Lecture notes on risk management, public policy, and the financial system

Credit and counterparty risk

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Debt and default

Bankruptcy and resolution

Debt and default

- Equity, debt and leverage
- Cost of credit intermediation
- Default
- Counterparty risk

Bankruptcy and resolution

Firm balance sheet

Equity: residual claim on earnings

- Ownership of firm and control over management
- Prevalent since 19th century: enjoys **limited liability**
- Value of equity ≥ 0, no **recourse** to property of shareholders or partners beyond value of assets (A_t)

Debt: fixed-income obligations; claims only to contractually-stipulated returns

Hybrids have characteristics of both, e.g. preferred shares

Schematic balance sheet:

Assets	Liabilities
Value of assets (A_t)	Equity (E_t)
	Debt (D_t)

Leverage

- Balance sheet constraint:

$$A_t = E_t + D_t$$

  - "Negative equity" if debt exceeds asset value, but doesn't lead to additional claim on owners
- **Leverage:** ratio of assets to equity $L_t = \frac{A_t}{E_t}$
- "Equity" can be shareholder or partner equity, down payment on a house, on a transaction with a dealer or exchange
- Leverage enhances returns or losses relative to equity capital (RoE)
  - Each "turn" of leverage increases RoE by the difference between return on assets and cost of debt

Credit intermediation faces special costs

Information costs: lending is an information-intensive business

Agency costs: intermediaries generally function as **agents** of **principals**, owners of funds being lent

- Consequent potential for conflicts of interest costly to resolve

Externalities: actions by one market participant imposes costs or provides benefits to others that can't be compensated through market mechanisms

Can be considered as **transaction costs**

- All these special costs are interrelated

Information costs in credit intermediation

- **Asymmetric information:** borrower has more information about ability to repay than lender
- Mitigated through costly **monitoring**
- **Adverse selection:** likelihood a seller but not buyer knows of defects of a security (or any good—"lemons problem")
    - **Examples**: market-maker widens bid-ask spread because of informed traders, originate-to-distribute model in securitization

Agency costs in credit intermediation

Principal-agent problem: costly to align incentives when a principal employs an agent

- **Example**: investment manager may maximize fee and trading income rather than investor returns
- Consequent potential for conflicts of interest costly to resolve

Risk shifting: asymmetry of risks and rewards→option-like payoffs

- **Examples**: equity investors vs. lenders, Too-Big-To-Fail

Moral hazard: insurance or guarantees diminishes incentives to monitor, perform due diligence, mitigate risks

> *That inscrutable thing is chiefly what I hate; and be the white whale agent, or be the white whale principal, I will wreak that hate upon him.* Ahab, in Melville, *Moby-Dick*

Externalities in credit intermediation

Coordination failures or **collective action problems:** parties cannot agree on action that benefits all

- **Examples**: holdouts in bankruptcy restructuring, bank runs

Systemic risk: risk-taking by one intermediary may increase risks of others

Default concepts

Default or **default event:** failure of **obligor** (borrower) to fulfill terms of debt contract, e.g.

Failure to pay contractually-agreed interest or principal

Fraud or **breach of representations and warranties** (e.g. lying)

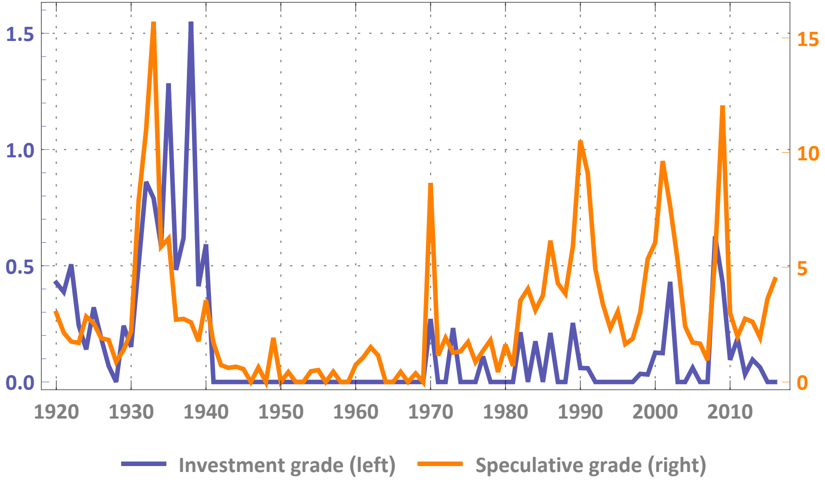
Cross-default: default under a different debt contract *may* be a triggering event

Insolvency: inability to pay debts, defined two ways

- **Cash-flow** insolvency: cash insufficient to meet debt obligations
- **Balance-sheet** insolvency: debt exceeds assets$\Rightarrow$ negative capital or **net worth**

Bankruptcy: legal procedure in which insolvent debtor "seeks relief" from creditors

U.S. default rates 1920–2016



Issuer-weighted default rates (fraction of rated issuers defaulting each year), annual, percent. *Source*: Moody's Investors Service.

Collateral

- Many credit transactions are **secured**, i.e. supported by **collateral:**
  - Assets (securities, factory or subsidiary), cash flows or revenues **pledged** to repay debt if borrower fails to meet specific obligations
- Highly developed markets based on use of financial assets as collateral by intermediaries$\rightarrow$**collateralized securities transactions**
- Collateral held by lender, but borrower retains ownership or other claim
  - And debt contract permits it to be sold by lender if borrower defaults
- **Secured**$\nleftrightarrow$**general obligation** debt backed by overall cash flows
- Amount of collateral may be frequently adjusted in certain types of credit transactions, esp.
  - Collateralized securities and derivatives transactions
  - Central bank monetary operations
- Other forms of **credit support** include **guarantees**

Credit rating agencies

- Lenders may engage advisory services to assess and monitor obligors' creditworthiness
- Particularly economical for
  - Smaller lenders and smaller loans (→**credit scoring**)
  - Bonds and other marketable credit exposures
- **Rating agencies:** services providing alphanumerical **credit ratings** of borrower or security creditworthiness
  - Distinction between **investment grade** (higher-rated) and **speculative grade** (lower-rated) securities
- Original **subscriber-pays** business model superseded by **issuer-pays**
  - Prompted by advances in copying technology from 1970s
  - Said to induce conflict of interest with investors

Ratings requirements in regulation

- 1936: banks' bond holdings restricted to investment-grade rated
- 1975: ratings of "recognized" agencies used to determine securities firms' capital requirements
  - SEC-sanctioned **Nationally Recognized Statistical Rating Organization** (NRSRO)
- Dodd-Frank reduces regulatory reliance on ratings by removing language requiring them

Credit rating migration

- **Credit rating migration**: change in credit rating,
  - May be **upgrade** or **downgrade**
  - Migration both a credit and market risk event
- Ratings correspond to probabilities of default and migration
- Summarized in **transition matrix**
  - Displays probability of obligor/security having a given rating at end of period, conditional on rating at beginning of period

Basics of counterparty risk

- **Counterparty:** not an obligor, but other party to a financial contract
- Major sources: OTC derivatives, e.g. options, interest rate swaps, credit derivatives
- Key differences from conventional credit risk:
  - Credit exposure not a fixed par value but varies with market risk factors
  - ⇒Credit exposure at time of default not known now, but uncertain
  - Combines market and credit risk
  - For swaps, forwards (but not options), cash flows bilateral, not one way→either party may owe other, depending on market conditions
  - Large gross notional amounts→high volatility of net exposure
- Managed/mitigated by monitoring, diversification of counterparties, limits, hedging via CDS, collateral, netting
  - Collateral, netting typically governed by ISDA Master Agreement

Some specific forms of counterparty risk

Wrong-way risk: asset-price fluctuations that increase credit exposure also adversely affect counterparty credit

- **Example**: foreign-exchange swap in which local bank pays dollars

Double default risk of CDS or guarantee

- Both underlying credit and counterparty must default to generate loss

Debt and default

Bankruptcy and resolution

- Debt priority and capital structure
- Bankruptcy

Debt priority

- **Debt priority:** order in which debts are required to be repaid
  - May be modified during bankruptcy
- →Allocation of credit risk to lenders: last in line bears greatest risk
- Determined by law and by terms, characteristics of all debt contracts, including

  Security: debt secured by collateral paid in full before unsecured
    - **Debenture:** bond backed by obligor's general credit

  Seniority: debt contract itself may provide for **subordination** to **senior debt**
    - **Junior** or **subordinated debt** has priority over dividends

  Maturity: short-term generally safer than long-term debt

  Corporate structure: holding company obligations generally subordinate to those of **operating subsidiaries**
- Top of "capital stack" generally bank loans, **senior secured debt**

What happens in bankruptcy?

- Legal process under bankruptcy court supervision
  - Adjudicate conflicting claims of creditors, shareholders
- **Automatic stay**: injunction stops creditor actions to recover debt
  - E.g. lawsuits, seizure of debtor's property, netting of debts
  - Aims to prevent value-destroying race to grab assets by creditors
- **Resolution** via court of law
- Two forms under U.S. Title 11

  Reorganization (U.S. Chapter 11): rehabilitate firm by restructuring balance sheet and operations

  Liquidation (U.S. Chapter 7): firm goes out of business, with equitable distribution of remaining assets to creditors
- **Recovery**: bankrupt firm likely still has valuable assets, so creditor doesn't lose entire amount of debt
  - Creditors share in losses beyond debtors ability to pay
- Bankruptcy culminates in **bankruptcy discharge**

Conflicts of interest among stakeholders

- Senior and secured creditors
  - Biased toward liquidation
  - Have less interest in realization of full value
- Junior creditors and equity owners
  - Biased toward reorganization
  - Have acute interest in realization of full value
- **Latent subordination:** subordination after the fact
  - Form of legal risk: new creditors get in front of old
  - **Debtor-in-possesion** (DIP) financing in Chapter 7
  - Loans by supranationals to distressed sovereigns
  - European sovereign debt crisis: central bank, supranational purchases of peripherals' debt subordinate private holdings

What happens to debt in bankruptcy?

- Impaired debt holders become residual claimants, gain control rights
  - Capital structure and judicial system determine **fulcrum security**
- **Liquidation:** debt receives proceeds in priority order
  - Senior and/or secured creditors may get full recovery
  - Subordinated debt may get "haircut" (reduction in par value)
- **Reorganization:** debt may be converted to equity in new reorganized firm
  - Subject to both bankruptcy rules and negotiation by creditors
  - **Cramdown:** plan forced upon dissenting class of creditors
    - Must adhere to **absolute priority rule:** if senior class impaired, any junior class, e.g. equity, must be wiped out
  - Senior creditors may get larger equity stake than subordinated
  - Senior creditors may get newly-issued bonds and subordinated creditors may get equity stake
  - **Distressed exchanges**: creditor receives securities with lower value or an amount of cash less than par in exchange for the original debt. **Examples**: CIT in 2009, Greece in 2012
- **Voluntary restructuring** as an alternative to bankruptcy: similar outcome, lower cost

Economic impact of resolution regimes

- **Resolution regime**: legal processes and institutions applied in event of firm insolvency or default
- Procedures for resolution of corporate insolvency related to several efficiency objectives
- Reorganization facilitates maximization of recovery to benefit of creditors and possibly owners
  - Solution of coordination/collective action problem among creditors
  - Facilitates fair distribution among claimants, prevents "race to courthouse"
  - Preserves **going-concern** value of estate if larger than liquidation value
- Alternative view: bankruptcy takes account of wider circle of stakeholders, e.g. employees, customers and suppliers

International differences in resolution regimes

- Countries vary widely in speed, efficiency, and certainty of legal procedures
- Better resolution regimes lead to higher recovery rates
- Insolvency leads to **nonperforming loans** (NPLs) on banks' balance sheets
  - Slow and uncertain resolution leads to larger volume of NPLs for longer, slow recovery from crises e.g. Italian banks
- Resolution part of broader mechanisms of **debt enforcement**: ability of creditors to enforce contracts with debtors