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Practical Corporate
Financial Modeling

Capital Structure

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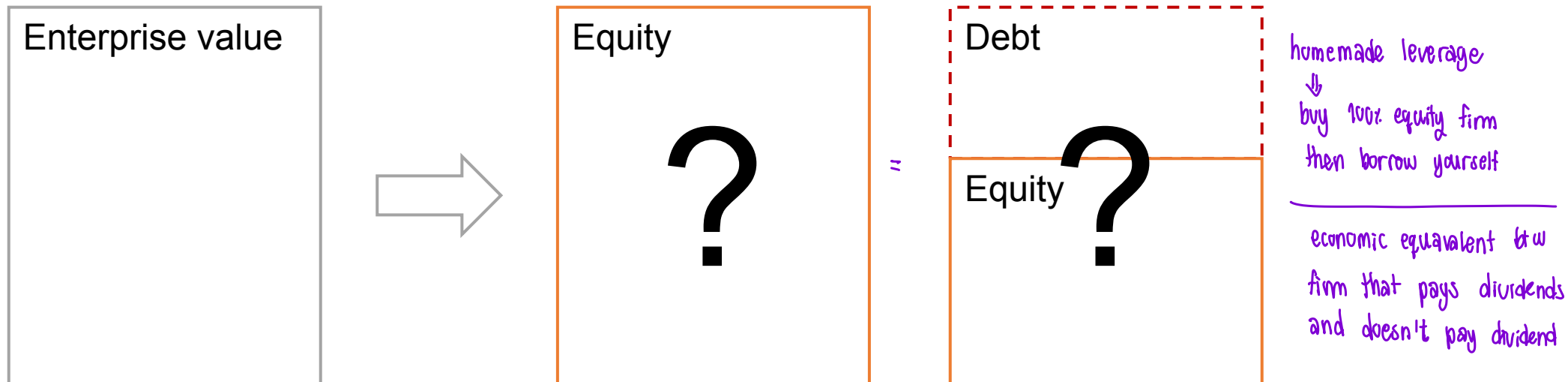
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Do corporate financial policies matter for firm value?

- Let's focus on the capital structure question. Does it matter whether a firm (or a project) is financed with debt or equity?





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This is how corporate finance began.



Franco Modigliani

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1985



Merton Miller

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 1990

Modigliani, Franco, and Merton H. Miller. "The cost of capital, corporation finance and the theory of investment." The American Economic Review (1958): 261-297.

Without friction, capital structure doesn't affect firm value



The 'Perfect' World

- In 1958, Professor Franco Modigliani and Professor Merton Miller theorized a “perfect” world where the following assumptions hold:
 - No taxes
 - No transaction costs
 - No bankruptcy costs
 - No “spread” – i.e. borrowing and lending occurs at the same (risk-free) rate for both firm and investors
 - No information asymmetry between firm and investors
 - No agency costs
 - Efficient market
- Then, under these conditions, capital structure policy (and payout policy) are **IRRELEVANT!**

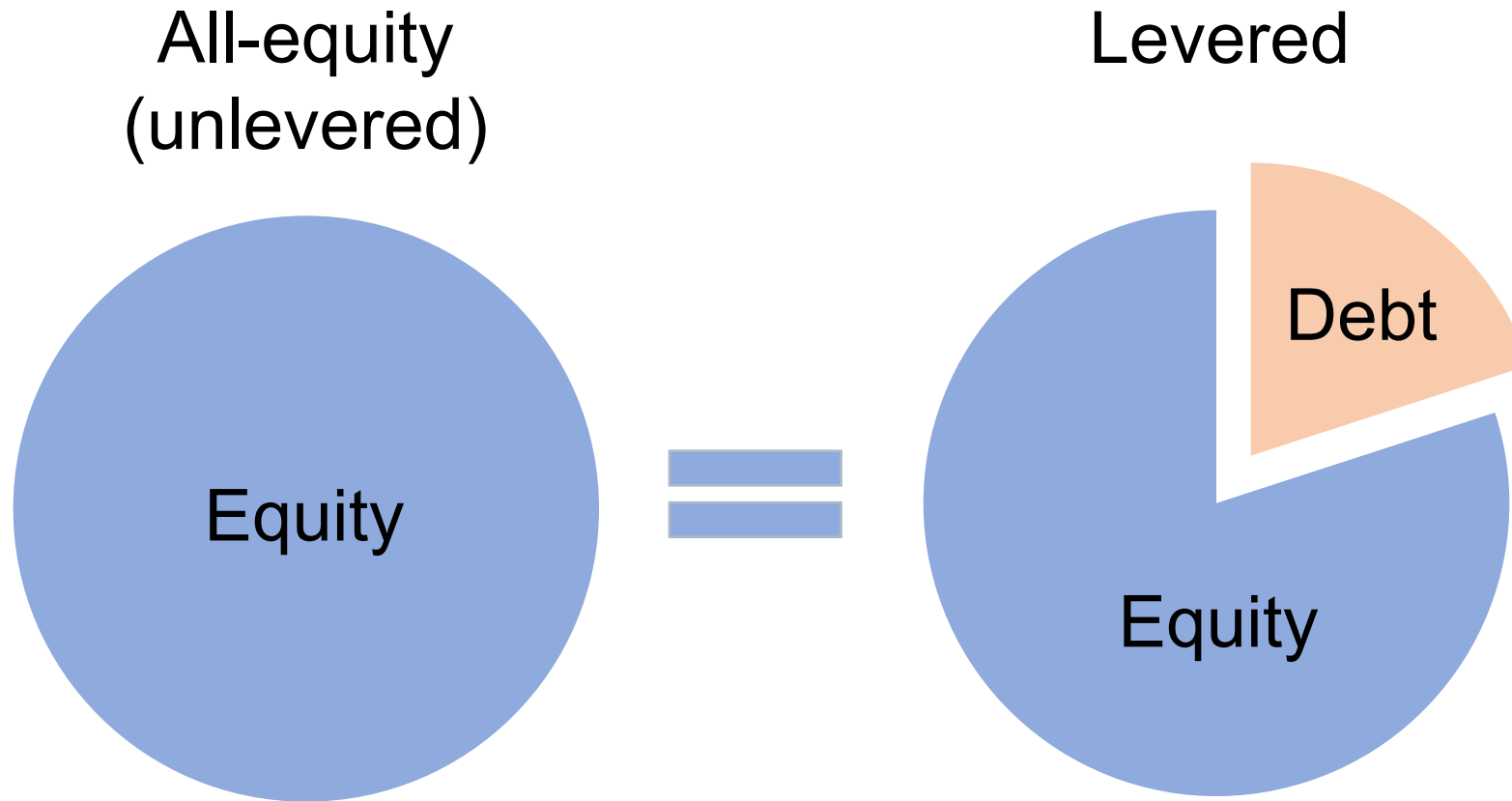


MM Proposition 1: Irrelevance

- The market value of any firm is independent of its capital structure.
- If investors can add or remove leverage on their portfolio themselves, then they can do so themselves without relying on the firm.
 - Sometimes this is referred to as “homemade” leverage.
 - If it doesn’t create any value for the firm, it doesn’t create any value for investors either.
- Implication: managers should focus on picking investments that add the most value (NPV) to the firm.



When there are no frictions, firm value is independent of capital structure.



$$E_U = V_U = V_L = D_L + E_L$$



While firm value does change, the distribution of risk does.

MM Proposition 2: Equity risk

- From identity we saw earlier, we can write:

$$r_E^L = r_E^U + \frac{D}{E} (r_E^U - r_D)$$

- By substituting in the CAPM, you can also write MM2 equation in terms of betas:

$$\beta_E^L = \beta_E^U \left(1 + \frac{D}{E} (1 - T) \right)$$

baseline
↓ business risk

multiple
leverage effect

directionally correct not precisely correct | accurate vs. precise
approximation & convenient
Hamada's equation

$$\beta_E^L = \beta_E^U + \frac{D}{E} (\beta_E^U - \beta_D)$$

↑ no need
↓ in finance
difficult to understand
is it help to improve decision?

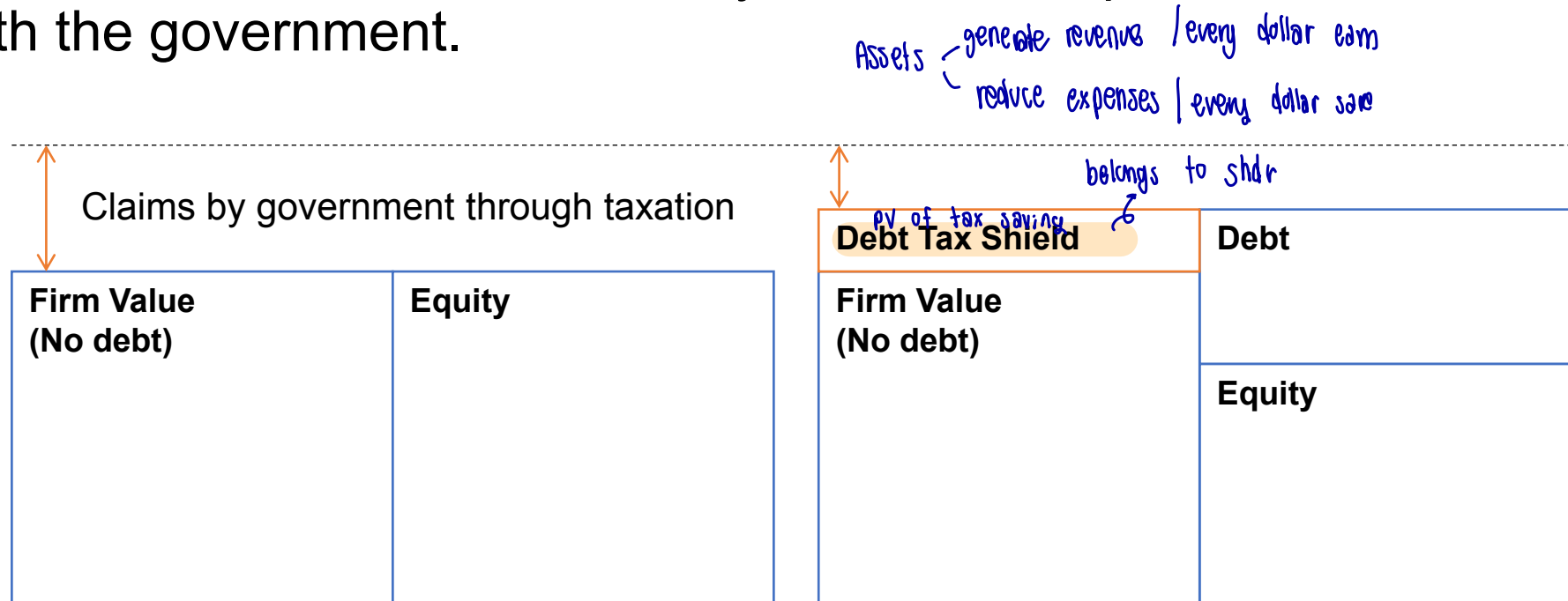


Friction 1: Tax

* Bed, Bath, Beyond case

Using debt increases firm value for companies that pay taxes since the firm can benefit from debt tax shield.

- The government is also a claimant of firm value.
- With the use of debt and tax deductibility of interest expense, less of the firm value is shared with the government.





Debt tax shield is valuable, but how do we value it?

$$V_L = V_U + PV(DTS)$$

- Just like any DCF exercises you've done.
 - Cash flow = interest tax saving
= effective tax rate x interest expense
= $\tau \times r_D \times D_t$
(Handwritten: tax rate, cost of debt, amount of debt)
 - Discount rate = r_{DTS}
 - Interest tax saving (ITS) is sometimes referred to as debt tax shield (DTS). We will use the word DTS in this course.
(Handwritten: may has many tax rate e.g. Incentive tax rate)

Discounted CF

$$PV(DTS) = \sum_{t=1}^T \frac{\tau r_D D_t}{(1 + r_{DTS})^t}$$

(Handwritten: circled around $\tau r_D D_t$)

While we can explicitly calculate DTS for each year, analysts tend to make the following simplifying assumptions.

- Let's assume:

- $r_{DTS} = r_D$ *- cost of debt as discount rate*
- Debt is constant and perpetual, i.e. $D_t = D$ and $T = \infty$.

- Then: *assume constant D & r_d*

$$DTS = \sum_{t=1}^{\infty} \frac{\tau r_D D}{(1 + r_D)^t} = \frac{\tau r_D D}{r_D} = \tau D$$

perpetuity

$$V_L = V_U + \tau D$$



Are there limits to the use of debt?

- In the world where $T > 0$, the more debt you use, the lower your WACC will be, and the more interest tax shield you will get.

$$V_L = V_U + PV(DTS)$$

Where $PV(DTS)$ is increasing in D .

- **Does this sound reasonable?**
- In reality, there are costs associated with having debt that may discourage you from using too much of it. We will discuss this in a moment.



Friction #2: Cost of Financial Distress

- By having debt, you have interest and principal payments which are obligations that you have to pay.
- If you cannot meet your debt obligations, you may risk **BANKRUPTCY**.
- Costs associated with bankruptcy can **lower** your firm value.
- Costs of financial distress (bankruptcy costs) are costs that you would otherwise never incur had you not been in bankruptcy.



Friction #2: Cost of Financial Distress

- Direct costs
 - Legal and administrative costs for court proceedings.
 - Though legal costs are high, they're not frequently incurred and are often a small percentage of firm value. Consequently, academic research pays little attention to this.
- Indirect costs [papers]
 - Lost business and trust: customers, suppliers, employees.
 - Fire sale: distressed, specialized and intangible assets sell for less. See Pulvino (JF, 1998)
 - Externality on others. See Benmelech and Bergman (JF, 2011)
- Ex-ante, this can affect behavior of lenders also.
 - See Schleifer and Vishny (JF, 1992), Benmelech (RFS, 2009)



- Pulvino, T. (1998). Do asset fire sales exist? an empirical investigation of commercial aircraft transactions. The Journal of Finance, 53(3), 939-978. <https://doi.org/10.1111/0022-1082.00040>
- Benmelech, E. and Bergman, N. (2011). Bankruptcy and the collateral channel. The Journal of Finance, 66(2), 337-378. <https://doi.org/10.1111/j.1540-6261.2010.01636.x>
- Shleifer, A. and Vishny, R. W. (1992). Liquidation values and debt capacity: a market equilibrium approach. The Journal of Finance, 47(4), 1343. <https://doi.org/10.2307/2328943>
- Benmelech, E. (2008). Asset salability and debt maturity: evidence from nineteenth-century american railroads. Review of Financial Studies, 22(4), 1545-1584. <https://doi.org/10.1093/rfs/hhn036>



CFD gives rise to the Trade-Off Theory.

- The value of the firm depends on leverage.
 - Debt creates value through tax shield.
 - But debt also increases cost of financial distress.

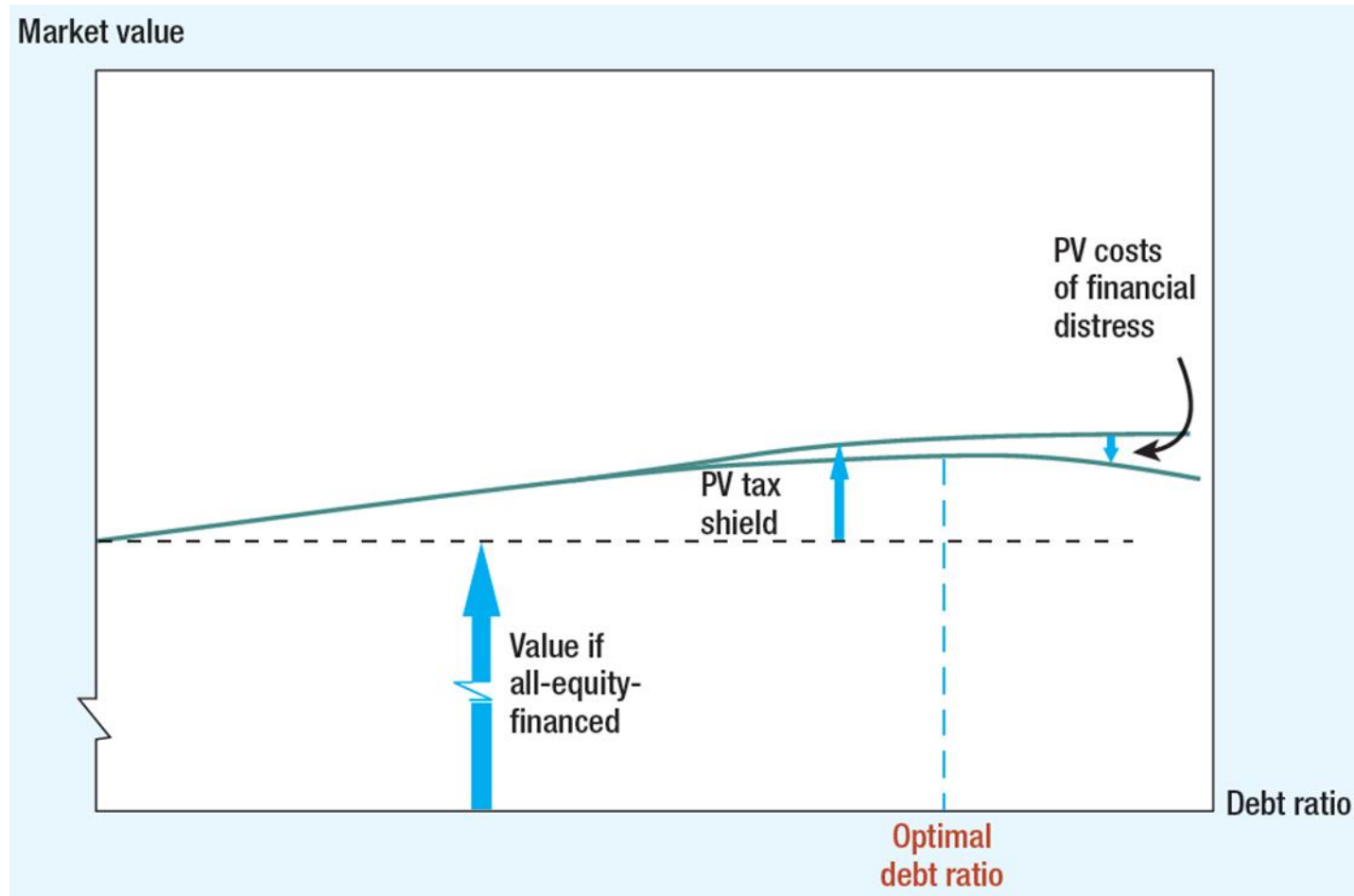
financial distress

$$V_L = V_U + PV(DTS) - PV(\text{CFD})$$

- Implication: **optimal leverage** → **target capital structure**
1. Firms choose to use debt to benefit from tax shield, but not to the highest level possible.
 2. The use of leverage depends on the expected cost of financial distress, which typically varies by industry.



When the marginal benefit [of debt tax shield] is equal to the marginal cost [of financial distress], the optimal capital structure [debt ratio] is achieved.





Friction #3: Asymmetric Information

- In most of the cases so far, we have assumed that managers and the market have the same (perfect) information.
- In real life, this is often not the case and information tends to be **asymmetric**.
- But what kind of information would lead to situations where firm value is increased or decreased?

Adverse selection is a problem where firm quality is unknown.

- Adverse selection occurs when the market does not know the **quality** of the investment (or product) being offered. [*Hidden type*]
- Managers have superior information about the firm.
 - In the extreme case, managers may have perfect knowledge of the firm's value, while potential investors have to “guess” by taking expectations.
- Also known as the “lemons” problem. See Akerlof (QJE, 1970).

Akerlof, G. A. (1970). The Market for "Lemons": Quality Uncertainty and the Market Mechanism. The Quarterly Journal of Economics, 488-500.

Adverse selection combined with incentive of managers to time the market means external financing can be 'expensive'.

- Under asymmetric information, investors may be skeptical when they observe that a firm decides to sell equity [think of used cars] and in turn are less willing to pay for the shares.
- The degree of mispricing is determined by the degree of information asymmetry (in essence, how managers and investors may disagree on the firm value).
- In the extreme case, the negative NPV of mispricing may be large enough to complete offset the positive NPV of your investment.

The degree of information asymmetry affects how 'expensive' different sources of financing can be.

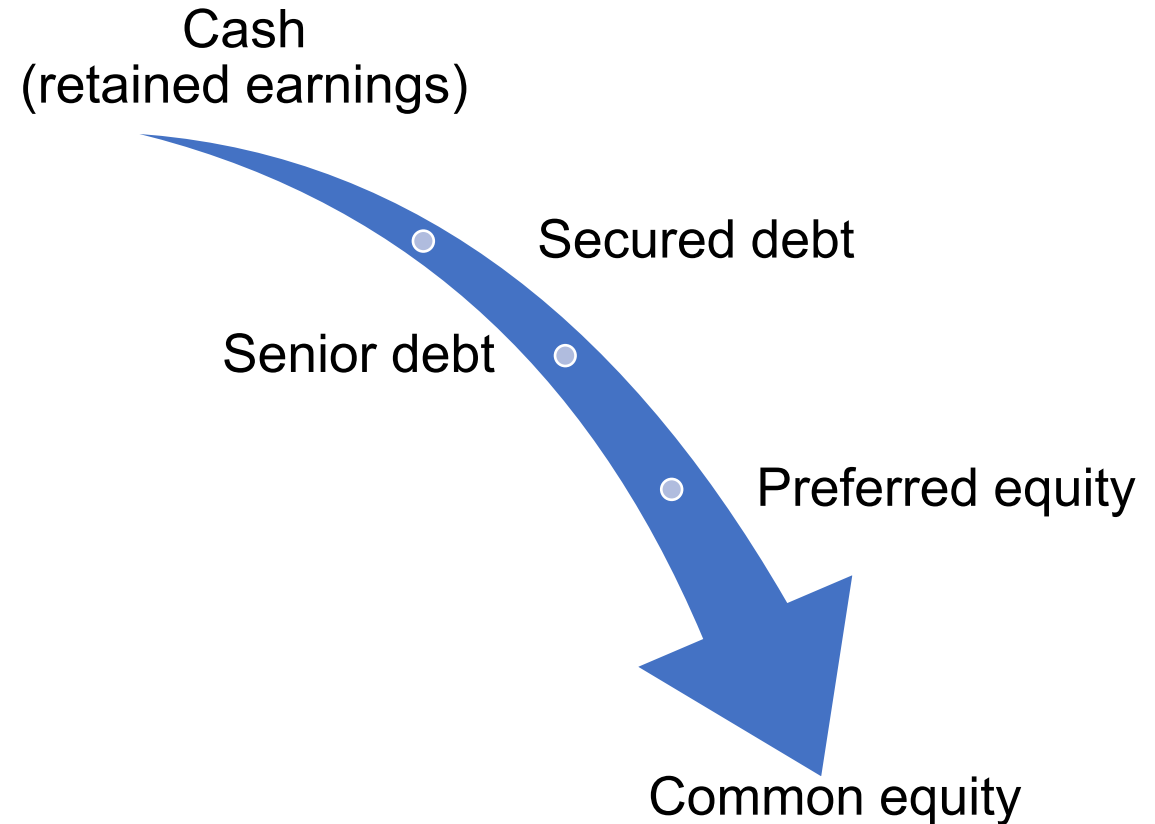
- The key driving force here is that potential investors are not sure about the firm's value.
 - If managers use internal cash, there is no worry about mispricing, since you are not "selling" the firm to new investors.
 - Creditors also care less about how much the firm is worth than the ability to repay debt in full.
- **The Pecking Order Theory** suggests that firms should use the source of cash which are the least sensitive to information asymmetry first.
- See Shyam-Sunder and Myers (JFE, 1999)
Shyam-Sunder, L., & Myers, S. C. (1999). Testing static tradeoff against pecking order models of capital structure. *Journal of Financial Economics*, 51(2), 219-244.
- Also, one possible reason why IPOs are issued at discount.



The Pecking Order Theory implies that sources of financing that have greater uncertainty in value should be used last.

Related Research Topics:

- Why do firms hold cash?
Opler et al. (JFE, 1999)
- What do corporate actions signal?
Asquith and Mullins (JFE, 1986)
- Do firms time capital structure?
Baker and Wurgler (JF, 2002)
- Is capital structure persistent?
DeAngelo and Roll (JF, 2015)
- Quick review:
Graham, Leary and Roberts (JFE, 2015)

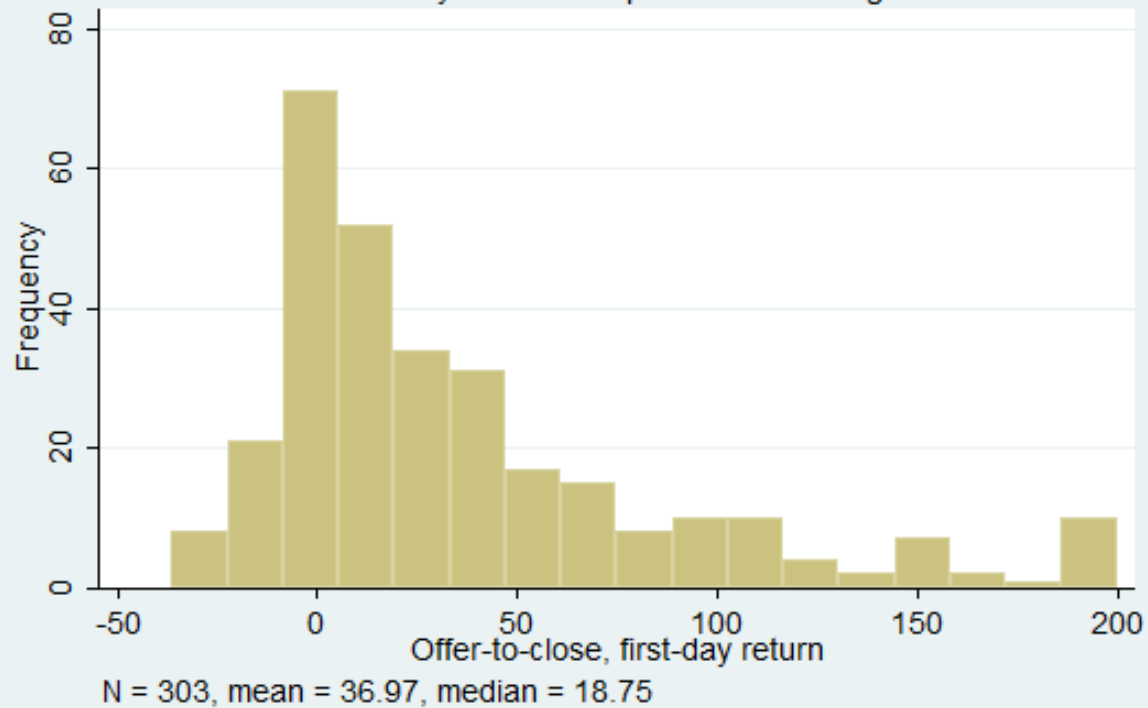




Stock IPOs are less underpriced than REIT IPOs.

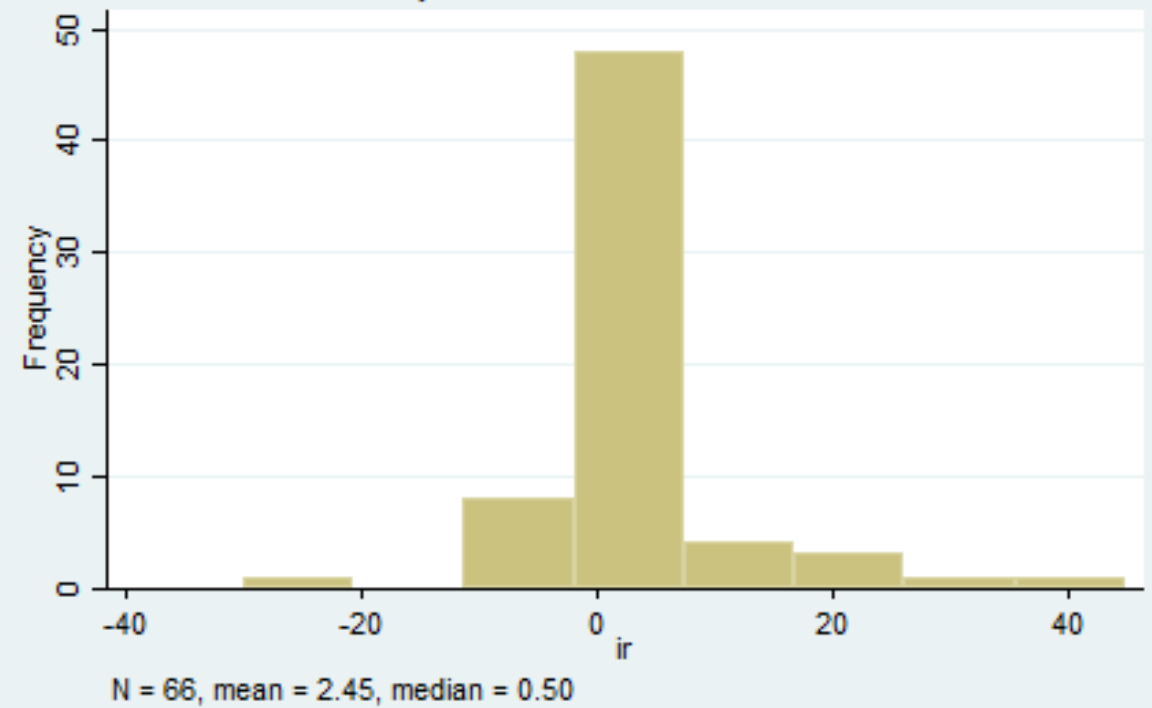
IPOs in Thailand, 2001-2017

First-day returns are positive on average.



REIT IPOs in Thailand, 2005-2019

First-day returns are lower than stock IPOs.





REITs with income guarantee also exhibit less underpricing.

JPIF
39,6

590

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Cash flow uncertainty and IPO underpricing: evidence from income guarantee in Thai REITs

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Abstract

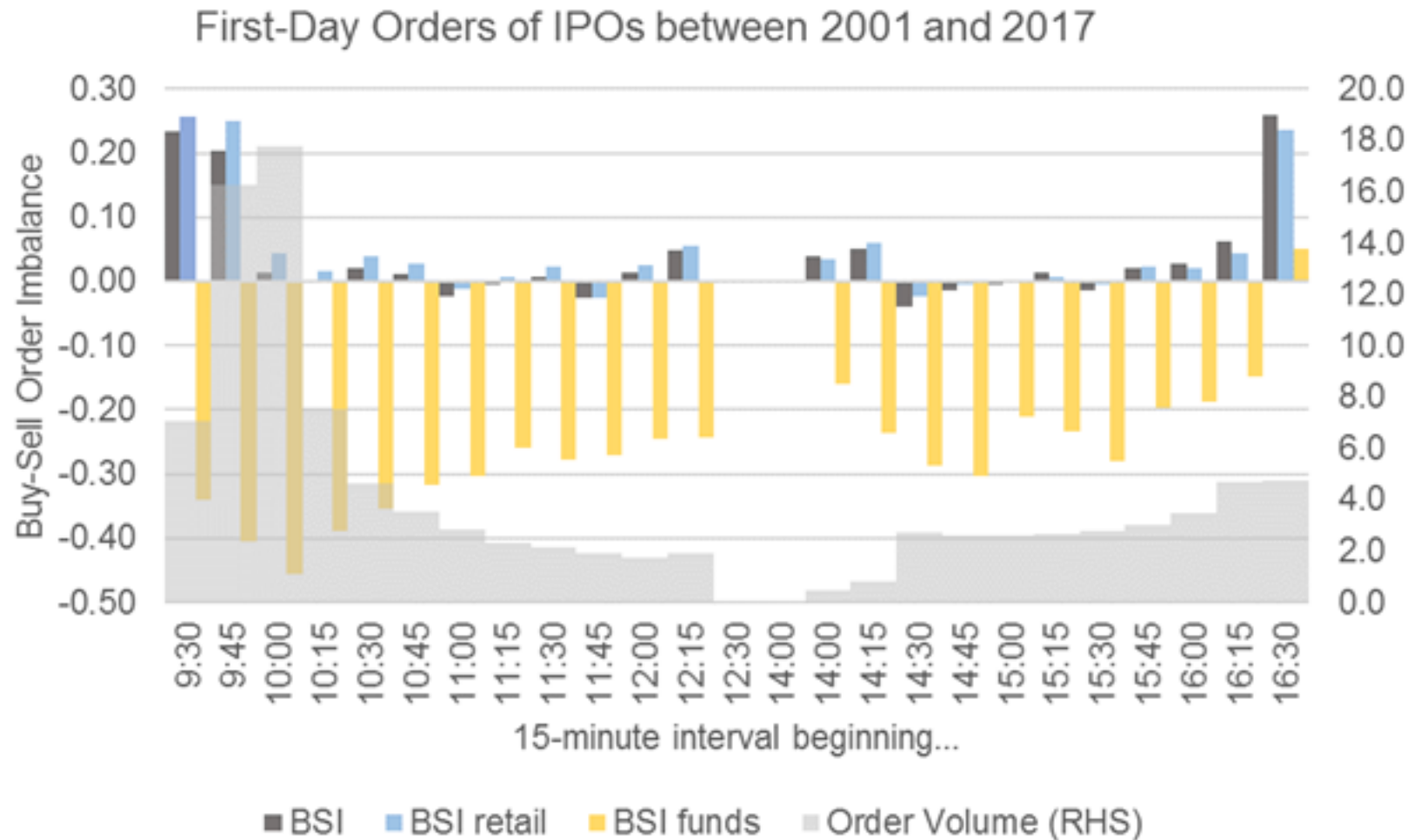
Purpose – The purpose of this article is to investigate the relationship between cash flow uncertainty and the underpricing of real estate investment trust (REIT) initial public offerings (IPOs) using hand-collected data on income guarantee in Thailand from January 2005 to December 2019.

Design/methodology/approach – This article uses linear regression to determine the relationship between underpricing (initial return) and proxy for cash flow uncertainty (income guarantee), controlling for other factors. Because issuers can use several actions to signal their quality under asymmetric information, the joint decisions are analyzed as simultaneous equations and estimated using three-stage least square (3SLS) to address potential endogeneity concern.

Findings – This article finds that underpricing, on average, is negatively related to income guarantee, which is a proxy for *ex ante* cash flow uncertainty. The relationship is economically and statistically significant and robust to simultaneous equations estimation. Further investigation shows that REITs with income guarantee tend to have lower systematic risk (measured by CAPM beta) and returns, making the nature of some REITs more debt-like than equity-like.



Mutual funds tend to be net sellers of IPO stocks on the first day.





They also strategically participate in IPOs. Q: is this in our best interest? → agency cost

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Strategic participation in IPOs by affiliated mutual funds: Thai evidence

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ABSTRACT

Underwriters and co-managers play an important role in IPOs, but because they often have affiliated mutual funds, concerns about conflicts of interest can arise. On the one hand, they can use this affiliation for the benefit of their asset management business (the information advantage hypothesis); on the other hand, they can use mutual funds under their control to support their IPO clients (the quid pro quo hypothesis). Using mutual fund holding data between 2005 and 2016 and a sample of Thai IPOs during the same period, we find behavior consistent with the information advantage hypothesis in lead underwriter-affiliated funds, and the quid pro quo hypothesis in both. We also find evidence of strategic placements within fund family in captive (tax-deductible) funds targeted at retail investors, raising the possibility that the quid pro quo behavior may unintentionally be facilitated by public policy to encourage mutual fund investment.

Underwriters and co-managers play an important role in IPOs, but because they often have affiliated mutual funds, concerns about conflicts of interest can arise. On the one hand, they can use this affiliation **for the benefit of their asset management business** (the information advantage hypothesis); on the other hand, they can use mutual funds under their control to **support their IPO clients** (the quid pro quo hypothesis).

Using mutual fund holding data between 2005 and 2016 and a sample of Thai IPOs during the same period, we find behavior consistent with the information advantage hypothesis in lead underwriter-affiliated funds, and the quid pro quo hypothesis in both.

Friction #4: Agency Costs

Agency costs are costs to the principals (owners of the firm) when:

1. Principal (owner) and agent (manager) are different.
 - Also known as the principal-agent problem.
 - This happens in conjunction with asymmetric information, i.e. moral hazard.
2. There are different types of principals with potentially different interests and incentives.
 - Also known as the conflict of interest between debt and equity principals.
 - This happens even if information is not asymmetric.

Moral hazard is a problem when managers' actions are unobservable, leading to make suboptimal decisions.

Moral hazard occurs when the **action** of the agent (manager) **cannot be observed or inferred** by the principal (owner). [*Hidden action*]

Implications

1. Managers may not work as hard as you would like them to.
2. Managers may do things you do not want them to.



The carrot and stick mechanism can address the moral hazard problem.

The stick



Install checks and balances

The carrot



Align incentives



Financial options are the right to buy/sell an asset at a predetermined price at some point in the future, subject to an expiry date.

- An option is a derivative contract; a derivative contract is a financial instrument whose payoff is **derived** from some underlying asset.
 - Can be written on anything, e.g. stock, interest rate, commodity
 - Sometimes referred to as warrant, derivative warrant (DW), ESOP
 - The predetermined price is called the “strike price”
- Call option = right to buy / put option = right to sell
 - For a call option, do you prefer low or high strike price?
- Q: How can stock options make managers work harder?



Stock options incentivize managers to maximize stock price [shareholder value] rather than just to sit back and relax.

- Related Research: Yermack (JFE, 995)

Yermack, D. (1995). Do corporations award ceo stock options effectively?. Journal of Financial Economics, 39(2-3), 237-269. [https://doi.org/10.1016/0304-405x\(95\)00829-4](https://doi.org/10.1016/0304-405x(95)00829-4)

- Startups often rely on stock options rather than cash.

“A company does better the less it pays the CEO.”

Peter Thiel in Zero to One.

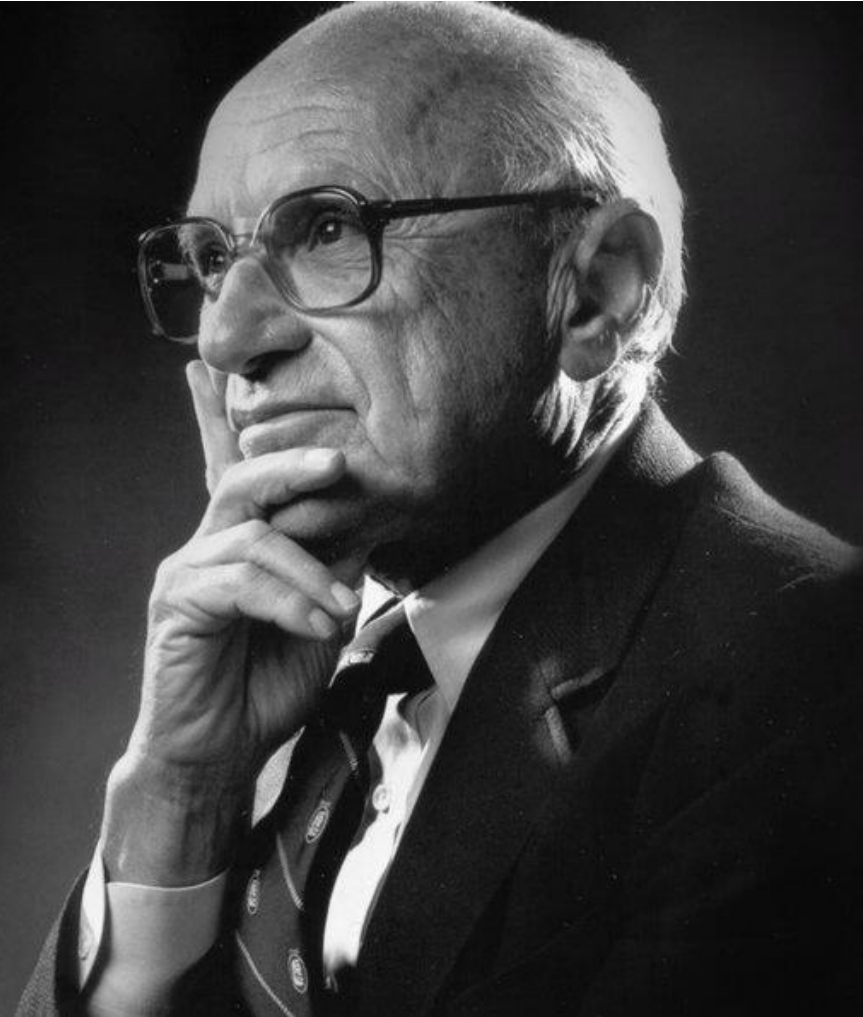
- “...high cash compensation teaches workers to claim value from the company as it already exists instead of investing their time to create new value in the future.”



*“When a man spends **someone else's money to buy something for himself**, he is very careful about what he buys, but doesn't care at all how much he spends.*

*And when a man spends **someone else's money on someone else**, he doesn't care how much he spends or what he spends it on.”*

-- Milton Friedman







Flights of fancy: Corporate jets, CEO perquisites, and inferior shareholder returns[☆]

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Abstract

This paper studies perquisites of CEOs, focusing on personal use of company planes. For firms that have disclosed this managerial benefit, average shareholder returns underperform market benchmarks by more than 4% annually, a severe gap far exceeding the costs of resources consumed. Around the date of the initial disclosure, firms' stock prices drop by an average of 1.1%. Regression analysis finds no significant associations between CEOs' perquisites and their compensation or percentage ownership, but variables related to personal CEO characteristics, especially long-distance golf club memberships, have significant explanatory power for personal aircraft use.

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JEL Classification: G30; J33

Keywords: Executive compensation; Perquisites; Corporate jets

Agency cost and can also arise when the firm is cash-rich and managerial decisions difficult to monitor/evaluate.

- Related Research: Jensen (AER, 1986)

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2), 323-329.

- When a firm has too much cash, managers with fractional ownership may be tempted to invest in negative NPV projects, especially when there is a lot of information asymmetry.
- Also, less free cash flow for managers to “waste”. Managers are forced to be more efficient with resources with faced with debt burden [or limited resources].
- Related area: leveraged buyouts (LBOs)

Agency cost of debt occurs when there are debt investors in the company.

- Existence of debt can lead to **conflict of interest** between shareholders and creditors.
 - The disagreement occurs when the firm is close to bankruptcy.
- Let's assume here that managers act in the interest of shareholders and try to maximize shareholder value.
- Depending on circumstances, managers may over-invest in risky projects or under-invest in good projects.

With your 'back against the wall', you may take risks that you shouldn't have under normal circumstances.

- Firms close to bankruptcy often take on risky investments because equity has **limited liability**. Even if the project fails, shareholders aren't that much worse off.
- Managers may even **accept negative NPV projects** because it can increase shareholder value at the expense of creditors.
- This is referred to as **risk shifting**. See Jensen and Meckling (1976)
Jensen, M. C., & Meckling, W. H. (2019). Theory of the firm: Managerial behavior, agency costs and ownership structure. In Corporate governance (pp. 77-132). Gower.

When you're too 'deep underwater', you may give up on things you should have done under normal circumstances.

- Firms that have risky debt on balance sheet, i.e. there are some states of the world that debt obligations cannot be fully met, may choose to **give up positive NPV projects**.
- Shareholders pay for investment, while creditors receive the first claim on cash flows. This results in positive NPV for creditors but negative NPV for shareholders.
- This is referred to as **debt overhang**. See Myers (JFE, 1977)

Myers, S. C. (1977). Determinants of corporate borrowing. Journal of Financial Economics, 5(2), 147-175. [https://doi.org/10.1016/0304-405x\(77\)90015-0](https://doi.org/10.1016/0304-405x(77)90015-0)



Changing Capital Structure

- Often called recapitalization (recap).
 - Can be done in conjunction with investment through fundraising choice.
 - Can also be done independently of investment opportunities.
- A leveraged recap is when a firm substitutes equity for debt.
 - A firm can increase debt by borrowing.
 - A firm can reduce equity by paying out special dividend or repurchase shares.

- It increases risk. See Kaplan and Stein (JFE, 1990)

Kaplan, S. N. and Stein, J. C. (1990). How risky is the debt in highly leveraged transactions?. Journal of Financial Economics, 27(1), 215-245. [https://doi.org/10.1016/0304-405x\(90\)90027-w](https://doi.org/10.1016/0304-405x(90)90027-w)

- But it can also be good for the firm. See Gupta and Rosenthal (FM, 1991)

Gupta, A. and Rosenthal, L. (1991). Ownership structure, leverage, and firm value: the case of leveraged recapitalizations. Financial Management, 20(3), 69. <https://doi.org/10.2307/3665752>



For next time

- Should capital structure affect cost of capital?
- How to empirically estimate cost of capital?
- Practical issues and common mistakes.