An economic analysis of financial structure

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Part II

- **Understanding financial structure**
- Theory of financial institutions
- Banking management *and* Theory of banking
- Financial stability and regulation
- Financial crisis
  - Today's lecture is drawn from
    - *Chapter 8* of Mishkin.
    - Stewart Myers "Capital structure" JEP
    - Oliver Hart "Financial contracting" JEL.

Financing decisions

- It is common that both businesses and households need to decide on what they should spend on, e.g. buying a house / corporate investment on a project.

- A natural question followed from is the financing decision; how do they choose financing choices?
  - Active area of study known under the subject of “Corporate finance” and “household finance”.

Financing decisions

- Two possible choices are
  - Internal finance via *Cash (company's own cash)*
  - External finance via ***Direct finance*** or ***Indirect finance***

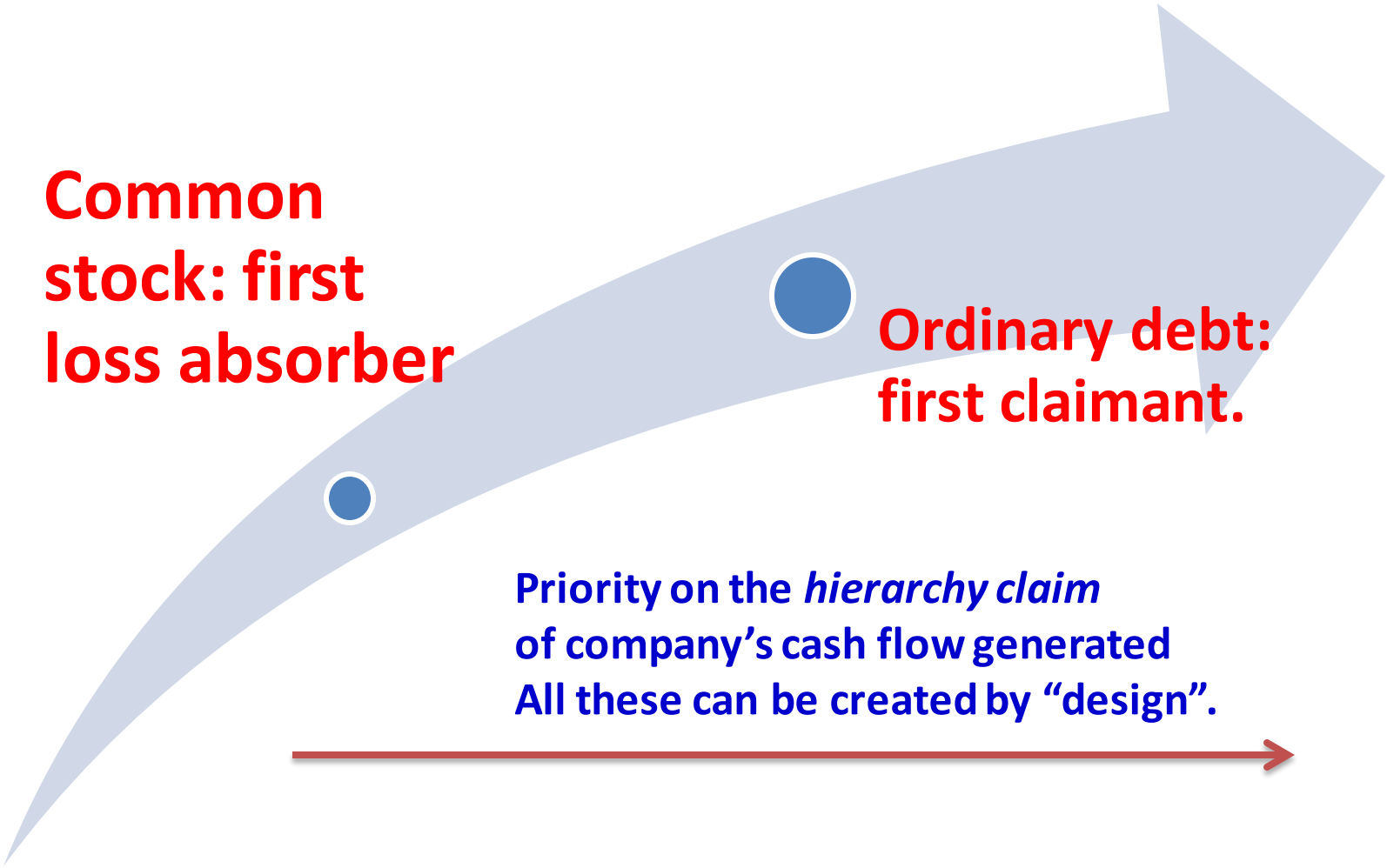
Direct v.s. indirect financing

- Direct financing
  - Financier directly arranges for financing contract with Fund-raiser(s).
  - Less formal approach is to basically agree upon terms written under non-tradable credit (debt) contract and non-tradable equity contract.
  - Formal approach relies on issuing some tradable instruments:
    - *debt instruments (bond)*
    - *equity instruments (stock)*

Choice of direct financing

	Equity	Debt
Tradability	Common stock	Bond
Non-tradable	Simple shares	Credit loan

Form of financing method ranged by the structure of financial contract: Spectrum of hierarchy on claims.



Indirect finance

- Intermediary-based borrowing/lending
- Fund-raiser may acquire funding from various financial institutions, i.e. commercial bank, saving and insurance company, mutual funds, venture capital firms.
- A common source of funding is credit loan (non-tradable debt contract).

Financial pattern and Financial structure

- If we look into the data, there exists some stylized patterns in which corporate and household reply on external financing.
- Corporate / household finance treats the structure of financial sector as given.
  - Given the choices that they have, how to best use the financial sector?
- The resulting outcomes (followed from the financing decision) results in the financial structure.

Theory of Financial structure

- Theory of financial structure explains about these behaviors of firms' and households' financing – forms of financing and sources of financing.
- Explaining the shape/structure/landscape of financial sector: markets v.s. institutions.
- How financial sector endogenously evolves to better facilitating the financing of business and households.

Stylized facts

- Based on various choices of financings that company can choose, what do we see in that data?

- Why this matters? **We want to explain why we observe such a pattern of financing.**

- Look at the stylized facts that appear common across the world!

1.“*Internal cash*” matters most!

Table 2.2 Average financing of nonfinancial enterprises, as a percentage of total financing sources, 1970–1985. *Source:* Mayer (1990).

	Canada	Finland	France	Germany	Italy	Japan	U.K.	U.S.
Retentions	54.2	42.1	44.1	55.2	38.5	33.7	72.0	66.9
Capital transfers								
Short-term securities								
Loans								
Trade credit								
Bonds								
Shares								
Other								
Statistical adjustment								

Take from Colin Mayer (1990), a bit old but remain valid.

2. Debt as a dominant form of *external finance*, all over around the world.

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	Canada	Finland	France	Germany	Italy	Japan	U.K.	U.S.
Retentions	54.2	42.1	44.1	55.2	38.5	33.7	72.0	66.9
Capital transfers	0.0	0.1	1.4	6.7	5.7	0.0	2.9	0.0
Short-term securities	1.4	2.5	0.0	0.0	0.1	n.a.	2.3	1.4
Loans	12.8	27.2	41.5	21.1	38.6	40.7	21.4	23.1
Trade credit	8.6	17.2	4.7	2.2	0.0	18.3	2.8	8.4
Bonds	6.1	1.8	2.3	0.7	2.4	3.1	0.8	9.7
Shares	11.9	5.6	10.6	2.1	10.8	3.5	4.9	0.8
Other	4.1	6.9	0.0	11.9	1.6	0.7	2.2	−6.1
Statistical adjustment	0.8	−3.5	−4.7	0.0	2.3	n.a.	−9.4	−4.1

DEBT

Equity

3. Debt financing *dominates* Equity financing, by industries. Also, *debt capacity* varies over industry

Table 2.4 Leverage in different industries. Measures of corporate net worth by industry in the United States, 1985.

Industry	Ratio of net worth to total assets	Ratio of debt to equity
All industries	0.32	2.11
Agriculture, forestry, and fishing	0.32	2.12
Mining	0.45	1.21
Construction	0.28	2.52
Manufacturing	0.45	1.20
Transportation and public utilities	0.40	1.50
Wholesale and retail trade	0.29	2.49
Services	0.31	2.25
Finance, insurance, and real estate	0.26	2.90
Commercial banks	0.08	11.00
Savings banks[1]	0.04	28.00

Source: U.S. Internal Revenue Service, White (1991).
1. Mutual savings banks plus savings and loan associations.

4. Credit loans from FIs is the dominant form of debt (external) financing; not tradable instrument

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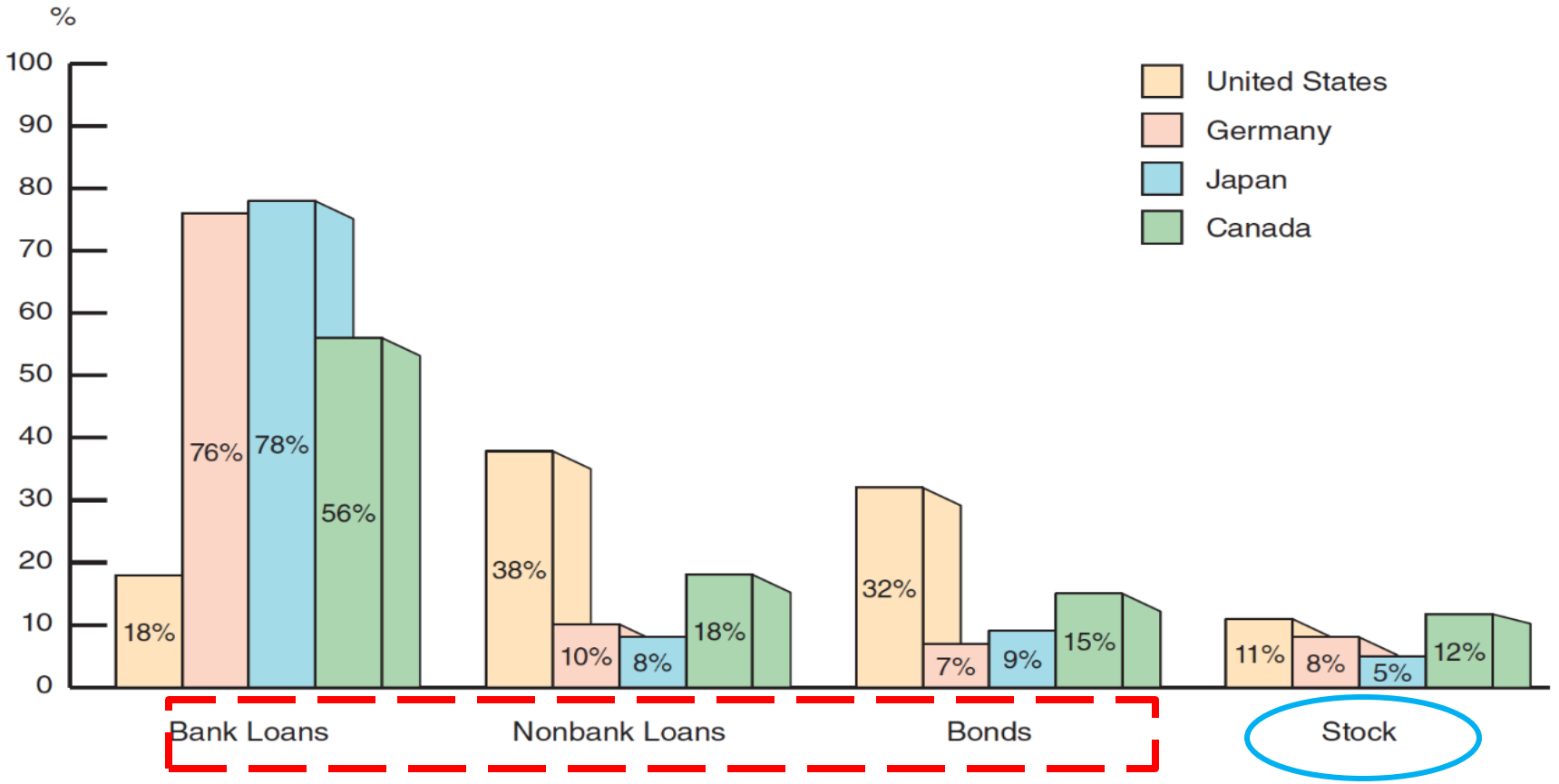
DEBT

	70-74	75-79	80-84	85-89	90-94	95-00
Japan						
Long-term bank loans	79%	79%	79%	75%	81%	74%
Long-term loans from other financial institutions	8%	9%	8%	7%	8%	9%
Bonds	7%	8%	6%	11%	9%	15%
Equity	7%	5%	6%	6%	2%	2%
Memo:						
Internal funds as a portion of investment	52%	76%	72%	81%	72%	98%
Germany						
Long-term bank loans	75%	74%	77%	72%	76%	74%
Long-term loans from other financial institutions	12%	11%	10%	10%	7%	8%
Bonds	7%	7%	5%	9%	9%	8%
Equity	7%	7%	7%	9%	8%	10%
Memo:						
Internal funds as a portion of investment	71%	87%	83%	92%	83%	83%
United States						
Long-term bank loans	22%	21%	21%	20%	11%	14%
Long-term loans from other financial institutions	42%	45%	47%	35%	31%	34%
Bonds	27%	28%	22%	38%	45%	34%
Equity	9%	6%	9%	7%	13%	19%
Memo:						
Internal funds as a portion of investment	72%	83%	84%	92%	99%	90%

More updated / less countries included: 1970 – 2000 → patterns remains the same

Figure 1 (in Mishkin) Sources of External Funds for Nonfinancial Businesses: A Comparison of the United States with Germany, Japan, and Canada (30 years average)



Source: Andreas Hackethal and Reinhard H. Schmidt, "Financing Patterns: Measurement Concepts and Empirical Results," Johann Wolfgang Goethe-Universitat Working Paper No. 125, January 2004. The data are from 1970–2000 and are gross flows as percentage of the total, not including trade and other credit data, which are not available.

5. Common feature of the designed debt contract usually includes many restrictive covenants and collateral required.

- **Restrictive covenants** – conditions that must be accepted by the borrower if the borrower will receive credit loan from the creditor.
  - Usually involves with clauses written to prohibit borrower from engaging certain activities, or require them to fulfill something.
- **Collateral** – assets / wealth put in place so that lender can forfeit the asset if the borrower does not honor credit agreement, i.e. default
  - Secured debt / mortgage loan

Basic Facts about Financial Structure Throughout the World

1. ***Stocks are not the most important sources of external financing for businesses.***
2. ***Issuing marketable (tradable) debt and equity securities is not the primary way in which businesses finance their operations.***
3. **Only large, well-established corporations have easy access to securities markets to finance their activities.**
4. ***Indirect finance is many times more important than direct finance.***
5. **Financial intermediaries, particularly banks, are the most important source of external funds used to finance businesses.**

Basic Facts about Financial Structure Throughout the World

5. ***Collateral is a prevalent feature of debt contracts for both households and businesses.***
6. ***Debt contracts are extremely complicated legal documents that place substantial restrictive covenants on borrowers.***
7. **The financial system is among the most heavily regulated sectors of the economy.**

Sum up: bottom line# 1

- **Debt *or* Equity?**
  - External finances heavily rely on **debt financing** + some special features included in the way debt contract is written/designed. (why?)
  - Why do we see a limit in debt capacity? What determines the capacity?

Sum up: bottom line# 2

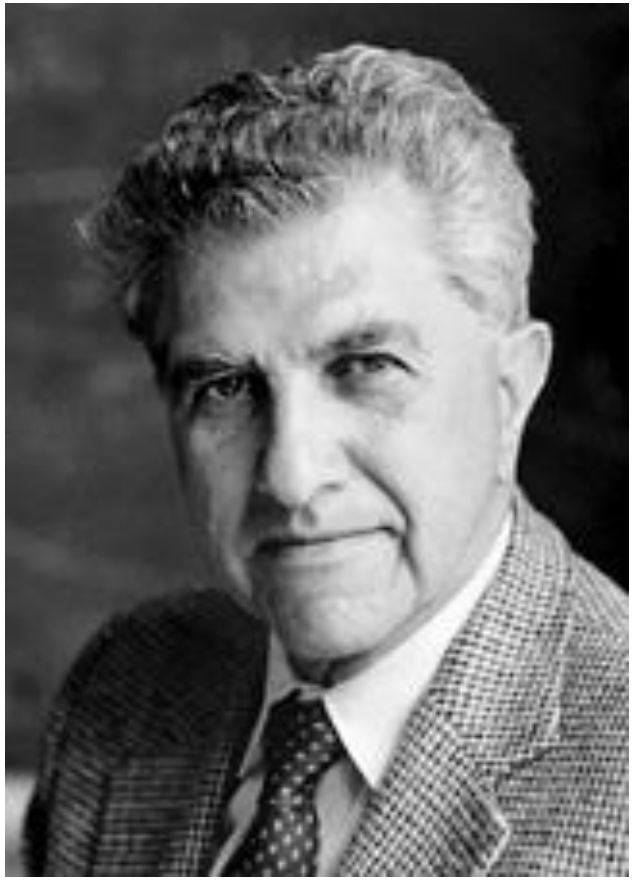
- **Marketable v.s. non-marketable?**
  - Few marketable; only large firms can. (why?)
- **Direct *or* indirect?**
  - Financial intermediaries, particularly banks, are the most important source of external funds used to finance businesses. (why Fis, and why bank?)
  - Its role is even more important for household finances, and small enterprise. (size-effect)

Explanations: debt domination.

- Optimal capital structure theory

- Optimal financial contract and security design theory

Optimal capital structure



- **Affiliation at the time of the award:** University of Chicago, Chicago, IL, USA
- **Contribution:** Important contributions in the field of corporate finance.
- Developed together with **Franco Modigliani** (also a Nobel Laureate for the contribution on consumption function)

Miller and Modigliani (1956)

- Under certain ideal assumptions, a firm's total market value is independent of its capital structure.
- What is the firm's total market value?
  - The cash flows received by all its claims must add up to the total cash flow that assets (real investment) generate.
  - A firm's value is the sum of the values of all its financial claims.

Miller and Modigliani (1956)

- 2 Firms: 1, 2 with identical projects
- At t = 1: both firms yield the same (random) CF X (independent of firms' action)
- However, at t = 0, they have different capital structures:
  - Firm 1 has equity and a constant level of risk-free debt.
  - Firm 2 has no debt.

Miller and Modigliani (1956)

- At t = 0,
  - Risk-free rate: r.
  - Market value of firm i's debt: Di.
  - Market value of firm i's equity: Ei.
  - Total market value of firm i: Vi = Di + Ei.
- Hence, at t = 1:
  - Firm 1's debt holders receive: rD1.
  - Firm 1's equity holders receive: X − rD1.
  - Firm 2's equity holders receive: X.

Miller and Modigliani (1956)

- Can V2 > V1?
- No, the size of pie is fixed. It's impossible that value of firm #2 will be greater than the value of firm #1.
- Financial investors can do the arbitrage if this occurs.

Miller and Modigliani (1956)

- Implications:
  - There is **NO such things as an optimal capital structure.**
  - Any profitable project (real investment) should always be invested; no need to worry about financing.
  - Technically, **capital structure is indeterminacy**!

How can financial decisions affect the size of the pie?

- Financial investors cannot undertake the same financial transactions as firms
  - Taxes,
  - transaction costs and short-sale constraints,
  - bankruptcy costs,
  - information asymmetries,
  - Moral hazard

Optimal capital structure

- Tax benefit
- Static Trade-off theory
- Asymmetric information: Incentive problem and moral hazard

Tax benefit

- Benefit from tax deduction.
- Problem: **100% debt issuance!**
- In the data, we see a mixture between debt and equity; **leverage (D/E) is an equilibrium outcome for most firms.** So, why then?

(Static) Trade-off theory

- While using debt allows firm to enjoy some tax benefits, debt-issuance is also associated with unintended cost.
- Debt involves with **"risk"** of bankruptcy costs.
  - Administrative and court cost, legal and advisory fees.
  - Resources spent by management and creditors dealing with bankruptcy.
  - In US, average time spent in bankruptcy: 20 months.

(Static) Trade-off theory

- **Static Trade-off theory:** balance between benefit and cost of debt borrowing.
- As leverage increases:
  - Tax shield increases.
  - Expected bankruptcy costs increase:
    - Probability of bankruptcy increases.
    - Costs when in bankruptcy increase (most likely)
- Optimal leverage (ratio) trades-off these costs and benefits
  - Predicting too high optimal leverage!

Asymmetric Information and incentive problem

- Jensen and Meckling (1976) developed notion of theory of debt capacity and optimal leverage.
- Main idea: Under the MM theorem, firm's profitability is independent of firm's internal action.
- In the reality, this may not be so due to the asymmetric information.
  - Adverse selection: unobserved quality / skill
  - Moral hazard: unobserved action

Asymmetric Information and incentive problem

- In the context of corporate management, manager (insider) runs the firm while financial investors (outsider) await for the return on their financial investments.

- Issue on conflict of interest may arise as incentive can be easily mismatched; moral hazard can occur at several layers.

Asymmetric Information and incentive problem

- Jensen and Meckling (1976) addressed two main issues of incentive problem (moral hazard) that may affect the corporate (outside) financing decision.
  - Effort problem: Shareholder v.s. manager
  - Risk-shifting problem: Debt v.s. equity

Asymmetric Information and incentive problem

- Effort problem: Shareholder v.s. manager
  - Shareholder wants to maximize firm's value.
  - Firm manager might choose for actions that might not increase profitability of firms, but instead provide private benefits to the manager.
  - This is the agency problem;
- Executive compensation package must be designed to align the incentive among stakeholders.

Asymmetric Information and incentive problem

- Suppose that effort problem can be resolved; manager chooses for actions that benefit most to the shareholder.

- The second issue on incentive problem arises: risk-shifting problem

Asymmetric Information and incentive problem

- What is the risk-shifting problem?
  - Also known as "excessive risk-taking" or "asset substitution" problem
  - Suppose that profitability of firm's project depends on choice of firm's action.
  - Manager (acting on behalf of shareholders) would tend to choose the risky project because of huge potential upside gain.
  - Benefit to the creditor is limit while shareholders excessively enjoy huge potential return if it is successful.

Asymmetric Information and incentive problem

- Firms excessively borrows money will be perceived as “bad” firm, and hence be penalized by “high” borrowing cost.
  - Internal cash is then important and acts as a way to mitigate the risk-shifting problem.
  - Debt capacity is then limited.
- In general, debt capacity varies with the degree/severity of incentive problem.
  - Good corporate governance can help.

Explanations: debt domination.

- ~~Optimal capital structure theory~~

- Optimal financial contract and security design theory

Financial contracting

- Looking into features of debt that is considered efficient.
- Emphasizing at information asymmetries and incentive issues for the design of debt contract.
- Several features include in the debt contract reflects the endogenous characteristics (by design) of debt contract.

Efficient risk-sharing and Equity contract

- Suppose an investor has a profitable (risky) project.
- Without information asymmetries, profit-sharing should be the most efficient means of funding allocations.
- Equity contract is classified an efficient risk-sharing contract.

Efficient risk-sharing contract under Information asymmetries

- Townsend (1979) analyzed the property of equity contract under information asymmetries.
- Under the information asymmetries so called “costly state verification”, debt contract is constrained efficient form of the financial contract.

Costly state verification

- This is one type of the asymmetric information problems, commonly occurred at the interim period of financial contract

Ex-ante period
Unknown quality of projects

Interim period
Realized outcome is observed by project Manager.

Ex-post period
Benefits are distributed upon the contract signed.

Costly state verification

- Financial investors can't be sure if the company will be making a truthful revelation.

- Financers/financial investors can exercise their right to verify the status of company.
  - This process is often know under the auditing, which is costly. (That's why we call "Costly state verification".)

Costly state verification

- Financial investors would need to frequently "audit" firm.
  - Firm has incentive to under-report the earning so that they can keep extra margins.

- This is why "equity financing" is not a common approach for financing, though considered as efficient risk-sharing contract.
  - Implementing "equity contract" would be costly.

Standard debt contract

- A better contract design that can mitigate the costly auditing problem is the standard debt contract (with threat of termination).
- What is the standard debt contract with threat of termination?
  - Require to pay fixed amount of pay-off to creditor. (principal + interest)
  - If firm can honor the contract, everything goes a normal.
  - With the threat of termination, firm choose to dishonor their debt would be forced into the bankruptcy state.

Standard debt contract

- Incentive to underreport will be now corrected.
  - If firm chooses to pretend to be poorly earned, they get terminated.
  - Firm will always tell the truth.
- If profit unfortunately turns out to be lower than the promised level, they accept the termination clause.
  - Financier only audit when firms declare for a default!
- Efficient truth-telling with lowest cost for the implementation.

Improving features of standard debt contract

- Leland and Pyle (1977):
  - By retaining a large equity stake in their firms, good entrepreneurs can signal their type to investors because
    - A large stake is costly (under-diversification).
    - It is more costly for worse entrepreneurs, because of their greater downside risk.
- Collateral-backed debt.

Improving features of standard debt contract

- Mitigating asset substitution:
  - Covenants to debt contract, e.g., interest coverage requirements or prohibition of investments into new, unrelated lines of business (Smith and Warner 1979).
  - Convertible debt alleviates existing shareholders' risk-taking incentives by allowing debtholders to share in the upside, making shareholders' payoff partly concave (Green 1984).