Corporate Finance

Lecture 7: Corporate Financing Decisions

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Announcements

- Paper Summary will be due today.

Announcements

Week	Date	Topics	Notes
1	9/8	Introduction	
2	9/15	Reschedule	Learning Objectives due
3	9/22	Review of Econometrics	1st News Summary due
4	9/29	Review of Econometrics and Corporate Governance	
5	10/6	ESG	October 6th is public holiday
6	10/13	Corporate Finance in China	2nd News Summary due
7	10/20	Research Topic Presentations	
8	10/27	Entrepreneurship and Innovation	
9	11/3	Corporate Financing Decisions	1st Paper Summary due
10	11/10	Corporate Investment and Payout Decisions	
11	11/17	Report on Research Progress and Q&As	
12	11/24	Exam	
13	12/1	Labor and Corporate Finance	
14	12/8	Term Paper Presentations	
15	12/15		
16	12/22	Cancelled	National Examination
17	12/29	AI in Corporate Finance	Term Paper due; Reflection Essay due

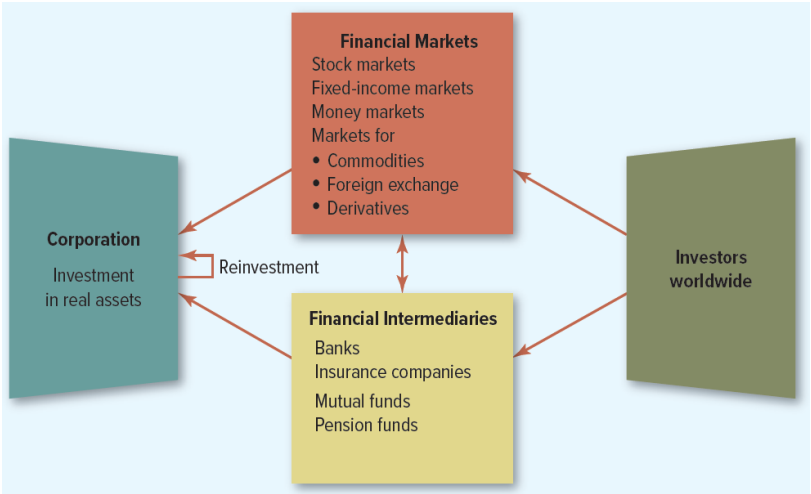
Quick Review of Last Lecture

- Entrepreneurship is one of the primary drivers of job opportunities, innovation, and economic growth.
- It is difficult for young firms to obtain financing from traditional sources. Entrepreneurs typically rely on a startup financing ecosystem including venture capital, private equity, angel investors, and crowdfunding.
- Drivers of entrepreneurs' entry decision include liquidity constraints, employment fallbacks, unemployment benefits, labor market distress, psychological bias, regulations, etc.
- VC-backed firms make up the majority of corporate R&D spending and generate most of the patents.
- There exist significant gender and racial gaps in entrepreneurship.
- Governments have incentives to boost entrepreneurship due to positive externalities and extensive frictions.
- R&D spending, patents, and innovation surveys are common but imperfect innovation indicators.
- VCs, especially those with greater failure tolerance, tend to enhance corporate innovation.
- IPOs usually hurt innovation (managerial myopia), but not for firms heavily relying on external financing.
- Human capital, especially firm-specific human capital, contributes to corporate innovation.
- Corporate innovation can be affected by CEOs' personal traits, skill sets, network, and compensation. Other insiders such as non-CEO executives, directors, and employees also matter for corporate innovation.
- Other prominent innovation drivers include general market conditions and country-level regulations, financial development, and demographic/social traits.

Outline for This Lecture

1. Instruments for Corporate Financing
2. Definition of Financial Leverage
3. Capital Structure and Firm Value (MM Proposition I)
4. Leverage and Expected Returns (MM Proposition II)
5. Trade-off Theory of Capital Structure
6. Leverage Differences among Firms

Flow of Savings to Investment for a Large, Public Corporation



Instruments for Corporate Financing

- **Debt** and **Equity** are two common financial instruments for corporate financing.
  - The simplest form of debt is a claim to a predetermined level on the firm's income.
  - Equityholders receive are the "residual claimants": they receive any profit beyond the payments to debtholders.

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- There exist various debt and equity instruments that differ in the priority of seeking payments.
  - Equity may take the form of common stocks and preferred stocks.
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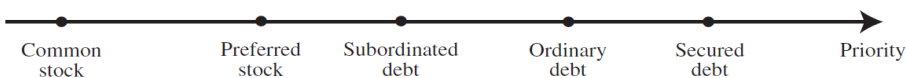


Preferred Stocks

- Preferred stock is like debt in that its holders are entitled to a fixed, predetermined repayment.
- Unlike debt, the firm is not obliged to pay back this specified amount, and thus nonrepayment does not trigger default.
- The firm cannot pay a dividend on (common) stock unless the cumulative (past and current) payments due to preferred stockholders have been made.
- While common stocks usually carry voting rights, preferred stockholders often do not have voting rights.

Senior Debt *v.s.* Subordinated Debt

- In the case of default, more senior debtholders are reimbursed first.
- Holders of subordinated debt are then repaid if enough is left.
- Subordinated debt must therefore deliver a higher yield than senior debt in order to compensate for the higher risk of default.
- In firms with small amounts of senior debt, the payoffs of subordinated debtholders resemble those of ordinary debtholders.
- In highly-leveraged firms, subordinated debt resembles equity.
  - These firms are unlikely to produce much income for its shareholders, so the holders of subordinated debt are almost residual claimants once senior debt is reimbursed.

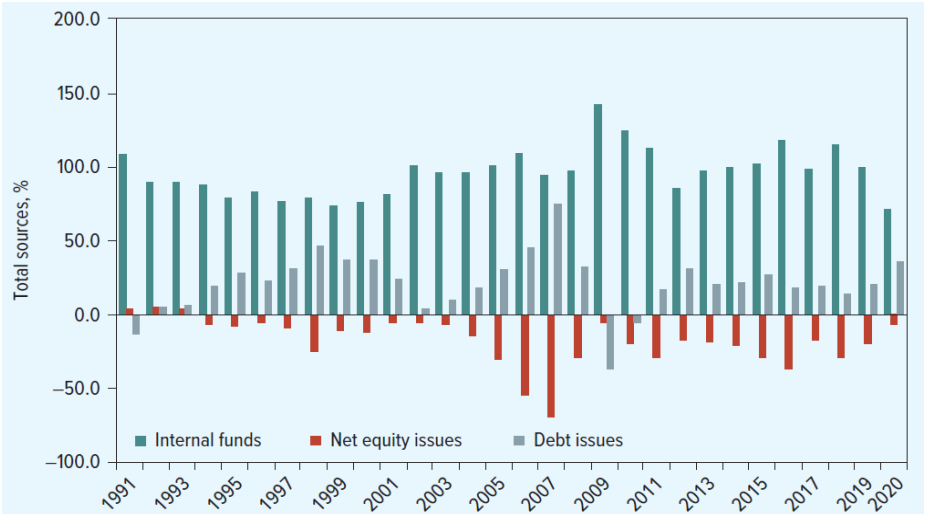
Ordinary Debt *v.s.* Secured Debt

- When debt is not fully reimbursed, secured debtholders can seize the assets used as collateral as part of their lending contract.
- Secured debtholders earn normally lower interest rates than ordinary debtholders, but they do better in defauts.

Convertible Debt

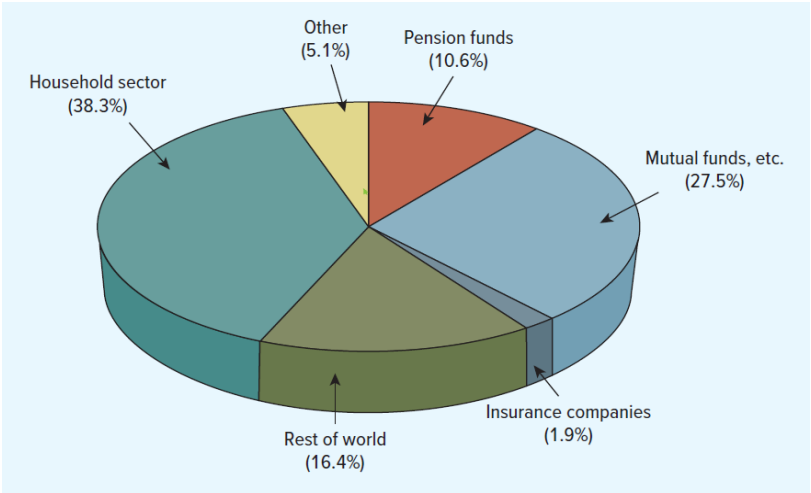
- One major intermediate claim between equity and debt is convertible debt.
- Convertible debt is basically debt, except that its holders can exchange it for the firm's shares at some predetermined conversion rate.
- Convertible debt takes the form of an option, which the holders can elect to exercise if circumstances are favorable.
- Potential situations when holders of convertible debt may exercise this option:
  - The firm's prospects become favorable.
  - For a given expected income of the firm, the riskiness of the firm's income has increased due to, for example, changes in the environment or to managerial choices.
- The convertibility option protects debtholders against excessive risk taking by the firm (Jensen and Meckling, JFE 1976).

Flow of Funds for U.S. Nonfinancial Corporations



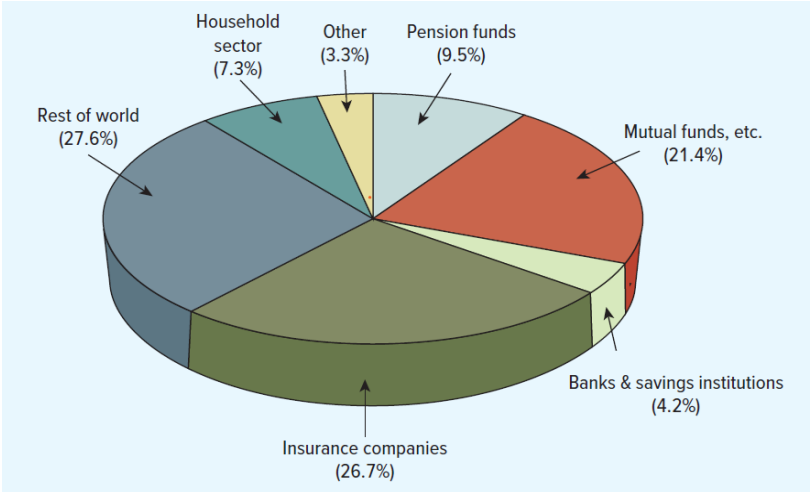
Source: Board of Governors of the Federal Reserve System, "Financial Accounts of the United States," Table F.103

Holdings of Equities for U.S. Nonfinancial Corporations (2020-12)



Source: Board of Governors of the Federal Reserve System, "Financial Accounts of the United States—Z1," Table L.223

Holdings of Corporate Bonds Issued in the United States (2020-12)



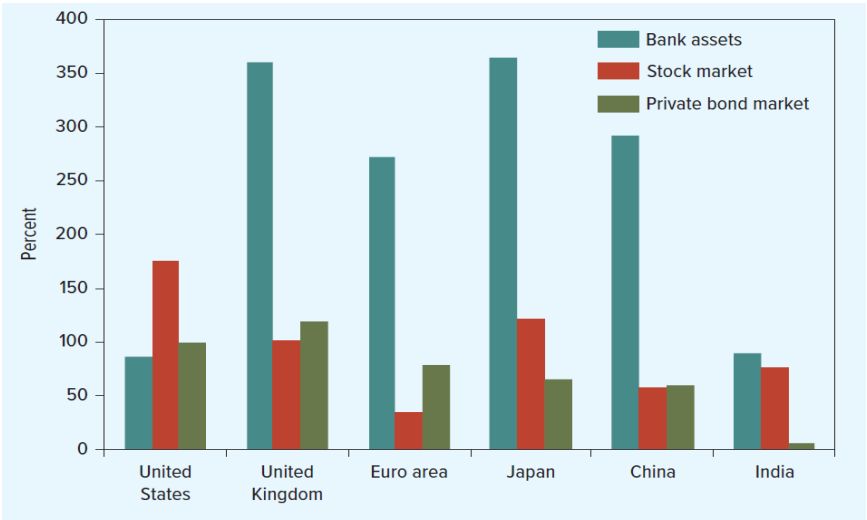
Source: Board of Governors of the Federal Reserve System, "Financial Accounts of the United States—Z1," Table L.213

Financial Assets of Intermediaries in the United States (2020-12)

	$ Billions
Mutual funds	$19,563
Money market funds	4,336
Closed-end funds	279
ETFs	5,449
Hedge funds[a]	2,700
Pension funds	25,666
Banks and savings institutions	23,454
Insurance companies	12,279

Source: Board of Governors of the Federal Reserve System, "Financial Accounts of the United States—Z1"

Value of Financial Claims in 2019, percentage of GDP



Source: World Bank and National Authorities

Define Capital Structure

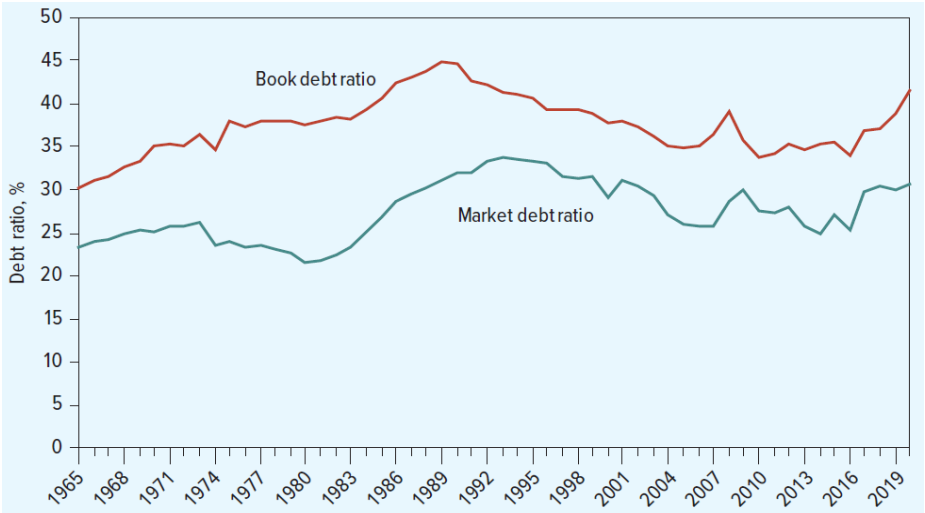
- Corporate capital structure refers to the composition of debt and equity as sources of funds for the corporation. This composition can be captured by financial leverage ratios.

- Papers commonly define the financial leverage ratio as $\frac{Debt}{Debt+Equity}$.
  - Some papers instead define leverage as $\frac{Debt}{Equity}$.
  - Other adjustments involve the inclusion or exclusion of short-term debt, leases, trade credit, non-financial debts, and other contingent debts due to contractual obligations (Mitton, 2022 RFS).

- Many researchers focus on **total debt** (i.e., the sum of short- and long-term debt).
  - Others focus on **long-term debt** because, in their view, the frictions in which they are interested matter more in the long run (e.g., Heider and Ljungqvist, JFE 2015).

- Leverage can be estimated using the **book or market value** of claims.

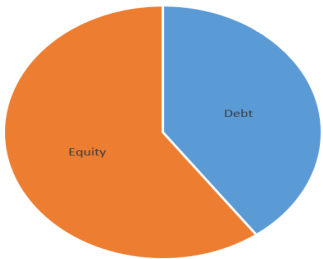
Debt Ratio for U.S. Nonfinancial Corporations



Source: Board of Governors of the Federal Reserve System, "Flow of Funds Accounts," Table B.103

Does Capital Structure Matter for Firm Value?

- Can firms increase their fundamental value by adjusting their capital structure?



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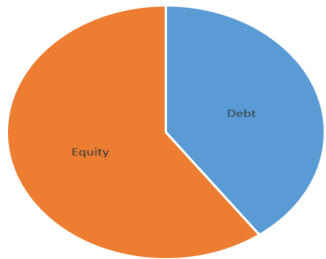

- This is a long-standing question in corporate finance that goes back to Modigliani and Miller (1958).

- They show that, under some conditions, the total value of the firm – that is, the value of all claims over the firm's income – is **independent of** its capital structure.

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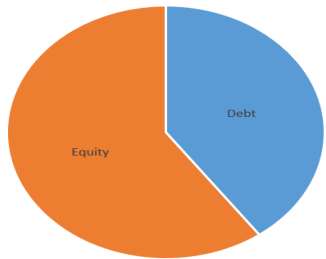

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- They show that, under some conditions, the total value of the firm – that is, the value of all claims over the firm's income – is **independent of** its capital structure.
- This is the *Modigliani-Miller Proposition I* (Capital Structure Irrelevance Proposition).

Modigliani and Miller's Proposition I: An Illustrating Example

- Imagine two firms that generate the same stream of operating profits and differ only in their capital structure. Now think which of these firms you would prefer to invest in.
  - Firm U is unlevered: $E_U = V_U$
  - Firm L is levered: $E_L = V_L - D_L$

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  - Firm L is levered: $E_L = V_L - D_L$
- If you don't want to take much risk, you can buy common stock in the unlevered firm U. Suppose you buy 1% of firm U's shares, you are entitled to 1% of the operating profits:

Dollar Investment	Dollar Return
$0.01V_U$	$0.01\times$Profits

- An alternative strategy is to purchase the *same fraction* of both the debt and the equity of firm L. Your investment and return are then:

	Dollar Investment	Dollar Return
Debt	$0.01D_L$	$0.01\times$Interest
Equity	$0.01E_L$	$0.01\times$(Profits-Interest)
Total	$0.01(D_L + E_L) = 0.01V_L$	$0.01\times$Profits

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Total	$0.01(D_L + E_L) = 0.01V_L$	0.01×Profits

- Both strategies offer the same payoff. The law of one price tells us that $0.01V_U = 0.01V_L \Rightarrow V_U = V_L$.

Leverage and Expected Returns

- The expected return on a firm's assets r_A is equal to the expected operating income calculated before interest expense, divided by the total market value of the firm's securities:

$$r_A = \frac{\text{expected operating income}}{\text{market value of all securities}}$$

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- The expected return on a portfolio is equal to a weighted average of the expected returns on the individual holdings. Therefore,

$$r_A = \frac{D}{D+E} \times r_D + \frac{E}{D+E} \times r_E$$

  - r_D: cost of debt
  - r_E: cost of equity
  - r_A: weighted average cost of capital (WACC)

Modigliani-Miller Proposition II

- From the equation above, we can solve for r_E:

$$r_E = r_A + (r_A - r_D)\frac{D}{E}$$

- This is the *Modigliani-Miller Proposition II:*
  - The expected rate of return on the common stock of a levered firm increases in proportion to the debt-equity ratio (D/E), expressed in market values.
  - The rate of increase depends on the spread between r_A, the expected rate of return on a portfolio of all the firm's securities, and r_D, the expected return on the debt.

- Note that $r_E = r_A$ if the firm has no debt (i.e., an unlevered firm).
  - This is also implied by MM's Proposition I.
  - MM's Proposition I says that r_A does not depend on capital structure.
  - In this case, the cost of capital for a levered firm should be equal to the cost of capital for an unlevered firm.

Modigliani and Miller's Assumptions

1. Homogeneous Expectations
2. Homogeneous Business Risk Classes
3. Perpetual Cash Flows
4. Perfect Capital Markets
   - Perfect competition
   - Firms and investors can borrow/lend at the same rate
   - Equal access to all relevant information
   - No transaction costs
   - No taxes
5. No bankruptcy costs
6. No agency costs

Modigliani-Miller *v.s.* Real World

- A series of research has shown that the Modigliani-Miller theorem **fails** under a variety of circumstances.
- The most commonly used elements include consideration of
  - taxes
  - bankruptcy costs
  - transaction costs
  - agency conflicts
  - adverse selection
  - ...

Trade-off Theory

- Let's first relax the assumption of "no taxes" in Modigliani and Miller (1958) and assume that firms have to pay income taxes.

- In this case, let's compare two identical firms, except that one is levered (i.e., financing with both debt and equity) and the other one is unlevered (i.e., financing with equity only).

- The levered firm will pay less taxes than the unlevered firm.
  - Recall from the balance sheet: firms' taxable income is computed based on earnings *after* interest payment.

- This effect is called "tax shield" of debt, which is one benefit of financing with debt.
  - $\text{Tax Shield of Debt} = \text{Interest Expense} \times \text{Tax Rate}$
    $= \text{Debt} \times \text{Interest Rate} \times \text{Tax Rate}$

Trade-off Theory

- With else being equal, firms that borrow more debt receives higher "tax shield" benefits and thus higher firm value.
- This predicts that the firm will adopts a financial leverage ratio of 1 (i.e., 100% debt financing), if there are no offsetting cost of debt.
- This prediction seems implausible in reality, which means costs of debt exist.
- Bankruptcy costs are one candidate: borrowing a high level of debt increases the probability of going bankruptcy, which incurs significant costs in reality.
  - Bankruptcy costs include direct costs (e.g., legal and administrative fees) and indirect costs (e.g., difficulty in obtaining future financing, disruption in supply-chains).
  - Here, we relax the "no bankruptcy costs" assumption in Modigliani and Miller (1958).
- A firm's optimal leverage reflects a **trade-off** between the tax benefits of debt and the deadweight costs of bankruptcy (e.g., Kraus and Litzenberger, 1973).

Trade-off Theory

- The use of the term "trade-off theory" is attributable to Myers (1984, JF).
- According to Myers (1984), a firm that follows the trade-off theory sets a target debt-to-value ratio and then gradually moves toward the target.
- The target is determined by balancing debt tax shields against costs of bankruptcy.

Determinants of Cross-sectional Leverage Differences

- Motivated by capital structure theories, researchers have documented the effects of many factors in driving leverage differences among firms.
  - profitability
  - firm size
  - growth opportunities
  - industry conditions
  - nature of assets
  - taxes
  - risk
  - supply-side factors
  - stock market conditions
  - debt market conditions
  - macroeconomic conditions
- Some factors are persistent and robust determinants of financial leverage, but others are not.

Which Factors Matter?

- Frank and Goyal (2009) consider each of a large set of empirical factors for its explanatory power and empirical robustness, defining robustness in terms of
  - identifiable subpopulations of firm types
  - randomly selected subsamples of firms
  - consistency as other factors are included or excluded

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  - consistency as other factors are included or excluded
- They conclude that the reliable determinants of financial leverage include
  - median industry leverage (+)
  - market-to-book assets ratio (-)
  - tangibility (+)
  - profits (-)
  - log of assets (+)
  - expected inflation (+)
- The empirical evidence seems reasonably consistent with the trade-off theory.
- They have reached similar conclusions with more recent data in Frank and Goyal (2024).

Which Factors Matter?

Table 2.8 Leverage regressions, U.S., 1971–2020

	Book Leverage		Market Leverage	
	Coefficient Estimates (1)	Elasticity (2)	Coefficient Estimate (3)	Elasticity (4)
$\text{IndMedianLev}_{t-1}$	0.203***	0.166***	0.291***	0.228***
	(0.035)	(0.029)	(0.020)	(0.016)
$\text{Profitability}_{t-1}$	−0.087***	−0.013***	−0.105***	−0.021***
	(0.022)	(0.003)	(0.020)	(0.004)
$\left(\frac{M}{B}\right)_{t-1}$	−0.006***	−0.036***	−0.010***	−0.076***
	(0.001)	(0.005)	(0.002)	(0.014)
Tangibility_{t-1}	0.234***	0.193***	0.197***	0.213***
	(0.026)	(0.021)	(0.010)	(0.011)
Ln(Assets)_{t-1}	0.024***	0.355***	0.039***	0.743***
	(0.004)	(0.060)	(0.004)	(0.081)
Clustered SE	Industry (FF48)		Industry (FF48)	
Firm FE	Yes		Yes	
Year FE	Yes		Yes	
R^2-Adjusted	0.392		0.632	
Observations	175,648		175,650	

How Large Are the Effects?

- Economic magnitudes of regression coefficients is often captured by the standardized "beta coefficient":

$$\beta^* = \beta \frac{\sigma_x}{\sigma_y}$$

where σ_x and σ_y are the estimated standard deviation of x and y, respectively. The interpretation is one standard deviation increase in x corresponds to β^* standard deviation change in y.

- Another way to measure the magnitude is to use "elasticity":

$$\epsilon_{yx} = \frac{\partial y/y}{\partial x/x} = \beta \frac{\bar{x}}{\bar{y}}$$

where $\bar{x}$ and $\bar{y}$ are average value of x and y over a range of data, respectively. The interpretation is a 1% increase in x corresponds to a $\epsilon_{yx}\%$ change in y.

  - Elasticity might be different either in a different range of data or if the data are averaged with a different weighting.

How Large Are the Effects?

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Additional Issues in Leverage Differences across Firms

- Low-Leverage Puzzle
- Debt Overhang
- International Evidence

Low-Leverage Puzzle

- The trade-off theory indicates that firms choose leverage by weighing the tax benefits of debt against the cost of debt.
- An empirical puzzle is that firms seem to adopt **a low leverage ratio** that cannot fully utilize the tax benefits (e.g., Graham, JF 2000).
  - The tax benefits are relatively large and the ex ante distress costs tend to be small.
- There are two broad responses to the low-leverage puzzle:
  - The ex ante distress costs are underestimated (e.g., Almeida and Philippon, JF 2007).
  - The tax benefits of debt are overestimated (e.g., Blouin, Core, and Guay, JFE 2010).
- In extreme cases, firms persistently maintain zero or negative debt.
  - This is a global phenomenon (2018, RF)
  - One response is that the phenomenon is due to personal preferences of the firm's manager.

Debt Overhang

- Debt overhang refers to situations where financial leverage distorts investment decisions. More specifically, firms with too much debt tend to underinvest.
- This issue occurs when the benefit from new investments goes to existing shareholders, not to new shareholders.
- There is evidence that high debt levels adversely affect investment and employment (e.g., Giroud and Mueller, RFS 2017).
- Debt renegotiation and debt restructuring are potential solutions to resolve debt overhang (e.g., Jordà, Kornejew, Schularick, and Taylor, RFS 2022).

International Evidence

- Cross-country differences in a number of factors may contribute to the observed differences in leverage. E.g., differences in culture, tax codes, and political system.
- Despite many detailed differences, firms' financial structures have been similar across countries.

Table 2.10 Balance sheets, G-7 countries, 1980–2021

Country→	United States (1)	Japan (2)	Germany (3)	France (4)	Italy (5)	United Kingdom (6)	Canada (7)
N	126,808	94,904	16,001	18,330	5,929	38,729	36,387
Total assets	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**
PPE-net	26.5	28.2	24.4	18.2	23.2	28.8	46.9
Other long-term assets	20.9	13.9	19.3	20.9	22.7	20.4	14.2
Cash and cash eqvts.	21.1	20.0	15.2	15.8	12.9	15.6	21.7
Accounts receivable	15.7	22.9	21.0	28.8	26.1	19.7	9.4
Inventory	12.5	12.0	16.7	14.4	13.6	12.7	6.1
Other current assets	3.5	3.0	3.5	2.0	1.5	2.9	1.9
Total liabilities	**50.9**	**52.8**	**58.1**	**60.0**	**61.2**	**50.1**	**35.8**
Total debt	22.0	22.2	19.2	21.5	26.1	17.4	15.2
Short-term debt	4.7	11.5	7.8	8.0	12.0	6.1	4.6
Long-term debt	17.2	10.7	11.5	13.5	14.2	11.3	10.6
Accounts payable	8.1	13.2	9.2	14.4	15.5	11.0	10.5
Other current liabilities	12.9	10.3	14.1	17.3	11.6	15.5	4.4
Other LT liabilities	7.9	4.7	14.0	4.9	6.8	4.7	5.2
Net worth	**49.1**	**47.2**	**41.9**	**40.0**	**38.8**	**49.9**	**64.2**
Total Liab.+net worth	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

International Evidence

Table 2.11 Leverage regressions, G-7 countries, 1981–2020

Country→	United States (1)	Japan (2)	Germany (3)	France (4)	Italy (5)	United Kingdom (6)	Canada (7)
$\text{IndMedianLev}_{t-1}$	0.349***	0.290***	0.262***	0.238***	0.361***	0.303***	0.486***
	(0.024)	(0.028)	(0.060)	(0.056)	(0.111)	(0.039)	(0.050)
$\text{Profitability}_{t-1}$	−0.086***	−0.349***	−0.152***	−0.297***	−0.347***	−0.094***	−0.046***
	(0.004)	(0.021)	(0.016)	(0.024)	(0.068)	(0.007)	(0.004)
$\left(\frac{M}{B}\right)_{t-1}$	−0.012***	−0.012***	−0.021***	−0.017***	−0.034***	−0.012***	−0.006***
	(0.000)	(0.001)	(0.002)	(0.002)	(0.006)	(0.001)	(0.001)
Tangibility_{t-1}	0.147***	0.290***	0.268***	0.171***	0.092*	0.133***	0.065***
	(0.011)	(0.019)	(0.033)	(0.042)	(0.055)	(0.017)	(0.009)
Ln(Assets)_{t-1}	0.039***	0.086***	0.059***	0.063***	0.079***	0.049***	0.028***
	(0.002)	(0.004)	(0.005)	(0.006)	(0.013)	(0.003)	(0.003)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2-Adjusted	0.653	0.786	0.672	0.700	0.688	0.571	0.659
Observations	100,733	79,639	14,171	15,823	5,139	32,514	22,373

Scholars to Follow for Capital Structure

- Murray Z Frank (Minnesota)
- Vidhan Goyal (HKUST)
- Toni M. Whited (Michigan)
- Harry C. DeAngelo (USC)
- John R. Graham (Duke)
- Mark T. Leary (WUSTL)
- Michael Roberts (Wharton)
- Ilya A Strebulaev (Stanford)