



Capital Structure Theory

Modigliani & Miller (1958)

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Introduction

- Capital Structure is the mix of financial instruments used to finance real investments by corporations.
- FUNDAMENTAL QUESTION: Does capital structure matter?
- ANSWER: There is no unconditional answer.
- Modigliani and Miller set in 1958 the assumptions under which a firm's value is independent of its capital structure. Their irrelevance proposition is the cornerstone of capital structure theory.
- The leading theories of capital structure attempt to explain the proportions of financial instruments observed on the right-hand side of corporations' balance sheets
- The main issues that capital structure literature deals with concern the following questions:
 - How do firms finance their operations?
 - Which factors influence these choices?
 - Is it possible to increase the firm value just by changing the mix of securities issued?
 - Is there an optimal debt-equity combination that maximizes the value of the firm and if so
 - What is it?
 - How is it determined?

M-M irrelevance propositions

- Assumptions
 - No transaction costs
 - No bankruptcy costs
 - Firms issue only two types of claims: risk-free debt and equity
 - Firms and individuals have the same information
 - Capital markets are complete
 - Capital markets are competitive (individuals and firms are price takers)
 - No taxes
- Under the above set of assumptions Modigliani and Miller (1958) proposing that:
 - **Proposition I:** A firm's total market value is independent of its capital structure
 - **Proposition II:** A firm's cost of equity increases linearly with its debt-equity ratio

Modigliani Miller Theorem

MM Theorem without Taxes

- MM proposition I : The market value of the company is not affected by the capital structure of the company
 $V_L = V_U$
- MM proposition II : The cost of equity is a linear function of the company's debt to equity ratio
 $r_e = r_0 + (r_0 - r_d) \times D/E$, where r_0 is the cost of capital for a company financed only by equity and has zero debt

MM Theorem with Taxes

- MM proposition I : The market value of the company with debt is greater than that of the all equity company by an amount of tax rate multiplied by the value of debt $V_L = V_U + t.D$
- MM proposition II : The cost of equity increases as the company increases the amount of debt in its capital structure, but the cost of equity does not rise as fast as it does in the no tax cases
 $r_e = r_0 + (r_0 - r_d)(1-t) \times D/E$, where r_0 is the cost of capital for a company financed only by equity and has zero debt

Capital Structure Theories

the departure from M-M irrelevance proposition

Static Trade Off Theory

A firm is said to follow the static trade-off theory if the firm's leverage is determined by the trade-off between the tax benefits of debt and the expected costs of bankruptcy.

Use of debt has both costs and benefits:

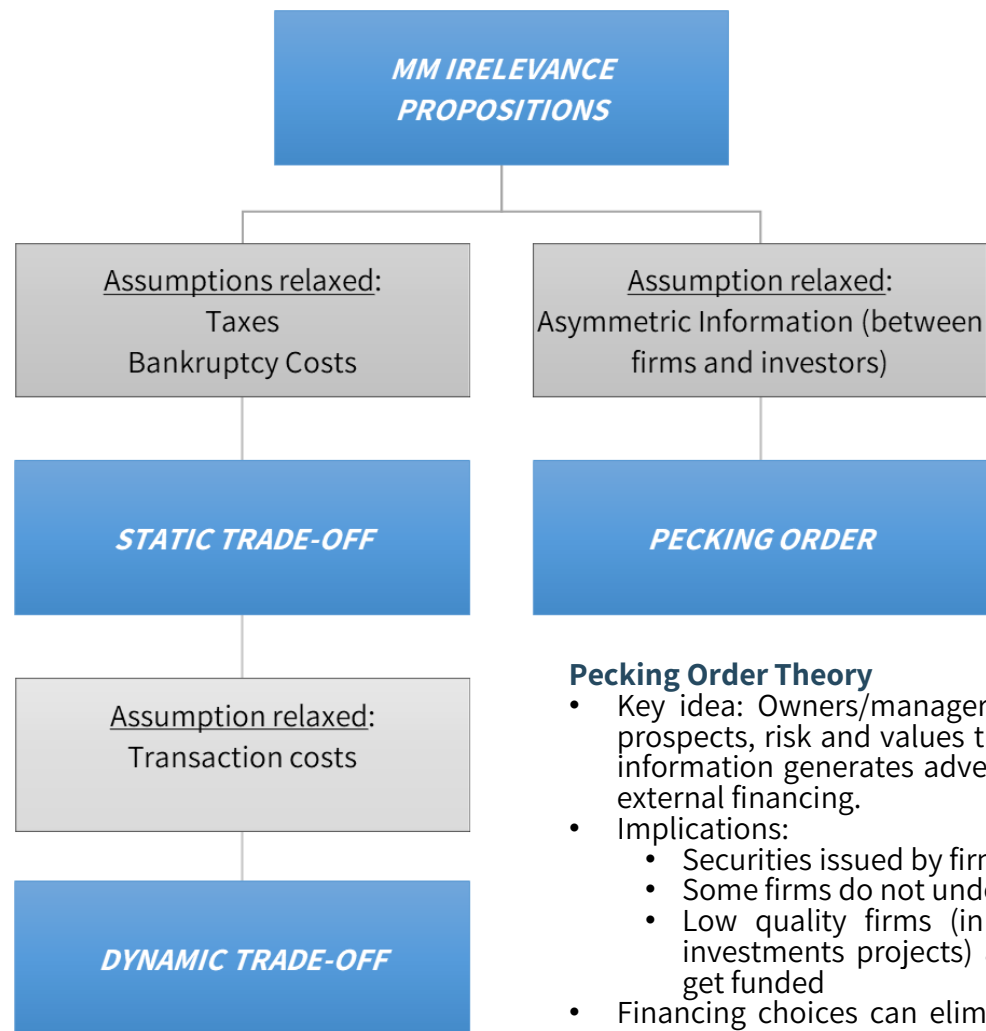
- Benefit: debt has a tax advantage
- Cost: debt creates the possibility of costly bankruptcy

This model gives a solution for leverage, but it leaves no room for the firm to be anywhere but at the solution. Since rebalancing is costless, firms should react to adverse shocks immediately.

Costly adjustment (Dynamic Trade-off)

Because of transaction costs, firms allow their leverage to drift within a range around the optimal leverage ratio and rebalance only when the benefits of adjustment to the target are likely to exceed the costs.

This implies that actual debt ratios should have a mean-reverting behavior around target ratios.



Pecking Order Theory

- Key idea: Owners/managers of firms know more about their firms' prospects, risk and values than outside investors do. This asymmetric information generates adverse selection problems when firms turn to external financing.
- Implications:
 - Securities issued by firms are mispriced (adverse selection cost)
 - Some firms do not undertake positive NPV investment projects
 - Low quality firms (in terms of risk and profitability of their investments projects) are more likely than high quality firms to get funded
- Financing choices can eliminate or mitigate adverse selection costs. Hence capital structure matters under asymmetric information.

Capital Structure Theories

the driving forces and implications

THEORY	DRIVING FORCES	IMPLICATIONS
STATIC TRADE-OFF (DYNAMIC TRADE-OFF)	<ul style="list-style-type: none">• Taxes• Bankruptcy• (Transaction costs)	There is an optimal leverage ratio for every firm (and actual leverage will revert towards that ratio).
PECKING ORDER	Asymmetric information between firms and investors. (Hidden types of firms)	Firms prefer internal to external financing and debt to equity financing (in Myers and Majluf context).



Capital Structure Puzzle

(Myers, 1984)



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Framework

Contrasting two ways of thinking about capital structure:

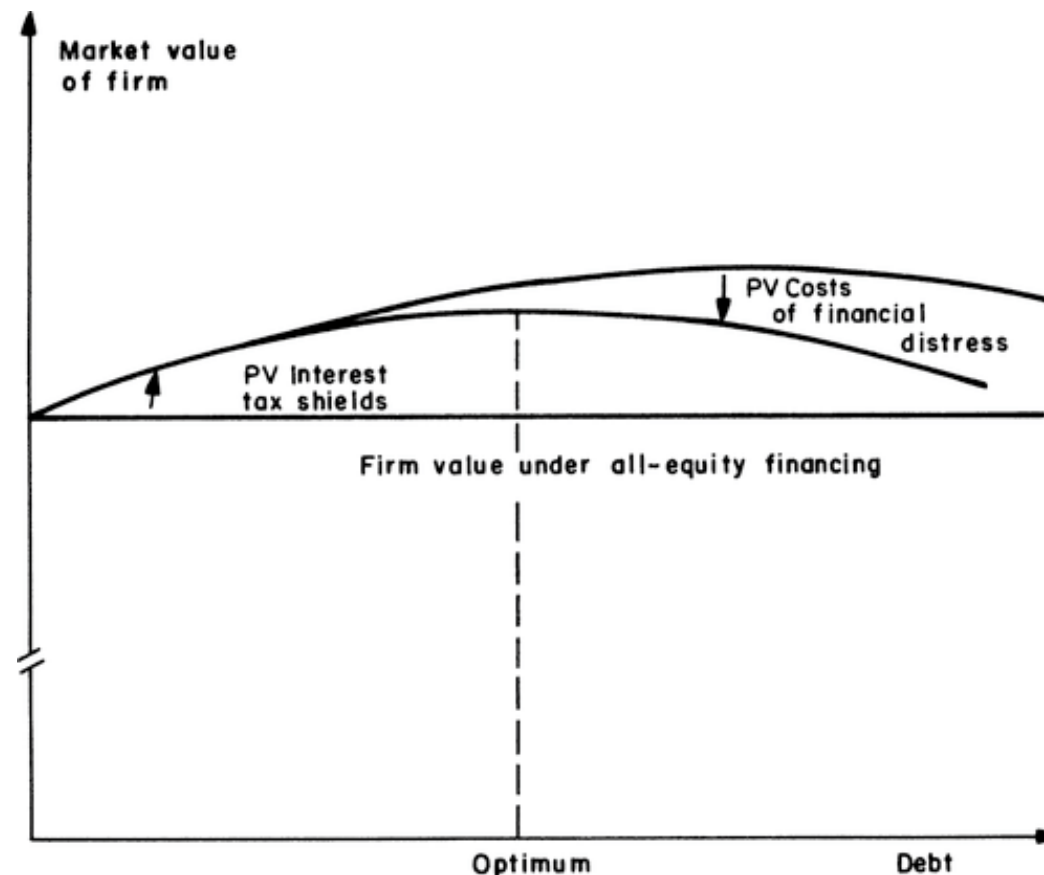
- **A static tradeoff framework**, in which the firm is viewed as setting a target debt-to-value ratio and gradually moving towards it, in much the same way that a firm adjusts dividends to move towards a target payout ratio.
- **An old-fashioned pecking order framework**, in which the firm prefers internal to external financing, and debt to equity if it issues securities. In the pure pecking order theory, the firm has no well-defined target debt-to-value ratio.
- If neither story explains actual behavior, **the neutral mutations** story will be there faithfully waiting.

Managerial and Neutral Mutation Hypotheses

- Exclusion of managerial theories (e.g., separation between ownership and control, agency theory, personal risk and rewards)
- Sidestepping neutral mutation (i.e., irrelevance theories)
- Reason for not immediately embracing neutral mutations:
 - Economist could identify **different costs regarding different financing strategies**, implying explanatory power of these costs can't be ignored
 - Interest of investors in the firm's financing choices, observed on how stock price change when choice is announced even though argument of **not-so-pure financing information effect**
 - That **managers have special information** regarding financing choices that can be interpreted by investor as good or bad news that eventually affect stock price.

Static Tradeoff Hypothesis

- A firm's optimal debt ratio is usually viewed as determined by a **trade-off of the costs and benefits of borrowing**, holding the firm's assets and investment plans constant.
- The firm is portrayed as balancing the value of interest tax shields against various costs of bankruptcy or financial embarrassment.
- The firm is supposed to substitute debt for equity, or equity for debt, until the value of the firm is maximized.



Static Tradeoff Hypothesis: the challenge

- **Adjustment Cost**

- If there were no costs of adjustment, and the static tradeoff theory is correct, then each firm's observed debt-to-value ratio should be its optimal ratio.
- However, there must be costs, and therefore lags, in adjusting to the optimum.
- Firms can not immediately offset the random events that bump them away from the optimum, so there should be some cross-sectional dispersion of actual debt ratios across a sample of firms having the same target ratio. Large adjustment costs could possibly explain the observed wide variation in actual debt ratios, since firms would be forced into long excursions away from their optimal ratios.

- **Debt and Taxes**

- The theory assuming an equilibrium of aggregate supply and demand for corporate debt, in which personal income taxes paid by the marginal investor in corporate debt just offset the corporate tax saving
- Trouble is that the assumption that all firms face approximately the same marginal tax rate can immediately be rejected.

- **Costs of financial distress**

Costs of financial distress include the legal and administrative costs of bankruptcy, as well as the subtler agency, moral hazard, monitoring and contracting costs which can erode firm value even if formal default is avoided. We know these costs exist, although we may debate their magnitude. For example, there is no satisfactory explanation of debt covenants unless agency costs and moral hazard problems are recognized.

Pecking Order Theory

- Preference of internal financing.
- **Interaction between financing behavior and investment behavior**
They adapt their target dividend payout ratios to their investment opportunities, although dividends are sticky and target payout ratios are only gradually adjusted to shifts in the extent of valuable investment opportunities.
- Sticky dividend policies, plus unpredictable fluctuations in profitability and investment opportunities, mean that internally-generated cash flow may be more or less than investment outlays. If it is less, the firm first draws down its cash balance or marketable securities portfolio.
- **If external finance is required, firms issue the safest security first**
That is, they start with debt, then possibly hybrid securities such as convertible bonds, then perhaps equity as a last resort. In this story, there is no well-defined target debt-equity mix, because there are two kinds of equity, internal and external, one at the top of the pecking order and one at the bottom. Each firm's observed debt ratio reflects its cumulative requirements for external finance.

Pecking Order Theory

- **External financing with asymmetric information**
- **The cost of relying on external financing**
We usually think of the cost of external finance as administrative and underwriting costs, and in some cases underpricing of the new securities. Asymmetric information creates the possibility of a different sort of cost: the possibility that the firm will choose *not* to issue, and will therefore pass up a positive-NPV investment. This cost is avoided if the firm can retain enough internally-generated cash to cover its positive-NPV opportunities.
- **The advantages of debt over equity issues**
If the firm does seek external funds, it is better off issuing debt than equity securities. The general rule is, “Issue safe securities before risky ones.”
- If you know the firm will issue equity only when it is overpriced, and debt otherwise, you will refuse to buy equity unless the firm has already exhausted its “debt capacity”—that is, unless the firm has issued so much debt already that it would face substantial additional costs in issuing more. Thus investors would effectively force the firm to follow a pecking order.

What we know?

1. Internal vs. external equity

Aggregate investment outlays are predominantly financed by debt issues and internally-generated funds. New stock issues play a relatively small part

2. Timing of security issues

Firms apparently try to “time” stock issues when security prices are “high.” Given that they seek external finance, they are more likely to issue stock (rather than debt) after stock prices have risen than after they have fallen.

3. Borrowing against intangibles vs growth opportunities

Firms holding valuable intangible assets or growth opportunities tend to borrow less than firms holding mostly tangible assets.

4. Exchange offers

That stock prices rise, on average, when a firm offers to exchange debt for equity, and fall when they offer to exchange equity for debt

5. Issue or repurchase of shares

On average, stock price falls when firms announce a stock issue. Stock prices rise, on average, when a stock repurchase is announced.

6. Existence of target ratios

Some evidence that firms adjust towards a target debt-to-value ratio. However, a model based solely on this partial adjustment process would have a very low R^2 . Apparently the static tradeoff model captures only a small part of actual behavior.

7. Risk

Risky firms tend to borrow less, other things equal. For example, significant negative relationships between unlevered betas and the level of borrowing. However, the evidence on risk and debt policy is not extensive enough to be totally convincing.

8. Taxes

No study clearly demonstrating that a firm's tax status has predictable, material effects on its debt policy. I think the wait for such a study will be protracted.

Conclusion

- The “modified pecking order” story is grossly oversimplified and underqualified, yet it is generally consistent with the empirical evidence.
- Firms have good reasons to avoid having to finance real investment by issuing common stock or other risky securities. They do not want to run the risk of falling into the dilemma of either passing by positive-NPV projects or issuing stock at a price they think is too low.
- Firms set target dividend payout ratios so that normal rates of equity investment can be met by internal funds.
- The firm may also plan to cover part of normal investment outlays with new borrowing, but it tries to restrain itself enough to keep the debt safe—that is, reasonably close to default-risk free.
- It restrains itself for two reasons: first, to avoid any material costs of financial distress; and second, to maintain financial slack in the form of reserve borrowing power. “Reserve borrowing power” means that it can issue safe debt if it needs to.
- Since target dividend payout ratios are sticky, and investment opportunities fluctuate relative to internal cash flow, the firm will from time to time exhaust its ability to issue safe debt. When this happens, the firm turns to less risky securities first—for example, risky debt or convertibles before common stock.



Thank You

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