MATH GR 5320
Financial Risk Management and Regulation

Lecture 2: Structure of the Financial Markets

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Outline

Review

Risk Management

Risk management is planning for what could go wrong.

Steps of risk management:

- Identification
  - What can go wrong?
- Assessment
  - Impact
  - Probability of occurrence
- Mitigation
  - Minimize impact
  - Reduce probability
  - Monitor

Identification

To make risk identification tractable, we classify risks by type:

- Market risk — Impact of market moves
- Credit risk — Impact of credit events (defaults, rating changes) on debt obligations
- Idiosyncratic risk — Impact of changes in individual companies
- Counterparty risk —Impact of credit events on OTC derivatives
- Model risk — Impact of faulty models
- Liquidity risk — Inability to unwind
- Operational risk — Weaknesses in controls, protocols and/or systems
  - Legal risk — Potential for lawsuits
- Compliance and regulatory risk — Following regulations and the impact of changing regulations
- Reputational risk — Potential for and impact of bad press
- Moral hazard — Rewarding bad behavior
- Systemic risk — Market crisis analysis and crisis avoidance

Types of risk management

Different financial entities measure and mitigate risks differently.

Banks:

- Estimate potential losses (VaR, credit exposures).
- Reduce positions or hold more capital.
- Separate large risk management team, model validation, ...
- Lots of regulation.

Mutual funds:

- Index tracking error and performance attribution.
- Position limits, error tracking limits, VaR limits via portfolio construction.
- Risk management part of portfolio management.

Hedge funds:

- Closer to banks than mutual funds.
- Separate, small risk team.

Market structure

Market structure

The markets consist of the players, the playing pieces, and the moves that they can make.

- The players
  - Banks and other financial institutions
  - Investors
  - Regulators
- The pieces
  - Bonds
  - Stocks
  - Loans
  - Savings
  - Derivatives — futures, options, structured products, ...
- The moves
  - Trading
  - Execution
  - Management

We will discuss the characteristics of each one.

The players

The players

The players are all of the entities involved in the financial markets

- Banks and market facilitators
- Investors
- Regulators

Banks

There are a number of types of banks:

- Retail and commercial banks
    - Community banks
    - Regional banks
    - National banks
    - Bank holding companies
- Savings and loan associations (AKA thrifts)
- Credit unions
- Investment banks
- The Federal Reserve Banks
- The Federal Home Loan Banks

Each has different activities and thus takes on different risks.

Retail and commercial banks

Retail banks:

- Work directly with consumers.
- Take deposits.
- Make loans.
- Offer checking and savings accounts.
- Issue credit cards.

Commercial banks:

- Oriented towards businesses.
- 1965: 13,544 institutions, \$375 billion in assets.
- 1984: 14,483, \$2.5 trillion.
- 2015: 5,338, \$15 trillion [FDIa].

Most banks today offer services both on a retail basis as well as a commercial basis.

Other retail banking institutions

Credit unions:

- Nonprofit.
- Member owned cooperatives.
- Perform retail banking functions for members.
- First appeared in the 1800s.
- About 6,000 credit unions in the states currently, total assets $1.3 trillion, 105 million members [CUN].

Savings and loan associations (AKA thrifts)

- Similar to a credit union.
- Mutually held, not member owned.
- Created to focus on mortgages.
- 1965: 6,071 S&Ls, $129 billion in assets [Mas03].
- 1984: 3,418 FDIC insured institutions, $1.1 trillion in assets.
- 2015: 844 institutions, $1 trillion in assets [FDIb].

Retail banking risks

Retail banking risks:

- Loan losses.
- Demand for deposits.
- AKA maturity transformation.
- Interest rate risk.

S&L Crisis

S&L Crisis:

- 1980s-90s
- 1/3 of of S&Ls failed.
- Lincoln Savings and Loan - $3 billion
- Keating Five – Cranstion, DeConcini, Glenn, McCain, Riegle.

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- Wikipedia. *Keating Five*. [Online; accessed September-2016]. 2016. URL: https://en.wikipedia.org/wiki/Keating_Five

Subprime crisis

Countrywide:

- 2008-9 subprime crisis.
- Countrywide CEO Angelo Mozilo.
- "Friends of Angelo" program – cheap loans and large campaign contributions to senators and Fannie Mae CEOs.
- Christopher Dodd, Kent Conrad, Ed Royce.

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Investment Banks

Investment banks focus on creating financial instruments and analyzing financial deals:

- Stock issues (IPOs).
- Bond issues – underwriting.
- Mergers and acquisitions.
- Market making.
- Asset management.
- Proprietary trading (unless they come under the Volker rule).

Original focus was on issuance (underwriting) and M&A, but other activities have grown over time, especially with investment banks becoming bank holding companies during the 2008 crisis.

Investment Banking risks

Investment banking risks:

- Liquidity risk.
- Underwriting losses.
- Market making risks.
- Operational risk.
- Regulatory risk.

See for example:

Jesse Eisinger. *Why Only One Top Banker Went to Jail for the Financial Crisis*. Apr. 2014. URL: http://www.nytimes.com/2014/05/04/magazine/only-one-top-banker-jail-financial-crisis.html

The Federal Reserve Banks (FRB)

The Federal Reserve – The central bank of the US

- Financial services to banks, the government, etc.
- Monetary policy.
- Banking supervision.

Activities:

- Buy and sell (primarily) treasury bonds to influence rates.
- Discount window lending.
- Reserve requirements.
- Regulation and oversight.

Reference: FRS [FRS14; FRS94].

The Federal Home Loan Banks

The Federal Home Loan Banks stimulate the housing market

- Government Sponsored Enterprises (GSEs).
- Lend to member banks.
- Take mortgages as collateral.
- Sell stock to member banks.
- Sell debt instruments.
- Overseen by the Federal Housing Finance Agency, (FHFA), the same organization overseeing Fannie and Freddie.

References: [ABF10], [SVY05], [FHL14], [FHL13]

Market facilitators

Market facilitators promote liquidity

- Exchanges make it easy for buyers and sellers to meet.
- Broker-dealers do the same, but more directly.
- Clearing houses reduce uncertainty regarding default.

Securities firms are similar to investment banks, providing brokerage, investment advise, and trading.

Investors

Types of investors:

- Individuals
- Hedge funds
- Mutual funds
- Insurance companies
- Pension funds
- Corporate treasuries

Anyone with money to park or hedging needs.

Individuals

Individuals:

- Directly buy stocks and bonds.
- Might use the advice of an advisor.
- Might park money in a mutual fund or a hedge fund.

Investment firms

Investment firms

- Hedge funds – Bridgewater, Man Group, JP Morgan Asset Management, Brevan Howard, DE Shaw, ...
- Mutual funds – SPDRs, various Vanguard and Fidelity funds, ...

Similarities:

- Both invest client funds.
- Both manage investments as a whole.

Hedge funds

Hedge funds:

- Cannot take investments from small investors.
- Judged on absolute returns.
- High fees – 2 & 20 = 2% management fee + 20% of growth.
- Lightly regulated.
- Long/short equity, global macro, relative value arbitrage, convertible bond arbitrage, ...

Risks:

Hedge funds

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Risks:

- The full gamut, exacerbated by secrecy.

Example failures:

Hedge funds

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Risks:

- The full gamut, exacerbated by secrecy.

Example failures:

- LTCM
- Madoff

Mutual funds

Mutual funds:

- Anyone can invest.
- Much more regulation.
- Judged on returns relative to an index.
- Actively managed vs index tracking.
- Much lower fees than hedge funds.

Insurance companies

Insurance companies:

- Receive premiums.
- Need to invest to match insurance payouts.
- Mix insurance with investment – tax benefits.

Risks:

Insurance companies

Insurance companies:

- Receive premiums.
- Need to invest to match insurance payouts.
- Mix insurance with investment – tax benefits.

Risks:

- Extreme maturity mismatches.
- Catastrophes.

Pension funds

Pension funds:

- Receive investments from employees.
- Make payments when employees retire.
- Need to invest to match expected payouts.
- Defined benefit or defined payment.
- Defined benefit plans are common in government.

Pension fund risks

Risks:

Pension fund risks

Risks:

- Defined benefit plans are often underfunded and cause financial trouble (GM, Detroit, ...).
- Lots of moral hazard.

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Corporate treasuries

Corporate treasuries:

- Invest to manage corporate balance sheet.
- Large cash reserves means a large amount of investment.
- Interest rate swaps to convert between fixed and floating rate liabilities.
- Cross currency swaps to fund off-shore enterprises.

Risks:

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Risks:

- Transition from hedging risks to taking risks.
- Liquidity risk.

Failures:

Corporate treasuries

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Failures:

- London whale
- Orange county

Regulation

Regulators help to guarantee smooth functioning of the markets by promoting transparency and good business practices.

Areas of regulation:

- Safety and soundness.
- Deposit insurance.
- Adequate capital.
- Systemic risk (post Dodd-Frank).

Regulators will regulate:

- Specific types of financial institutions, such as depository institutions.
- Specific markets, such as stock exchanges.
- Specific financial activities, such as derivative trading.
- Systemic risk.

References: Jickling and Murphy [JM10], FRS [FRS94], Banking Supervision [BS12], Office of the Comptroller of the Currency [Off14]

Regulators

US regulatory agencies include:

- Federal Deposit Insurance Corporation (FDIC) and The National Credit Union Administration (NCUA)
- US Treasury — Office of Comptroller of the Currency (OCC)
- Federal Reserve Banks (FRB)
- Securities and Exchanges Commission (SEC)
- Commodity Futures Trading Commission (CFTC)
- Federal Housing Finance Agency (FHFA)
- US Treasury department's Office of Financial Research (OFR)
- Consumer Financial Protection Bureau (CFPB)
- Financial Stability Oversight Council (FSOC) — from Dodd-Frank
- Financial Industry Regulatory Authority (FINRA)
- State banking regulators http://www.csbs.org/
- State insurance commissioners http://naic.org/

Federal Deposit Insurance Corporation (FDIC)

The FDIC regulates

- Insured depository institutions.

Operation:

- Banks pay the FDIC for deposit insurance.
- FDIC pays depositors if necessary, up to a certain limit.
- FDIC requires holding capital based on level of risk (Basel II-like):
  - 8% of "risk weighted assets"
  - Less of safer investments (e.g. – 0% of AAA sovereign debt, 20% of AAA corporate debt)
  - More of riskier investments (e.g. – 100% for BBB corporate debt, 150% for below BB-, up to 1250%)

The National Credit Union Administration (NCUA) is the FDIC of the credit union world.

US Treasury — Office of Comptroller of the Currency (OCC)

The OCC regulates

- National banks — banking institutions chartered and supervised by the OCC.
- US federal branches of foreign banks.

Operation:

- Rules similar to the FDIC capital rules apply.
- Alternative rules for larger banks — advanced method, VaR based approaches, etc.
- Post crisis, much emphasis on Comprehensive Capital Analysis and Review (CCAR).

Excellent reference: Office of the Comptroller of the Currency [Off14]

Federal Reserve Banks (FRB)

The Federal Reserve regulates

- Holding companies of banks, financials, savings and loans, etc.
- Anything designated systemically significant.
- State member banks.
- US branches of foreign banks and visa-versa.

Operation:

- Also imposes capital requirements.
- Lender of last resort.
- Takes actions to control interest rates and inflation.
- Shut down firms.

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Securities and Exchanges Commission (SEC)

The SEC – protect investors and integrity of the security markets

Regulates:

- Exchanges
- Brokers-Dealers
- Clearing agencies
- Mutual funds
- Investment advisers and large hedge funds
- Rating agencies
- Security based swap dealers, participants and execution facilities
- Corporations selling securities to the public — financial disclosures

Operation:

- Disclosure rules
- Trading rules (no insider trading)
- Investigations

Commodity Futures Trading Commission (CFTC)

The CFTC regulates

- Futures exchanges
- Brokers
- Commodity pool operators
- Commodity trading advisors
- Swap dealers, major participants and execution facilities

Operation:

- Rules for the operation of futures and options exchanges
- Disclosure
- Position limits
- Capital requirements

Federal Housing Finance Agency (FHFA)

The FHFA regulates

- Fannie Mae
- Freddie Mac
- The Federal Home Loan Banks

Operation:

- Rulemaking
- Ongoing monitoring
- Risk assessments

US Treasury department's Office of Financial Research (OFR)

The OFR

- Lobbied for by the Committee for the Establishment of the National Institute of Finance (CE-NIF)
- Created by Dodd-Frank
- Collects information on financial firms
  - Only appears to have made progress on Legal Entity Identifiers (LEIs)
- Sponsors research into systemic risk
  - http://www.treasury.gov/initiatives/ofr/research/Pages/Working-Paper-Series.aspx
  - http://www.treasury.gov/initiatives/ofr/research/Pages/Staff-Discussion-Paper-Series.aspx
  - http://www.treasury.gov/initiatives/ofr/research/Pages/AssetManagementFinancialStability.aspx

Consumer Financial Protection Bureau (CFPB)

The Bureau of Consumer Financial Protection regulates

- Nonbank mortgage related firms
- Student lenders
- Payday lenders
- "Consumer financial entities"
- Consumer businesses of banks with over $10 billion in assets

Financial Stability Oversight Council (FSOC)

The FSOC

- Established by Dodd-Frank
- Identify risks to financial stability
- Respond to threats
- Regulatory coordination
- Information sharing and collection

Financial Industry Regulatory Authority (FINRA)

FINRA - Regulation of the securities industry

- Self-regulatory organization (SRO)
- Regulates brokers-dealers and securities firms
- Creates and enforces rules for members based on SEC rules
- Overseen by SEC

The pieces

What pieces do the players play with?

- Savings
- Loans
- Stocks
- Bonds
- Futures and options
- Structured products

The business of buying and selling contracts.

Savings

Savings — people depositing money in banks.

- Retail and commercial banks, S&Ls, ... — all depository institutions.
- FDIC insurance.
- Short term.
  - Bank has the money but it could be demanded at any time.
  - Savings accounts.
  - Checking accounts.
- Medium term.
  - Money can be accessed, but incentives to the depositor (lender) to avoid doing so.
  - 30 day CDs.
  - Money market accounts.

To avoid bankruptcy, let alone turn a profit, banks need to invest deposits.

Loans

Loans — How banks turn a profit

- Classic 3-6-3 business.
- Must balance demand for savings withdrawals with terms of loans.
- Business loans.
- Lines of credit.
- Credit cards.
- Secured loans, such as mortgages.

Risks:

Loans

Loans — How banks turn a profit

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Risks:

- Default risk.
- Liquidity risk – Maturity transformation, hence asset-liability mismatch.

Mitigants:

Loans

Loans — How banks turn a profit

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Risks:

- Default risk.
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Mitigants:

- Cash on hand.
- Investment in liquid instruments.
- Underwriting.
- Collateral.

Stocks

Stock — public partial ownership of company

- A form of a financial contract
- One way companies raise money
- Usually grants voting rights
- Usually grants dividends — profits are distributed proportionally
- But "profits" are whatever the company decides not to hold onto or spend

Risks:

Stocks

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- Usually grants dividends — profits are distributed proportionally
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Risks:

- Default — after creditors are paid, the owners (stockholders) get what's left.
- Malfeasance
- Lack of information
- Changes in markets
- Dilution
- Information investors vs noise traders [Bla86]

Bonds

Bonds — the other way companies raise money

- Another form of financial contract
- Company agrees to pay bondholder (creditor) back according to a fixed schedule, with various caveats
- Essentially taking out a loan from the market instead of from a bank
- Fixed maturity date at which principal is paid back
- Fixed interest payment dates
- Sinking funds
- Callable bonds

Risks:

Bonds

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- Sinking funds
- Callable bonds

Risks:

- Same as for loans, but the investor/market holds the risk

Futures and options

What other games can we play?

- Futures and forwards
    - Promise to purchase in the future at a specific price, either resettled daily (futures) or only at maturity (forwards).
    - Typically on commodities, interest rates, or bonds, but also on stocks
    - Commodity and equity futures on exchanges
- Options
    - Calls, puts, caps, floors, barriers, ...
    - On stocks, indices, interest rates and FX rates
    - Equity calls and puts are traded on exchanges, the rest are OTC
- Credit Default Swaps (CDSs)
    - Synthetic credit exposure – buying insurance against default

Risks:

Futures and options

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Risks:

- The nonlinear payoff
- Leverage
- Counterparty risk

Structured products

Upping the option ante

- Collateralized Mortgage Obligations (CMOs)
- Collateralized Debt Obligations (CDOs)
- Collateralized Loan Obligations (CLOs)
- Arbitrarily structured deals

Characteristics:

- Pool assets (mortgages, commercial loans, credit card receivables, etc)
- Stratify risks by divide up cash flows into tranches
- Sell the tranches

Risks:

Structured products

Upping the option ante

- Collateralized Mortgage Obligations (CMOs)
- Collateralized Debt Obligations (CDOs)
- Collateralized Loan Obligations (CLOs)
- Arbitrarily structured deals

Characteristics:

- Pool assets (mortgages, commercial loans, credit card receivables, etc)
- Stratify risks by divide up cash flows into tranches
- Sell the tranches

Risks:

- Highly nonlinear exposures
- Market risk
- Credit risk
- Good luck

The moves

What do the players do with the pieces?

- Market making
- Transactional services
- Investing
- Hedging

Market making

Market making occurs throughout the financial system

- Exchange traded stocks trade via market makers
- Banks make markets for securities

Example:

- Client wants a 10 year at the money interest rate swap
- Sales sets the rate and enters into the swap
- Swaps from sales are managed by the interest rate desk
- Interest rate desk sets rates and manages and hedges swap portfolio to lock in profits
- Interest rate desk buys default insurance from CVA desk
- CVA desk hedges the default risk

Transactional

Transactional - Buying and quickly selling

Examples:

- Mortgage market after the great depression – Banks make mortgages and sold them to the agencies
- Banks structure deals and sell off pieces

Risks:

Transactional

Transactional - Buying and quickly selling

Examples:

- Mortgage market after the great depression – Banks make mortgages and sold them to the agencies
- Banks structure deals and sell off pieces

Risks:

- Unable to sell before the market falls

Investing

Investing can carry a variety of risks

- Long only equities – diversified exposure to the markets
- Long/short equities – exposure to spreads between equities, market exposure reduced, idiosyncratic exposure increased, also exposure to interest rates
- Bonds – exposure to interest rates, default, credit migrations
- Carry trades – exposure to curve shifts

Summary

Summary

Lesson 2:

- Market overview.
- Players, pieces and moves.

Future – financial risk management in detail

- Value at Risk
- Market Risk
- Credit risk
- Counterparty risk
- Regulation
- Case studies

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