Course description

The contemporary financial system has been massively reshaped by the global financial crisis. The close relationships among quantitative risk management techniques, quantitative approaches to financial regulation, and research on financial risk, have been accentuated. Some pre-crisis trends, such as increasing leverage, the growth of derivatives use, and the development of ever-deeper wholesale funding markets, have been abruptly halted.

This course presents an overview of the financial system, introducing and explaining its rapidly evolving organization, institutions and market mechanisms in the context of the crisis and the public policy response to it. Its unifying themes are risk and risk management: we study market, liquidity and credit risk management principles and techniques employed by banks and other intermediaries, as well as their drawbacks and limitations. The course will make comprehensible the enormous changes leading up to and following the crisis, provide context and background for studying quantitative finance, and prepare students to participate meaningfully in discussions of current issues in finance.

To help understand the crisis and the public sector’s increasingly dominant role in the financial system, the course provides background in several related areas: We review asset price behavior in normal times and periods of financial distress, by looking at data and using basic models of returns, volatility and extreme events. We examine the institutional and legal setup of modern credit systems, focusing on the treatment of firms and debt
in bankruptcy and how it differs for financial firms, on the role of collateralized securi-
ties markets and securitization in the financial system, and on the changing structure of
wholesale funding markets. We study the role of leverage and of market and funding
liquidity in normal times and in crises. And we provide an introduction to regulatory and
monetary policy and describe their responses to the crisis and their impact on financial
markets. Discussion of current issues such as the risk management and financial stability
implications of low interest rates will be woven throughout the course.

Prerequisites

The course assumes basic familiarity with probability and statistics, instruments of the
financial markets, and asset pricing models, and is appropriate for graduate students as well
as advanced undergraduates who meet these requirements. The course will also convey
much of the quantitative and technical material using graphical and numerical examples,
introducing many sources of financial and statistical data, and enabling students to grasp
the realities behind abstract financial concepts.

Assignments and grades

There will be two assignments, giving students the opportunity to rehearse the quantitative
techniques and concepts presented, and a midterm and final exam. Grades will be based
primarily on the assignments and exams, but some weight may also be placed on class
discussion.

Schedule and location

Weekly, Monday 7:30–10:00 p.m., Sep. 12–Dec. 12, 2016
Location TBD

The midterm and final exams will be given during the second half of the 7th and 14th
weekly class sessions.
Course outline

Week 1 Development of the financial system up to the crisis

- Financial intermediation
- Overview of financial risks: market, credit, counterparty and liquidity risk
- Overview of financial risks: operational, model, reputational and compliance risk
- Postwar evolution of the financial system: derivatives, financial globalization and market intermediation
- Broader economic developments: large capital pools and rising frequency of crisis
- The Great Inflation and the Great Moderation
- Long-term decline in real interest rates

Week 2 Basic concepts of asset pricing and risk

- Risk, expectations and asset prices
- Investor choice and the capital asset pricing model
- Capital market efficiency
- The standard model of asset price dynamics
- Return volatility measurement and estimation

Week 3 Market risk measurement and Value-at-Risk

- Value-at-Risk for positions and portfolios
- Computing Value-at-Risk: parametric, Monte Carlo, and historical simulation
- Assessing the accuracy of Value-at-Risk estimates
- Limitations of Value-at-Risk
- Alternatives to Value-at-Risk
- Scenario analysis and stress testing

Week 4 Extreme events and market risk

- Limitations of the standard asset price dynamics model
- Behavior of asset prices in normal and in stress periods
- Alternatives models of asset price behavior
- Extreme value theory
- How asset prices express extreme event risk
Week 5  Credit and counterparty risk

- Financial distress: default, ratings migration, insolvency and bankruptcy
- Treatment of insolvency for financial firms
- Counterparty risk
- Forms of debt, capital structure and collateral
- Credit spreads and credit spread risk
- Hazard rates and default analytics
- Single-obligor credit risk models

Week 6  Liquidity risk and leverage

- Credit, maturity and liquidity transformation
- Fragility of commercial banking
- Funding liquidity risk and asset-liability management
- Liquidity risk management by commercial banks and securities dealers
- Financial distress: solvency and liquidity
- Market liquidity risk
- Defining and measuring leverage
- Leverage risk: why is leverage attractive?
- Forms of leverage: carry trades and embedded leverage
- Economic capital

Week 7  Central banks and the financial system

- The framework of monetary policy
- The economics of monetary policy in normal times
- The conduct of monetary policy in normal times

Midterm exam

Week 8  Portfolio credit risk

- Credit portfolios
- Credit diversification and default correlation
- Expected and unexpected credit loss
- Portfolio credit VaR
- Portfolio credit risk models
Week 9  **Collateralized securities markets and structured credit risk**

- Collateralized securities markets: repo, margin and securities lending
- Basics of structured credit and tranching
- Structured credit risk
- Valuing securitization tranches
- Copula models
- Collateralized securities markets and securitization
- Default correlation in structured credit products

Week 10  **Extreme events and financial crises**

- Banking, currency, and sovereign and external debt crises
- Typical features of financial crises
- Illiquidity and insolvency during crises
- Extreme behavior of asset prices during crises
- Default correlation and widespread financial distress
- Bubbles, market crashes and financial crises
- Causes of financial crises

Week 11  **Financial regulation**

- Rationale and scope: financial-firm risk management, information and externalities
- Organization: governments and central banks, states and international coordination
- Regulation and supervision of individual financial firms
- Evolution of capital standards: internal models and risk management practice
- Basel 2.5: refining the Value-at-Risk approach for market risk capital
- Basel III: capital and liquidity standards
- Regulatory stress testing and its impact on firm practice
- Addressing counterparty risk: Basel III and derivatives clearing mandates
- Addressing wholesale funding: money market mutual fund and repo markets reform
Week 12  Financial stability policy

- Financial-firm risk, systemic risk and financial stability policy
- Addressing fragility of commercial banking: deposit insurance and the Volcker Rule
- Addressing fragility of the financial system: lender of last resort
- Too-big-to-fail: moral hazard, private-risk taking and public guarantees
- International challenges of financial stability policy: cross-border banking
- Identifying and addressing asset price bubbles
- Paradox of volatility, risk-taking, excessive liquidity, and the procyclicality of policy
- Macroprudential regulation: systemic effects of risk-management practices
- Anticipating financial stress and financial warning indicators

Week 13  Central banks and the crisis impact on financial markets

- The central bank response to the global financial crisis
- Impact on liquidity risk management instruments: wholesale funding markets
- Impact on market risk management instruments: evolution of derivatives markets
- Market and funding liquidity risk after the crisis
- Electronic securities trading and “flash crashes”
- Reduced efficacy of arbitrage in the pricing of risk: swap spreads, repo rates, and the cross-currency basis
- Reaching for yield, asset-liability management, and capital standards

Week 14  Exiting unconventional monetary policies

- Evolution of exit strategy
- New monetary policy tools for normalization
- Challenges of monetary policy normalization

Final exam
September 14, 2016