Fixed Income Securities, 8th Edition* (New York: McGraw-Hill, 2012).
 - Chapter 12. Corporate Bonds, by Frank Fabozzi, Steven Mann and Adam Cohen

24. Bruce Tuckman, Angel Serrat, *Fixed Income Securities: Tools for Today's Markets, 3rd Edition* (New York: Wiley, 2011).
- Chapter 20. Mortgages and Mortgage-Backed Securities
25. John B. Caouette, Edward I. Altman, Paul Narayanan, and Robert W.J. Nimmo, *Managing Credit Risk, 2nd Edition* (New York: John Wiley & Sons, 2008).
- Chapter 6. The Rating Agencies

VALUATION AND RISK MODELS—PART I EXAM WEIGHT • 30%

- Value-at-Risk (VaR)
 - Expected shortfall
 - Stress testing and scenario analysis
 - Option valuation
 - Fixed income valuation
 - Country and sovereign risk models and management
 - External and internal credit ratings
 - Expected and unexpected losses
 - Operational risk
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Readings for Valuation and Risk Models

26. 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
 - Chapter 3. Putting VaR to Work
27. Kevin Dowd, *Measuring Market Risk, 2nd Edition* (West Sussex, England: John Wiley & Sons, 2005).
 - Chapter 2. Measures of Financial Risk
28. Philippe Jorion, *Value-at-Risk: The New Benchmark for Managing Financial Risk, 3rd Edition* (New York: McGraw Hill, 2007).
 - Chapter 14. Stress Testing
29. “Principles for Sound Stress Testing Practices and Supervision” (Basel Committee on Banking Supervision Publication, May 2009).*
30. John Hull, *Options, Futures, and Other Derivatives, 9th Edition*.
 - Chapter 13. Binomial Trees
 - Chapter 15. The Black-Scholes-Merton Model
 - Chapter 19. Greek Letters
31. Bruce Tuckman, *Fixed Income Securities, 3rd Edition* (Hoboken, NJ: John Wiley & Sons, 2011).
 - Chapter 1. Prices, Discount Factors, and Arbitrage
 - Chapter 2. Spot, Forward and Par Rates
 - Chapter 3. Returns, Spreads and Yields
 - Chapter 4. One-Factor Risk Metrics and Hedges
 - Chapter 5. Multi-Factor Risk Metrics and Hedges

32. Daniel Wagner, *Managing Country Risk: A Practitioner's Guide to Effective Cross-Border Risk Analysis* (Boca Raton, FL: Taylor & Francis Group, 2012).
- Chapter 3. Assessing Country Risk
 - Chapter 4. Country Risk Assessment in Practice
33. Arnaud de Servigny and Olivier Renault, *Measuring and Managing Credit Risk* (New York: McGraw-Hill, 2004).
- Chapter 2. External and Internal Ratings
34. Gerhard Schroeck, *Risk Management and Value Creation in Financial Institutions* (New York: Wiley, 2002).
- Chapter 5. Capital Structure in Banks (Pages 170-186 only)
35. John Hull, *Risk Management and Financial Institutions, 3rd Edition* (Boston: Pearson Prentice Hall, 2012).
- Chapter 20. Operational Risk

FRM EXAM PART II

TOPICS

AND

READINGS

MARKET RISK MEASUREMENT AND MANAGEMENT—PART II EXAM WEIGHT • 25%

- VaR and other risk measures
 - Parametric and non-parametric methods of estimation
 - VaR mapping
 - Backtesting VaR
 - Expected shortfall (ES) and other coherent risk measures
 - Extreme value theory (EVT)
 - Modeling dependence: Correlations and copulas
 - Term structure models of interest rates
 - Discount rate selection
 - Volatility: Smiles and term structures
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Readings for Market Risk Measurement and Management

36. Kevin Dowd, *Measuring Market Risk, 2nd Edition* (West Sussex, England: John Wiley & Sons, 2005).
- Chapter 3. Estimating Market Risk Measures: An Introduction and Overview
 - Chapter 4. Non-parametric Approaches
 - Chapter 7. Parametric Approaches (II): Extreme Value
37. Philippe Jorion, *Value-at-Risk: The New Benchmark for Managing Financial Risk, 3rd Edition* (New York: McGraw Hill, 2007).
- Chapter 6. Backtesting VaR
 - Chapter 11. VaR Mapping
38. “Messages from the Academic Literature on Risk Measurement for the Trading Book,” Basel Committee on Banking Supervision, Working Paper No. 19, Jan 2011.*
39. Gunter Meissner, *Correlation Risk Modeling and Management* (New York: Wiley, 2014).
- Chapter 1. Some Correlation Basics: Properties, Motivation, Terminology
 - Chapter 2. Empirical Properties of Correlation: How Do Correlations Behave in the Real World?
 - Chapter 3. Statistical Correlation Models—Can We Apply Them to Finance?
 - Chapter 4. Financial Correlation Modeling—Bottom-Up Approaches (Sections 4.3.0 (intro), 4.3.1, and 4.3.2 only)
40. Bruce Tuckman, *Fixed Income Securities, 3rd Edition* (Hoboken, NJ: John Wiley & Sons, 2011).
- Chapter 6. Empirical Approaches to Risk Metrics and Hedges
 - Chapter 7. The Science of Term Structure Models
 - Chapter 8. The Evolution of Short Rates and the Shape of the Term Structure
 - Chapter 9. The Art of Term Structure Models: Drift
 - Chapter 10. The Art of Term Structure Models: Volatility and Distribution
41. John Hull, *Options, Futures, and Other Derivatives, 9th Edition*.
- Chapter 9. OIS Discounting, Credit Issues, and Funding Costs
 - Chapter 20. Volatility Smiles

CREDIT RISK MEASUREMENT AND MANAGEMENT—PART II EXAM WEIGHT • 25%

- Credit analysis
 - Default risk: Quantitative methodologies
 - Expected and unexpected loss
 - Credit VaR
 - Counterparty risk
 - Credit derivatives
 - Structured finance and securitization
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Readings for Credit Risk Measurement and Management

42. Jonathan Golin and Philippe Delhaise, *The Bank Credit Analysis Handbook* (Hoboken, NJ: John Wiley & Sons, 2013).
- Chapter 1. The Credit Decision
 - Chapter 2. The Credit Analyst
43. Arnaud de Servigny and Olivier Renault, *Measuring and Managing Credit Risk*.
- Chapter 3. Default Risk: Quantitative Methodologies
44. René Stulz, *Risk Management & Derivatives* (Florence, KY: Thomson South-Western, 2002).
- Chapter 18. Credit Risks and Credit Derivatives
45. Allan Malz, *Financial Risk Management: Models, History, and Institutions* (Hoboken, NJ: John Wiley & Sons, 2011).
- Chapter 6. Credit and Counterparty Risk
 - Chapter 7. Spread Risk and Default Intensity Models
 - Chapter 8. Portfolio Credit Risk (Sections 8.1, 8.2, 8.3 only)
 - Chapter 9. Structured Credit Risk
46. Jon Gregory, *Counterparty Credit Risk and Credit Value Adjustment: A Continuing Challenge for Global Financial Markets, 2nd Edition* (West Sussex, UK: John Wiley & Sons, 2012).
- Chapter 3. Defining Counterparty Credit Risk
 - Chapter 4. Netting, Compression, Resets, and Termination Features
 - Chapter 5. Collateral
 - Chapter 8. Credit Exposure
 - Chapter 10. Default Probability, Credit Spreads, and Credit Derivatives
 - Chapter 12. Credit Value Adjustment
 - Chapter 15. Wrong-way risk

47. Christopher Culp, *Structured Finance and Insurance: The Art of Managing Capital and Risk* (Hoboken, NJ: John 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

48. Adam Ashcraft and Til Schuermann, “Understanding the Securitization of Subprime Mortgage Credit,” Federal Reserve Bank of New York Staff Reports, No. 318 (March 2008).*

OPERATIONAL AND INTEGRATED RISK MANAGEMENT—PART II EXAM WEIGHT • 25%

- Principles for sound operational risk management
 - Enterprise Risk Management (ERM)
 - Modeling operational loss distributions
 - Liquidity risk (including repurchase agreements and funding risks)
 - Model risk
 - Risk appetite frameworks
 - Risk-adjusted return on capital (RAROC)
 - Economic capital frameworks and capital allocation
 - Stress testing banks
 - Evaluating the performance of risk management systems
 - Failure mechanics of dealer banks
 - Regulation and the Basel Accords
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Readings for Operational Risk Measurement and Management

49. “Principles for the Sound Management of Operational Risk,” (Basel Committee on Banking Supervision Publication, June 2011).*
50. Brian Nocco and René Stulz, “Enterprise Risk Management: Theory and Practice,” *Journal of Applied Corporate Finance* 18, No. 4 (2006): 8–20.*
51. Philippa X. Girling, *Operational Risk Management: A Complete Guide to a Successful Operational Risk Framework* (Hoboken: John Wiley & Sons, 2013).
- Chapter 7. Internal Loss Data
 - Chapter 8. External Loss Data
 - Chapter 12. Capital Modeling
52. “Operational Risk—Supervisory Guidelines for the Advanced Measurement Approaches,” (Basel Committee on Banking Supervision Publication, June 2011).
- Paragraphs 1-42. Introduction
 - Paragraphs 160-261. Modelling
53. Kevin Dowd, *Measuring Market Risk, 2nd Edition*.
- Chapter 14. Estimating Liquidity Risks
 - Chapter 16. Model Risk
54. Allan Malz, *Financial Risk Management: Models, History, and Institutions*.
- Chapter 11. Assessing the Quality of Risk Measures (Section 11.1)
 - Chapter 12. Liquidity and Leverage

55. Bruce Tuckman, Angel Serrat, *Fixed Income Securities: Tools for Today's Markets, 3rd Edition* (New York: Wiley, 2011)
 - Chapter 12. Repurchase Agreements and Financing
56. "Observations on Developments in Risk Appetite Frameworks and IT Infrastructure," Senior Supervisors Group, December 2010.*
57. Michel Crouhy, Dan Galai and Robert Mark, *Risk Management* (New York: McGraw-Hill, 2001).
 - Chapter 14. Capital Allocation and Performance Measurement
58. "Range of Practices and Issues in Economic Capital Frameworks," (Basel Committee on Banking Supervision Publication, March 2009).*
59. "Capital Planning at Large Bank Holding Companies: Supervisory Expectations and Range of Current Practice," Board of Governors of the Federal Reserve System, August 2013.*
60. Til Schuermann. "Stress Testing Banks," April 2012.*
61. Darrell Duffie, 2010. "Failure Mechanics of Dealer Banks," *Journal of Economic Perspectives* 24:1, 51-72.*
62. John Hull, *Risk Management and Financial Institutions, 3rd Edition* (New York: John Wiley & Sons, 2012).
 - Chapter 12. Basel I, Basel II and Solvency II
 - Chapter 13. Basel 2.5, Basel III, and Dodd-Frank

Optional Regulatory Readings for Reference

Candidates are expected to understand the objective and general structure of important international regulatory frameworks and general application of the various approaches for calculating minimum capital requirements, as described in the readings above. Candidates interested in the complete regulatory framework can review the following:

63. "Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework—Comprehensive Version," (Basel Committee on Banking Supervision Publication, June 2006).*
64. "Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems—Revised Version," (Basel Committee on Banking Supervision Publication, June 2011).*
65. "Basel III: The Liquidity Coverage Ratio and Liquidity Risk Monitoring Tools," (Basel Committee on Banking Supervision Publication, January 2013).*
66. "Revisions to the Basel II Market Risk Framework—Updated as of 31 December 2010," (Basel Committee on Banking Supervision Publication, February 2011).*

RISK MANAGEMENT AND INVESTMENT MANAGEMENT—PART II EXAM WEIGHT • 15%

- Portfolio construction
 - Portfolio risk measures
 - Risk budgeting
 - Risk monitoring and performance measurement
 - Portfolio-based performance analysis
 - Hedge funds
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Readings for Risk Management and Investment Management

67. Richard Grinold and Ronald Kahn, *Active Portfolio Management: A Quantitative Approach for Producing Superior Returns and Controlling Risk, 2nd Edition* (New York: McGraw-Hill, 2000).
- Chapter 14. Portfolio Construction
68. Philippe Jorion, *Value-at-Risk: The New Benchmark for Managing Financial Risk, 3rd Edition*.
- Chapter 7. Portfolio Risk: Analytical Methods
 - Chapter 17. VaR and Risk Budgeting in Investment Management
69. 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
70. Zvi Bodie, Alex Kane, and Alan J. Marcus, *Investments, 9th Edition* (New York: McGraw-Hill, 2010).
- Chapter 24. Portfolio Performance Evaluation
71. Andrew Ang, *Asset Management: A Systematic Approach to Factor Investing* (New York: Oxford University Press, 2014).
- Chapter 13. Illiquid Assets (Excluding Section 13.5—Portfolio Choice with Illiquid Assets)
72. G. Constantinides, M. Harris and R. Stulz, eds., *Handbook of the Economics of Finance, Volume 2B* (Oxford: Elsevier, 2013).
- Chapter 17. Hedge Funds, by William Fung and David Hsieh
73. Kevin R. Mirabile, *Hedge Fund Investing: A Practical Approach to Understanding Investor Motivation, Manager Profits, and Fund Performance* (Hoboken, NJ: Wiley Finance, 2013).
- Chapter 11. Performing Due Diligence on Specific Managers and Funds

CURRENT ISSUES IN FINANCIAL MARKETS—PART II EXAM WEIGHT • 10%

- Role of clearinghouses in limiting systemic risk
 - Evolution of high frequency trading (HFT)
 - Risk management in an HFT environment
 - Current environment for derivatives trading
 - Funding value adjustments
 - Cyber security
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Readings for Current Issues in Financial Markets

74. Roe, M. (2013) *Clearinghouse Overconfidence*. *California Law Review*, 101 (6), pp. 1641-1703.*
75. O'Hara, M. (2014). *High-Frequency Trading and Its Impact on Markets*. *Financial Analysts Journal*, 70, 3. pp. 18-27.*
76. Clark, C. (2010). *Controlling Risk in a Lightning-Speed Trading Environment*.*
77. Clark, C. (2011). *How Do Exchanges Control the Risk of High Speed Trading?**
78. Clark, C. and Ranjan, R. (2012). *How Do Proprietary Trading Firms Control the Risks of High Speed Trading?**
79. "Report on Cyber Security in the Banking Sector," New York State Department of Financial Services. May 2014.*
80. "Framework for Improving Critical Infrastructure Cybersecurity," National Institute of Standards and Technology. February 2014.*
81. "The Changing Landscape for Derivatives," by John Hull, Joseph L. Rotman School of Management University of Toronto.*
82. Hull, J. and White, A. (2014). *Valuing Derivatives: Funding Value Adjustments and Fair Value*, *Financial Analysts Journal* 70 (3), pp. 46-56.*

NOTES

2015 FRM Committee Members

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Dr. Victor Ng	Goldman Sachs & Co
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