Spring 2018

Preliminary Syllabus -- Subject to Change

FINTECH RISK MANAGEMENT

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Meeting time & location: Wednesday 6-9pm, location: KMC 5-75

DESCRIPTION OF THE CLASS

This class explores how FinTech business should conduct their risk management operations and how FinTech changes the practice of risk management in financial firms. Risk management requires understanding, measuring, and managing market risk, credit risk, liquidity risk, and operational risk. The class presents the technology behind enterprise risk systems and shows how to manage risk using quantitative models. We consider how recent FinTech innovations such as Blockchains, mobile technologies, etc., can change the way these risk systems operate, and create a new demand for talents in risk departments. We also study the specific risk management and regulatory challenges faced by FinTech firms.

The class has two main objectives. The first objective is to introduce the principles of risk management that anyone working for a financial firm needs to understand. The second objective is to discuss specific opportunities and challenges created by the use of new technologies in finance. Here are some examples:

- FinTech customers expect real-time responses to their requests (for a loan, etc.) which means risk management must be able to assess risks automatically
- Cyber security risks will become more important
- New algorithms can be used for underwriting, monitoring and fraud detection

Financial technology has gone through three major stages. In 1960s and ‘70s, back office paper based processes migrated to mainframe computers, using standard CUSIP’s and equity clearing houses and depositories. The second stage used PCs, communications networks to address the front office, FIX standards brought online banking, trading and electronic markets. The third, and the subject of our class, is “fin-tech”, where innovative use of technology disrupts existing financial processes and businesses.
Entrepreneurs create new business models with relatively modest capital investment using new technologies: broadband internet, Wi-Fi, mobile computing, cloud storage and “free” platforms such as Python and Linux. Major banks, securities and insurance firms research these same opportunities looking to protect their own revenue by creating competing products or acquiring interesting startups.

**PREREQUISITES**

The material covered in *Foundations of Finance* is a prerequisite for this class. In addition, you should be familiar with the following topics:

- Statistics concepts such as expected value, standard deviation, and percentiles. You need to know how to compute them in a spreadsheet.

**GRADING**

At NYU Stern, we strive to create courses that challenge students intellectually and that meet the Stern standards of academic excellence. To ensure fairness and clarity of grading, the Stern faculty have agreed that for elective courses the individual instructor or department is responsible for determining reasonable grading guidelines. The Finance Department has elected to use the following grading guidelines for this course and all other elective courses. Instructors should award grades of “A” or “A-” to approximately 35% of students in elective courses with enrollments of more than 25 students. Your final grade will be based on:

- Participation: 5%
- Six homework assignments and quizzes: 60%
- Final take-home exam: 35%
COURSE CONTENT

The course is organized in two parts. The first part introduces the building blocks of risk management: market, credit, liquidity, operational risk and data, payment systems, clearing and settlements. The second part focuses on various topics related to FinTech and risk management.

1. Building Blocks

1. **Feb. 7**: Introduction to FinTech and Risk Management (Thomas)
   a. What is financial risk management? Liquidity, credit, market, and operational risks
   b. What is FinTech? Payments, transfers and remittances; Alternative funding platforms; Retail & personal finance; Crypto currencies; RegTech
   c. Why is FinTech happening now? Cost of financial intermediation; New consumers’ demands; regulations
   d. New models of credit risk analysis
   e. Readings
      i. *The future of bank risk management* (McKinsey)
      ii. *Systemic Risk Barometer* (DTCC)

2. **Feb. 14**: Basics of Financial Risk Management (Thomas)
   a. Liquidity
   b. Stress tests
   c. Regulations
   d. Readings
      i. *Comparison between US and EU Stress Tests* (TCH)
   e. Guest Speaker Stephen Hazelton (Street Diligence)
   f.  *Homework 1 posted, due February 21.*

3. **Feb. 21**: Introduction to Operational Risk (Mike)
   a. Definitions of Operational Risk (Basel II, III, and IV)
   b. Causes of Operational Risk events.
   c. Key Risk Indicators
   d. Frequency and Severity Distributions (Loss Distribution Approach)

4. **Feb. 28**: Operational Risk in Fintech (Mike)
   a. Operational Risk in Algorithmic Trading (HFT, Robo-Investing)
   b. Cybersecurity: Hacks and Breaches
   c. Operational Risk in DLT and in cryptocurrency exchanges
   d. Operational Risk in payment systems, P2P Lending, Crowdfunding
   e.  *Homework 2 posted, due March 7*
5. **Mar. 7**: Payment Systems (Bernard)
   a. Checking, debit, ATM, credit card processes
   b. New card transaction methodologies and their risk mitigation potential
   c. Near Field Communication (NFC)
   d. EMV- Chip cards
   e. Digital wallets, Apple, Google, Samsung Pay, Square, et al.

March 14: SPRING BREAK

6. **Mar. 21**: Institutional Payments and On-line security and Encryption (Bernard)
   a. Institutional payment systems
      i. Fedwire, Automated Clearing House (ACH), CHIPS, SWIFT, CLS
   b. Online security and encryption
      i. Encryption
      ii. PKI, RSA, SSL, Hashing, Digital signatures

7. **Mar. 28**: Blockchain (Bernard)
   a. History and context
      i. Digital Assets – risk of unlimited duplication
      ii. Data structure, hash pointers
   b. Distributed ledgers, peer to peer file sharing, mining, proof of work
   c. Cryptocurrency, Initial Coin Offerings (ICOs), Block chain proof of concepts

8. **Apr. 4**: Cybersecurity (Bernard)
   a. Cyber Threats
   b. Security risk analysis
   c. Cyber Defenses
   d. Fundamental security design practices
   e. Regulations and frameworks
      i. FFEIC, SCI, NIST
   f. **On-line quiz due April 11th**

II. **Topics in Fintech Risk Management**

9. **Apr. 11**: Data Acquisition and Data Mining (Mike)
   a. Multi-Factor analysis: Composite factors, Linear and Nonlinear regression.
   b. Use of Central Limit Theorem (Normal Distribution); Extreme Value Theorem (Generalized Extreme Value Distribution).
   c. ACBC Case (how to detect human errors (or inappropriate trading) in a database of trades.)

10. **Apr. 18**: Machine Learning and Fraud Detection (Mike)
    a. Neural Nets, Bayesian Belief Networks and Support Vector Machines
    b. Applications of machine learning techniques to fraud detection (payment systems)
    c. **Homework 3 posted, due April 25**
11. Apr. 25: Risks and Disruption in Banking, Insurance and Asset Management
   a. New Risks: Systemic, geopolitical, cyber
   b. Regulations
   c. Guest Speaker: Michael White (Ondec)
   d. *Homework 5 posted, due May 3*

12. May 2: Risks and Disruption in Banking, Insurance and Asset Management
   a. Payments
   b. Robo investing
   c. Smart contract
   d. Insuretech
   e. Financial solutions in Emerging markets
   f. Guest Speaker: Ron Papanek (symbiont)