

Corporate Finance

Leverage and Capital Structure

Chapter 13

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The Capital Structure Question

- This is the percentage of debt and equity used to fund the firm's assets.
 - Leverage is the amount of debt a firm uses to finance assets.
- Capital restructuring is defined as changing the amount of leverage without changing the firm's assets.
 - Increase leverage by issuing debt and repurchasing outstanding shares.
 - Decrease leverage by issuing new shares and retiring outstanding debt.

The Effect of Financial Leverage

- When we increase the amount of debt financing, we increase the fixed-interest expense.
- If we have a really good year, we pay our fixed costs and we have more left over for our shareholders.
- If we have a really bad year, we still have to pay our fixed costs and we have less left over for our shareholders.
- Leverage amplifies the variation in both EPS and ROE.

The Effect of Financial Leverage Cont'd

Example (EPS and ROE: Eagles Air Services)

We will ignore the effect of taxes at this stage. What happens to EPS and ROE when we issue debt and buy back shares?

	CURRENT	PROPOSED
Assets	\$8000000	\$8000000
Debt	\$ 0	\$4000000
Equity	\$8000000	\$4000000
Debt–equity ratio	0	1
Share price	\$ 20	\$ 20
Shares outstanding	400000	200000
Interest rate	10%	10%

The Effect of Financial Leverage Cont'd

Example (EPS and ROE: Eagles Air Services)

Capital structure scenarios for Eagles Air Services:

Current Capital Structure: No Debt			
	RECESSION	EXPECTED	EXPANSION
EBIT	\$500,000	\$1,000,000	\$1,500,000
Interest	<u>0</u>	<u>0</u>	<u>0</u>
Profit for the year	\$500,000	\$1,000,000	\$1,500,000
ROE	6.25%	12.50%	18.75%
EPS	\$ 1.25	\$ 2.50	\$ 3.75

Proposal Capital Structure: Debt = \$4 million			
	RECESSION	EXPECTED	EXPANSION
EBIT	\$500,000	\$1,000,000	\$1,500,000
Interest	<u>400,000</u>	<u>400,000</u>	<u>400,000</u>
Profit for the year	\$100,000	\$600,000	\$1,100,000
ROE	2.50%	15.00%	27.50%
EPS	\$ 0.50	\$ 3.00	\$ 5.50

The Effect of Financial Leverage Cont'd

- Variability in ROE:
 - Current: ROE ranges from 6.25% to 18.75%;
 - Proposed: ROE ranges from 2.50% to 27.50%.
- Variability in EPS:
 - Current: EPS ranges from \$1.25 to \$3.75;
 - Proposed: EPS ranges from \$0.50 to \$5.50.
- The variability in both ROE and EPS increases when financial leverage is increased.

Break-even EBIT

- Find EBIT where EPS is the same under both the current and proposed capital structures.
- If we expect EBIT to be greater than the break-even point, then leverage is beneficial to our shareholders.
- If we expect EBIT to be less than the break-even point, then leverage is detrimental to our shareholders.

Example (EPS and ROE: Eagles Air Services Cont'd)

$$EPS_{\text{Before}} = \frac{EBIT}{\text{Number of Shares}_{\text{Before}}}$$

$$EPS_{\text{After}} = \frac{EBIT}{\text{Number of Shares}_{\text{After}}}$$

$$EBIT_{\text{Breakeven}} = EPS_{\text{After}} \times (\text{Number of Shares}_{\text{Before}})$$

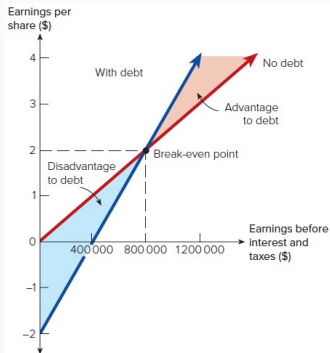
$$\frac{EBIT}{400,000} = \frac{EBIT - 400,000}{200,000}$$

Break-even EBIT Cont'd

Example (EPS and ROE: Eagles Air Services Cont'd)

$$EBIT = \frac{400,000}{200,000} (EBIT - 400,000) = 800,000$$

$$EPS = \frac{800,000}{400,000} = \$2$$



Corporate Borrowing and Home-made Leverage

- The effect of leverage depends on EBIT.
 - When EBIT is higher, leverage is beneficial.
- Under the *expected* scenario, leverage increases ROE and EPS.
- Shareholders are exposed to more risk with more leverage.
 - ROE and EPS are more sensitive to changes in EBIT.
- Capital structure is an important consideration, owing to the impact of financial leverage.
- *Home-made Leverage* is the use of personal borrowing to change the overall amount of financial leverage to which the individual is exposed.

Corporate Borrowing and Home-made Leverage Cont'd

Example (Proposed Capital Structure versus Original Capital Structure with Home-made Leverage)

TABLE 13.3a Proposed capital structure versus original capital structure with homemade leverage

Proposed Capital Structure			
	RECESSION	EXPECTED	EXPANSION
EBIT	\$0.50	\$3.00	\$5.50
Earnings for 100 shares	50.00	300.00	550.00
Net cost = 100 shares at \$20 = \$2000			

TABLE 13.3a Proposed capital structure versus original capital structure with homemade leverage

Proposed Capital Structure			
	RECESSION	EXPECTED	EXPANSION
EBIT	\$0.50	\$3.00	\$5.50
Earnings for 100 shares	50.00	300.00	550.00
Net cost = 100 shares at \$20 = \$2000			

Corporate Borrowing and Home-made Leverage Cont'd

- Any stockholder who prefers leverage can create their own home-made leverage and replicate the payoffs.
- Eagle Air Services capital structure is irrelevant to shareholders.

$$\text{Leverage Ratio} = \frac{\text{Debt}}{\text{Equity} + \text{Debt}}$$

- Number of shares to be sold is equal to number of shares held times leverage ratio.

Capital Structure Theory

- Suppose that there are no taxes or costs of financial distress. Then the Modigliani-Miller Propositions say the following:
 - **M-M Proposition I (The Pie Model):** The value of the firm is independent of the percentage of debt or equity in its capital structure.
 - **M-M Proposition II (WACC):** The cost of equity capital is increasing in the percentage of debt in the capital structure. In fact,

$$R_E = R_A + \frac{D}{E}(R_A - R_D),$$

where R_A is the cost of capital if the firm were financed entirely with equity.

- The value of the firm is determined by the cash flows to the firm and the risk of the firm's assets.

Capital Structure Theory Cont'd

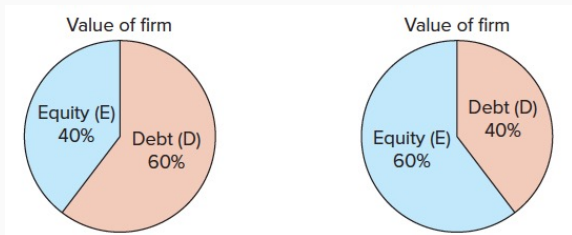


Figure 1: Two Pie Models of Capital Structure

Capital Structure Theory Cont'd

- The change in the capital structure weights (E/V and D/V) is exactly offset by the change in the cost of equity (R_E), so the WACC stays the same.

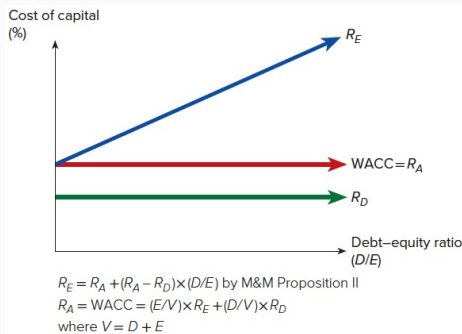


Figure 2: The cost of equity and the WACC: M-M Propositions I and II with no Taxes

Business Risk and Financial Risk

- Business Risk: The equity risk that comes from the nature of the firm's operating activities.
- Financial Risk: The equity risk that comes from the financial policy (i.e., capital structure) of the firm.
- The systematic risk of the share depends on:
 - Systematic risk of the assets, β_A (Business Risk);
 - Level of leverage, D/E (financial risk).

Corporate Taxes and Capital Structure

- Interest on debt is tax deductible.
- When a firm adds debt, it reduces taxes, all else being equal.
- The reduction in taxes increases the cash flow of the firm.
- The reduction in taxes reduces net income.

	FIRM U	FIRM L
EBIT	\$1000	\$1000
Interest	<u>0</u>	<u>80</u>
Profit before tax	\$1000	920
Taxes (30%)	<u>300</u>	<u>276</u>
Profit for the year	<u>\$ 700</u>	<u>\$ 644</u>

Interest Tax Shield

- The tax saving attained by a firm from the tax deductibility of interest expense.

CASH FLOW FROM ASSETS	FIRM U	FIRM L
EBIT	\$1000	\$1000
-Taxes	<u>300</u>	<u>276</u>
Total	\$ 700	\$ 724

CASH FLOW	FIRM U	FIRM L
To shareholders	\$700	\$644
To debtholders	<u>0</u>	<u>80</u>
Total	\$700	\$724

Taxes and M-M Proposition I

- The value of the levered firm equals the value of the un-levered firm plus the present value of the interest tax shield, where

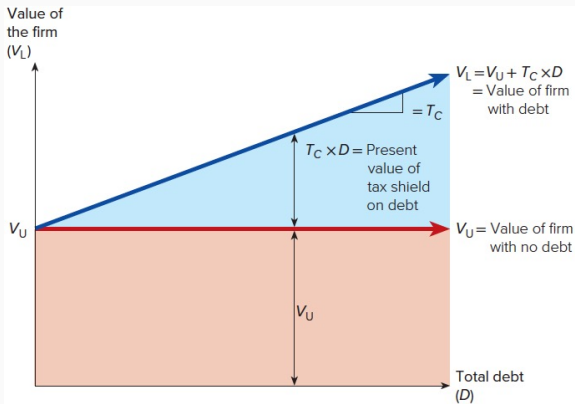
$$PV \text{ of Interest Tax Shield} = \frac{T_C \times D \times R_D}{R_D} = T_C \times D$$

- M-M Proposition I with taxes therefore states that

$$V_L = V_U + T_C D$$

- The value of the firm increases by the present value of the annual interest tax shield.

Taxes and M-M Proposition I Cont'd



The value of the firm increases as total debt increases because of the interest tax shield. This is the basis of M&M Proposition I with taxes.

Capital Structure and Dividend Imputation

- Dividend imputation is a tax policy used in several countries that eliminates the double taxation of cash payouts from a corporation to its shareholders.
- There are a number of differences between an M-M I no-tax situation and a dividend imputation system.
 - Time difference;
 - The rebate of company tax is only for resident shareholders and tax paid on resident company profits.

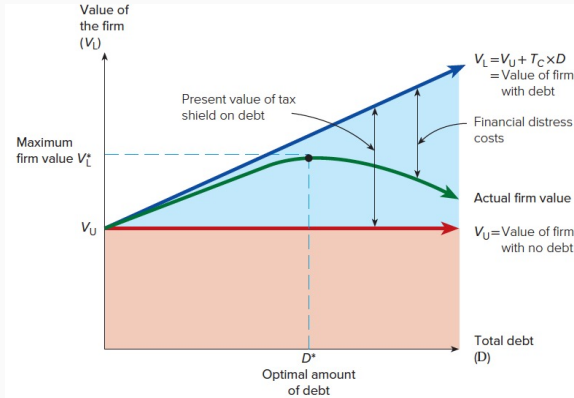
Bankruptcy Costs

- Direct Bankruptcy Costs: The costs that are directly associated with liquidation, such as legal and administrative expenses.
- Indirect Bankruptcy Costs: The costs of avoiding a liquidation process incurred by a financially distressed firm.
- Financial Distress Costs: The direct and indirect costs associated with going into liquidation or experiencing financial distress.

Optimal Capital Structure

- Static Theory of Capital Structure
 - The theory that a firm borrows up to the point where the tax benefit from an extra dollar in debt is exactly equal to the cost that comes from the increased probability of financial distress.
- An increase in D/E ratio leads to an increase in the probability of liquidation;
- An increase in the probability of liquidation leads to an increase in the expected liquidation costs.
 - At some point, the additional value of the interest tax shield will be offset by the expected liquidation costs.
 - At this point, the value of the firm will start to decrease and the WACC will start to increase as more debt is added.

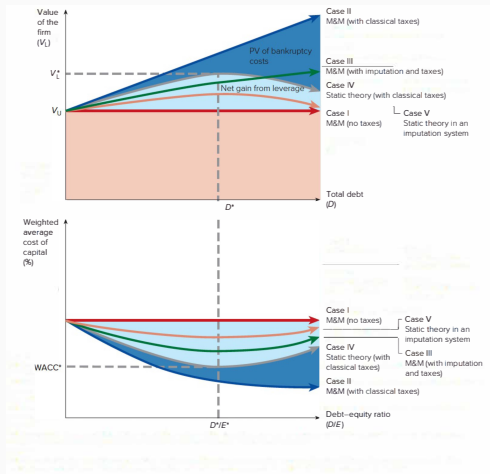
Optimal Capital Structure Cont'd



Optimal Capital Structure Cont'd

- **Case I:** No taxes or bankruptcy costs.
 - No optimal capital structure.
- **Case II:** Corporate taxes but no bankruptcy costs.
 - Optimal capital structure consists of 100% debt.
 - Each additional dollar of debt increases the cash flow of the firm.
- **Case III:** Corporate taxes and bankruptcy costs.
 - Optimal capital structure is part debt and part equity.
 - Occurs where the benefit from an additional dollar of debt is just offset by the increase in expected bankruptcy costs

Optimal Capital Structure Cont'd



- Liquidation is a legal proceeding for liquidating or reorganising a business.
 1. Business failure: business has terminated with a loss to creditors.
 2. Legal bankruptcy: petition federal court for bankruptcy.
 3. Technical insolvency: firm is unable to meet debt obligations.
 4. Accounting insolvency: book value of equity is negative.

Liquidation and Reorganisation

- Reorganisation
 - Financial restructuring of a failing firm to attempt to continue operations as a going concern.
- Absolute Priority Rule (APR)
 - The rule establishing priority of claims in liquidation
- When a firm defaults on an obligation, it can avoid an administration.
- The legal process of liquidation can be lengthy and expensive.