



UNIVERSITY OF CALGARY
HASKAYNE SCHOOL OF BUSINESS

Corporate Finance

Capital Structure (empirical)

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Capital Structure Theories

- Financial distress
- Trade-off theory
- Pecking-order theory
- Signaling models
- Agency costs
- Neutral mutation
- Life cycle

Empirical evidence

Practitioners' perspectives

Chapter 17 of the textbook

Capital Structure Theories

Capital structure theories are rational economic models that provide guidance regarding how a firm should choose and adjust its capital structure with the aim of enhancing/maximizing its value.

Static trade-off theory (MM with corporate taxes + cost of financial distress)

- Increase debt until the cost of financial distress starts increasing WACC.

Pecking order theory (i.e. minimize transactions costs and the cost of asymmetric information)

- Exhaust internal sources of capital, then raise new debt, and lastly new equity if needed.

Signaling theory (i.e. management attempt to overcome the suspicions of investors)

- Capital structure changes are used by management to convey credible information to the market.

Agency costs

- Debt helps discipline management and reduces **agency costs**.

Neutral mutation

- Management relies on “heuristic, rule-of-thumb, intuitive kind of decision making” **Miller (1977)**.

Firm's life cycle

- Drivers of capital structure are influenced at once by the firm's life cycle stage.

Cost of financial distress

4/22

Financial distress

- As an outcome of doing business, a firm has contractual obligations towards its debtholders, its lenders, its employees, its suppliers, the tax authorities, etc. (altogether its '[creditors](#)').
- A breach of such obligations arising from an inability or unwillingness to comply, often triggered by a lack of funds or untoward circumstances, has serious consequences (e.g. [bankruptcy](#)).
- A complete breach, a partial breach, or a likely breach of contractual obligations is indicative of financial distress, putting in jeopardy the survival of the firm.

Direct costs of financial distress (bankruptcy under the form of a reorganization or a liquidation)

- Receiver (trustee in bankruptcy), lawyers, financial consultants (monitors), etc.

Indirect costs of financial distress

- Disruption to business as clients, sources of capital, suppliers and employees desert the firm (often the most valuable ones leaving first), leading to loss of market share, damaged reputation, higher costs, etc. All these are working toward a much lower firm valuation.
- Agency costs under financial distress
 - ▶ Extreme behavior and counterproductive decisions by management are more likely to happen under financial duress (i.e. the 'nothing to loose' psychology).

Anticipating and mitigating the cost of financial distress

5/22

Debtholders and lenders can reduce the probability of financial distress and mitigate their ensuing costs by having the debtor agree to various conditions (which if any breached triggers a default).

- Negative covenants (restrictive)
 - ▶ Limit to indebtedness (e.g. maximum debt to equity ratio)
 - ▶ Limit to payouts to shareholders (e.g. dividends)
 - ▶ No pledging of assets, etc.
- Positive covenants (affirmative)
 - ▶ Maintain minimum interest coverage ratio
 - ▶ Maintain minimum working capital
 - ▶ Maintain minimum credit rating, etc.
- Collateral and reporting
- Staggered debt maturities (avoid all or most debt to have to be rolled-over at the same time)
- Cross default provisions
 - ▶ Any other debt in default triggers a default, depriving the debtor to strategically default.

Management views all of these as a reduction in financial flexibility.

Expected cost of default

From the perspective of a debtholder or a lender, the expected cost of default is a function of the likelihood of default and the magnitude of the loss if a default actually occurs.

- Expressed as a percentage of the credit exposure:

$$\text{Expected Cost of Default} = \text{Probability of Default} \times \text{Loss given Default}$$

The probability of default ('PD') as well as the loss given default ('LGD') are both a positive function of the debt-to-equity ratio (i.e. the higher the debt given the equity, the higher the PD and the LGD).

- As debt to equity increases, fixed debt-related charges increase, therefore increasing the likelihood that cash flows might be insufficient to satisfy all fixed charges (i.e. resulting in a default).
- As debt to equity increases, the protection afforded by equity to debt (i.e. losses arising from a liquidation or a reorganization have to be absorbed by equity first) is decreasing in relative terms.

Therefore, the expected cost of default is likely to be a power function of the debt-to-equity ratio.

Since debtholders and lenders are able to estimate the expected cost of default, they will adjust the required interest rate accordingly (i.e. if they bear more risk, they will ask for more return).

- The expected cost of default is therefore paid-for in advance by shareholders.

Expected cost of default (example)

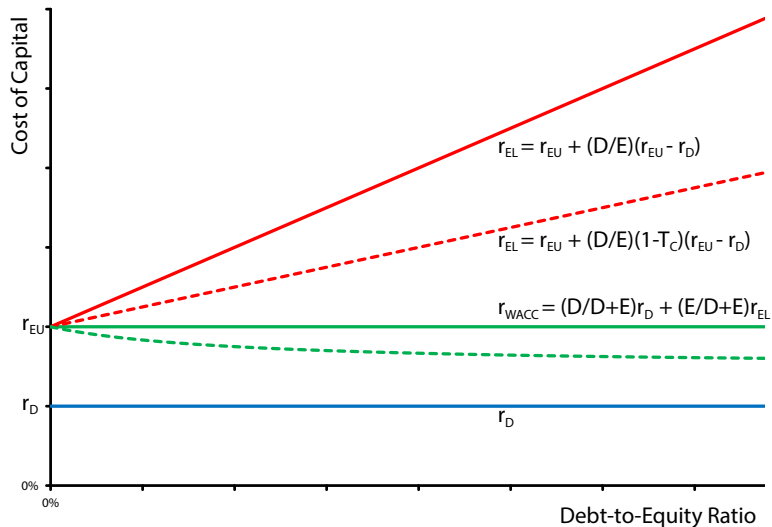
The firm has a total market value of 3,000, of which 60% is lost in case of default.

- As illustrated below, as the debt-to-equity ratio increases, debt increases and equity decreases.
- Upon default, debt is losing nothing if equity is worth more than the cost of default (since such costs are borne by equity first), but once equity is depleted, such costs are fully borne by debt.
- If the default probability is a linear function of the debt-to-equity ratio, the expected cost of default for debt is kind of exponential once equity is depleted.

Debt-to-Equity Ratio	Value of Debt	Value of Equity	Cost of Default	Loss for Equity	% of Equity Lost	Loss for Debt	% of Debt Lost	Default probability	Exp. cost of default
0.00	0	3,000	1,800	1,800	60%	0	0%	0%	0.0%
0.25	600	2,400	1,800	1,800	75%	0	0%	1%	0.0%
0.50	1,000	2,000	1,800	1,800	90%	0	0%	3%	0.0%
0.75	1,286	1,714	1,800	1,714	100%	86	7%	4%	0.3%
1.00	1,500	1,500	1,800	1,500	100%	300	20%	5%	1.0%
1.25	1,667	1,333	1,800	1,333	100%	467	28%	6%	1.8%
1.50	1,800	1,200	1,800	1,200	100%	600	33%	8%	2.5%
1.75	1,909	1,091	1,800	1,091	100%	709	37%	9%	3.3%
2.00	2,000	1,000	1,800	1,000	100%	800	40%	10%	4.0%

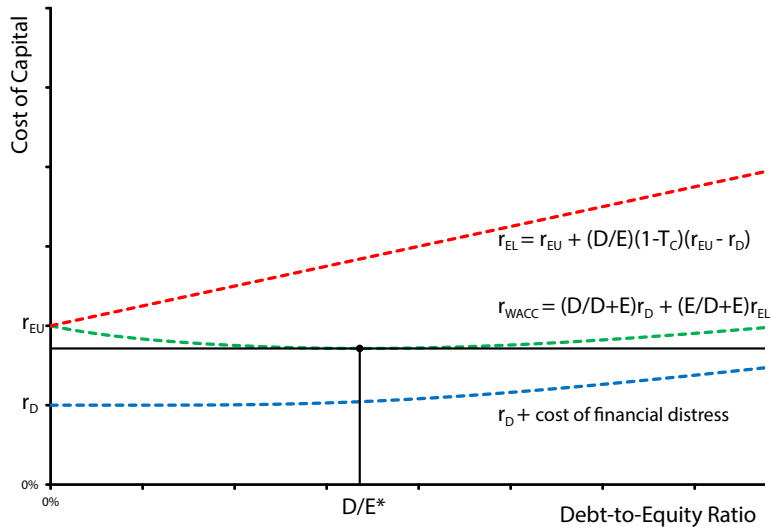
MM with taxes + cost of financial distress

8/22



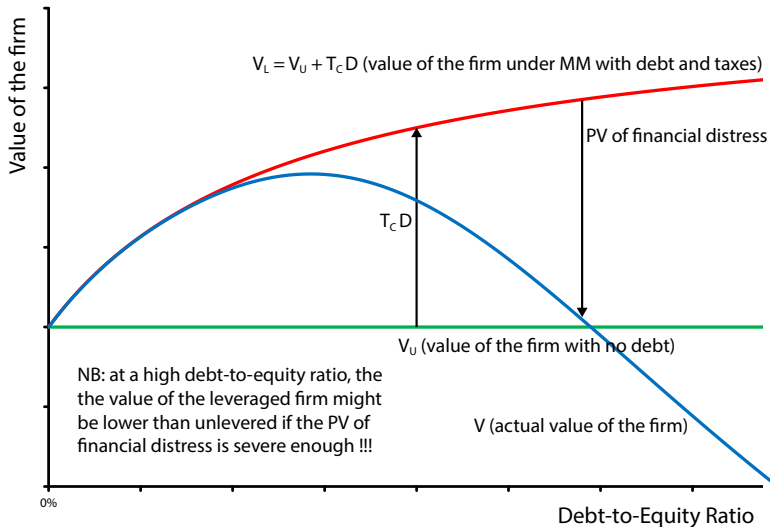
MM with taxes + cost of financial distress

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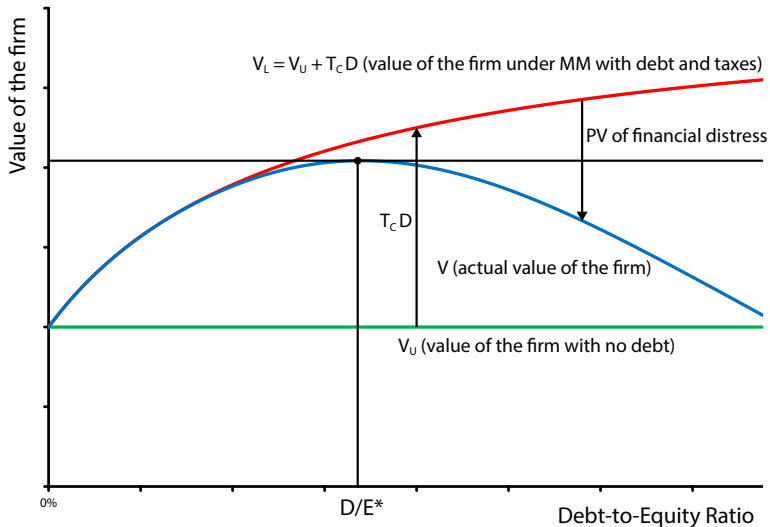
Firm value with taxes + cost of financial distress

9/22



Firm value with taxes + cost of financial distress

9/22



Pecking-order theory

Management is assumed to know more than outside investors (i.e. a case of asymmetric information).

- Management is unlikely to issue equity if it is undervalued (would entail a transfer of wealth from current to new shareholders, and management is a current shareholder).
- Therefore, a decision by management to issue equity is perceived by investors as a signal that the stock price is overvalued, making such new equity not attractive for investors.
- Management chooses to exhaust 'internal capital' first, then issue debt, and issue equity last (as opposed to issuing equity first which could lead to a drop in share price).
- Profitable firms therefore use less debt, since 'internal capital' is plentiful.
- Firms like to accumulate cash or other forms of financial flexibility, as sources of readily available 'internal capital'.

Empirical testing of the pecking-order theory is inconclusive.

The theory is at odds with the existence of an optimal capital structure.

Nevertheless, survey evidence indicates that some firms follow a pecking-order approach.

Signaling models

Management is assumed to know more than outside investors and to shamelessly convey “optimistic news” to investors, who in turn discount the truthfulness of such information from management.

- As the distrust of investors depresses the firm value, management has an incentive to use credible signals, especially with regard to the firm's financial prospects and the NPV of its projects.
- To be credible, a signal has to be costly to the sender (e.g. the CFA designation in finance).

Assuming the firm is pursuing an optimal capital structure (e.g. marginal tax benefit of debt equals the marginal distress cost of debt), shareholders interpret changes to debt-to-equity ratios as informative.

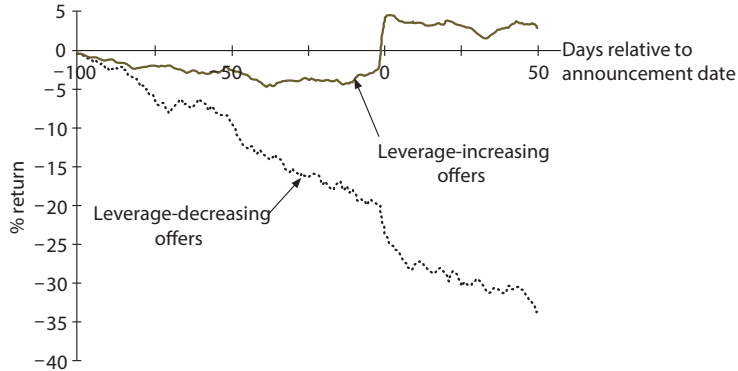
- An increase in debt might signal better prospects for the firm (i.e. increased ability to support debt) and lead to an increase in share price, and vice versa.
- As long as the falsification of the signal by management is deemed costly enough to management, shareholders are likely to perceive the signal as credible. Increasing debt is increasing the likelihood of financial distress and bankruptcy which are quite costly to management.

Some empirical evidence supports the signaling models (see next slide).

The theory supports the existence of an optimal capital structure.

Signaling models

12/22



Exchange offers change the debt–equity ratios of firms. The graph shows that stock prices increase for firms whose exchange offers increase leverage. Conversely, stock prices decrease for firms whose offers decrease leverage. Source: K. Shah (JFE 1994),

Agency costs

The 'agency cost of equity' arise as shareholders (principal) need to delegate firm management to executives (agent). It is not uncommon to notice executives making decisions to benefit themselves rather than shareholders (e.g. 'empire building', perks like private jets and club memberships).

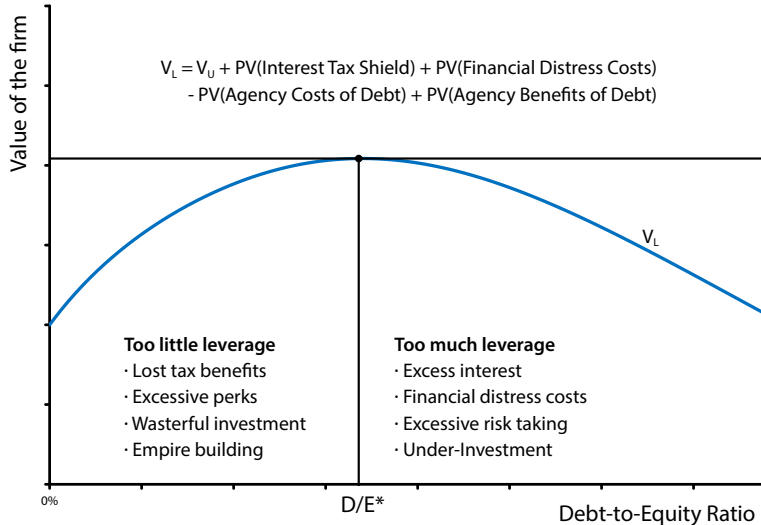
Free cash flow hypothesis

- Debt discipline management by creating fixed obligations while reducing the free cash flows that could be wasted by management on perks or expenses with no positive impact on firm's value.
- Suggest that firms subject to agency costs of equity should have both debt and equity.

Little is said about which proportion of debt versus equity is optimal.

However, the cost reduction of equity agency costs from using debt can be added to a static trade-off model as the second benefit of debt while recognizing that debt might also have its own agency costs (e.g. lost financial flexibility arising from too restrictive covenants).

Agency costs once included in a trade-off model



Management relies on “heuristic, rule-of-thumb, intuitive kind of decision making” Miller (1977).

- Management uses some rule-of-thumb which, from management's perspective, has previously proven successful when making capital structure decisions.
- The usage of a given rule-of-thumb might persist indefinitely as long as no harm is done.
- One rule-of-thumb is to have a capital structure 'in-line' with industry peers. If most firms in an industry abide by this rule, the average capital structure is unlikely to change for that industry.
- As a consequence of an unforeseen negative consequence, the rule-of-thumb might be modified or even replaced in a trial and error manner.

Little is said about which proportion of debt versus equity is optimal.

Firm's life cycle influencing all drivers at once (Damodaran, 2015) 16/22

	Start-up	Rapid expansion	High growth	Mature	Decline
Tax benefits	Zero (if losing money)	Low (as earnings are small)	Increasing (in line with earnings)	High	High (but declining)
Bankruptcy cost	Very high (firm has no or negative earnings)	Very high (earnings are small and volatile)	High (earnings are increasing but still volatile)	Declining (as earnings are more stable)	Low (but increasing as existing projects end)
Need for flexibility	Very high (as firm looks for ways to establish itself)	High (expansion needs are large and unpredictable)	High (expansion remains unpredictable)	Low (lower and more predictable investment needs)	Nonexistent (firm has no new investment needs)
Agency costs	Very high (as firm has almost no assets)	High (new investments are difficult to monitor)	High (lots of new investments and unstable risk)	Declining (assets in place become a larger portion of firm)	Low (firm takes few new investments)
Discipline of debt	Low (as owners run the firm)	Low (even if public, firm is closely held)	Increasing (as managers own less of the firm)	High (managers are separated from owners)	Declining (firm takes few new investments)
Net trade-off	Costs exceed benefits (minimal or no debt)	Costs still likely to exceed benefits (minimal or no debt)	Debt starts yielding net benefits (debt is increasing)	Debt becomes more attractive (high debt ratio)	Debt provides benefits (high debt ratio)

Mixed empirical evidence regarding capital structure

17/22

Empirical evidence indicates that capital structure matters

- Debt ratios are negatively correlated with volatility of earnings, Bradley & al. (JOF 1984)
- Firms' stock price responds to changes in leverage, Smith (JFE 1986)
- Investors react negatively to changes in capital structure that dilute shareholders, Asquith and Mullins (JFE 1986)
- Changes in firm value track changes in capital structure, Cheung and Ng (JOF 1992)
- However, no consistent findings about what is driving capital structure

Most healthy firms have a low debt-to-equity ratio.

Many firms have very little debt, some large firms hoard a lot of cash.

Capital structure differs by industry, but within the same industry firms have a similar capital structure.

Many firms seem to target a pre-defined range of debt-to-equity ratio.

- Over the years, the debt-to-equity ratio might change somewhat, but within a given range.

Practitioners' perspective

“What factors affect how you choose the appropriate amount of debt for your firm (0 not important to 4 very important)”

Rank	Factor	Mean score
1	Financial Flexibility (we restrict debt so we have enough internal funds available to pursue new projects when they come along)	2.59
2	Our credit rating (as assigned by rating agencies)	2.46
3	Volatility of our earnings and cash flow	2.32
4	The tax advantage of interest deductibility	2.07
5	Transactions costs and fees of issuing debt	1.95
6	Debt levels of other firms in our industry	1.49
7	The potential costs of bankruptcy, near bankruptcy, or financial distress	1.24

Source: Graham and Harvey (JFE 2001)

Chapter 17 of the textbook

19/22

Textbook sections covered

- 17.1 to 17.7, 17.10 and 17.11

Worked examples

- Two worked examples are provided in chapter 17 of the textbook.

Exercises

- 10 exercises are provided in chapter 17 of the textbook.
- You should practice your Excel skills with a few of those.
- Suggest 17.4, 17.7 and 17.8
- Hints
 - ▶ 17.4: 750,000
 - ▶ 17.7: a) 2,600 vs. 2,450; b) 100 vs. 150; d) +100
 - ▶ 17.8: a) 85; b) 27.7%; c) 12.8%

17.4 Solution

20/22

Debt	5,000,000
V_u	14,500,000
Shares	300,000
Stock price	35
Tax rate	35%
V_I	16,250,000
$V=B+S$	15,500,000
Fin distress	750,000

17.7 Solution

21/22

State	Probability	Low vol project	High vol project	Low vol less debt of 2,500	High vol
Bad	0.5	2,500	2,100	0	0
Good	0.5	2,700	2,800	200	300
Value of firm		2,600	2,450		
Value of equity				100	150

Stockholders prefer the high-volatility project since it maximizes the expected value of the company's equity.

17.8 Solution

22/22

Scenario	Probability	Cash Flow	Debt Face value	Debt Mrk value	Debt Payoff	Return
Boom	60%	\$210	\$120	\$94	\$120	27.7%
Recession	40%	\$85	\$120	\$94	\$85	-9.6%
Weighed				\$94	\$106	12.8%