

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

Credit and counterparty risk

Allan M. Malz

Columbia University

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: a residual claim on asset returns or earnings

- E.g. shareholder or partner equity in a firm, down payment on a house, margin on a transaction with a dealer or exchange

Debt instruments: fixed-income obligations

- Claims only to contractually-stipulated returns
- **Hybrid debt** or securities, e.g. **preferred shares**, have characteristics of both equity and debt

Assets create value over time

- E.g. physical and nonphysical assets of a firm, pecuniary and nonpecuniary benefits of real estate, securities purchase with borrowed funds, human capital

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

Equity in a firm

- Generally entails 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)
 - Negative accounting equity if debt exceeds asset value, but doesn't lead to additional claim on owners

Leverage

- Balance sheet constraint:

$$A_t = E_t + D_t$$

- **Leverage:** ratio of assets to equity $L_t = \frac{A_t}{E_t}$
- Leverage enhances returns or losses relative to equity capital (RoE)

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)

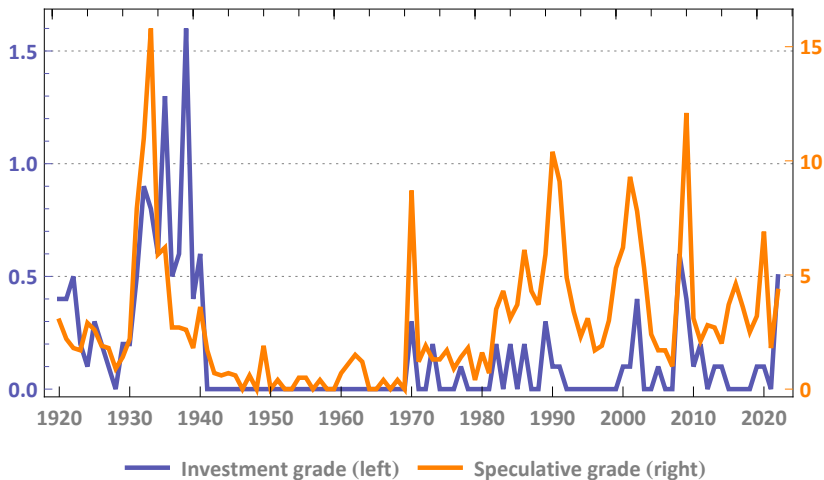
Cross-default: default under a different debt contract *may* be a triggering event

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 1920–2022



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 → **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** ↔ **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**

Overcollateralization

- The full value of the collateral is not lent
- Several mechanisms in different markets:
 - Secured debt
 - OTC and exchange-traded derivatives
 - (→)Collateralized securities markets
 - (→)Securitization, tranching products
- **Overcollateralization**—the excess of the collateral value over the amount lent—provides equity or buffer against price variation

Overcollateralization in securities and OTC derivatives markets

- Overcollateralization expressed in two equivalent forms, depending on market conventions
 - Margin:** market value of collateral/loan par value (e.g. 105 percent)
 - Haircut:** percentage deduction of loan from the market value of collateral (e.g. 5 percent)
- The haircut as a fraction of the market value of the collateral is equal to the reciprocal $\frac{1}{L}$ of the leverage in the transaction
- **Initial margin:** haircut agreed when transaction initiated
 - To preserve overcollateralization as collateral value fluctuates, counterparties may exchange **variation margin**
- Declines in asset values generally require borrowers to post additional collateral → **fire sales**

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

- Firm's **capital structure**: split of funding sources between equity, debt, and various forms of each
- **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 debtor's 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-possession** (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