

Corporate Finance

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Session 3 – 09.12.2014

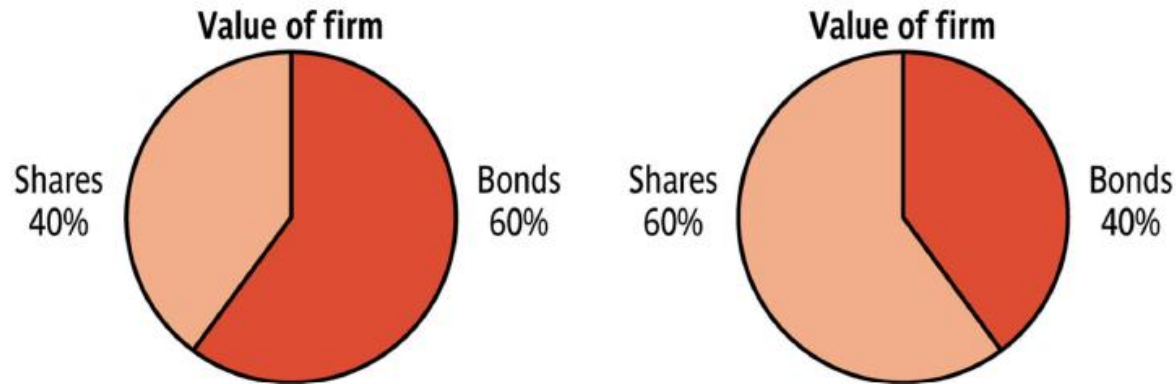
Capital Structure

Weighted Average Cost of Capital

Dividend policy

- Understand the effect of financial leverage (i.e. capital structure) on firms earnings.
- Critically discuss capital structure theories with and without taxes (MM Proposition I and II)
- Compute the value of the unlevered and levered firm
- Understand the effect of corporate taxes on capital structure

Capital Structure and the Pie



The value of a firm is defined to be the sum of the value of the firm's **debt** and the firm's **equity**.

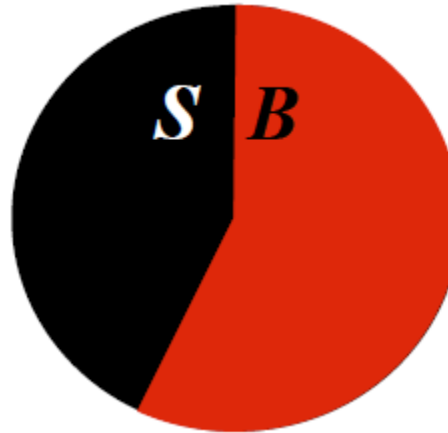
$$V = B + S$$

Stockholder Interests

There are **two** important questions?

1. Why should the **stockholders** care about **maximizing firm value**?
Perhaps they should be interested in strategies that maximize shareholder value.
2. What is the ratio of **debt-to-equity** that **maximizes** the shareholder's value?

Maximizing Firm value vs. Maximizing Shareholder Interests



If the goal of the firm's management is to make the firm as valuable as possible, then the firm should pick up the **debt-equity ratio** that makes the pie as **big as possible**.

Maximizing Firm Value vs. Shareholder Interests

Changes in capital structure benefit the shareholders **if and only if** the **value of the firm increases**

Managers should choose the capital structure that they believe will have the **highest firm value** because this capital structure will be **most beneficial** to the firm's shareholders.

Financial Leverage and Firm Value: An example

	Current	Proposed
Assets	€8,000	€8,000
Debt	€0	€4,000
Equity (market and book)	€8,000	€4,000
Interest rate	10%	10%
Market value/share	€20	€20
Shares outstanding	400	200

The **current** capital structure is **all equity**

The **proposed** capital structure **has leverage**

Current Capital Structure

NO DEBT

	Current
Assets	€8,000
Debt	€0
Equity (market and book)	€8,000
Interest rate	10%
Market value/share	€20
Shares outstanding	400

	Recession	Expected	Expansion
Return on assets (ROA)	5%	15%	25%
Earnings	€400	€1,200	€2,000
Return on equity (ROE) = Earnings/Equity	5%	15%	25%
Earnings per share (EPS)	€1.00	€3.00	€5.00

Proposed Capital Structure

Debt = 4,000

	Proposed
Assets	€8,000
Debt	€4,000
Equity (market and book)	€4,000
Interest rate	10%
Market value/share	€20
Shares outstanding	200

	Recession	Expected	Expansion
Return on assets (ROA)	5%	15%	25%
Earnings before interest (EBI)	€400	€1,200	€2,000
Interest	<u>-400</u>	<u>-400</u>	<u>-400</u>
Earnings after interest	€0	€800	€1,600
Return on equity (ROE)			
= Earnings after interest/Equity	0	20%	40%
Earnings per share (EPS)	0	€4.00	€8.00

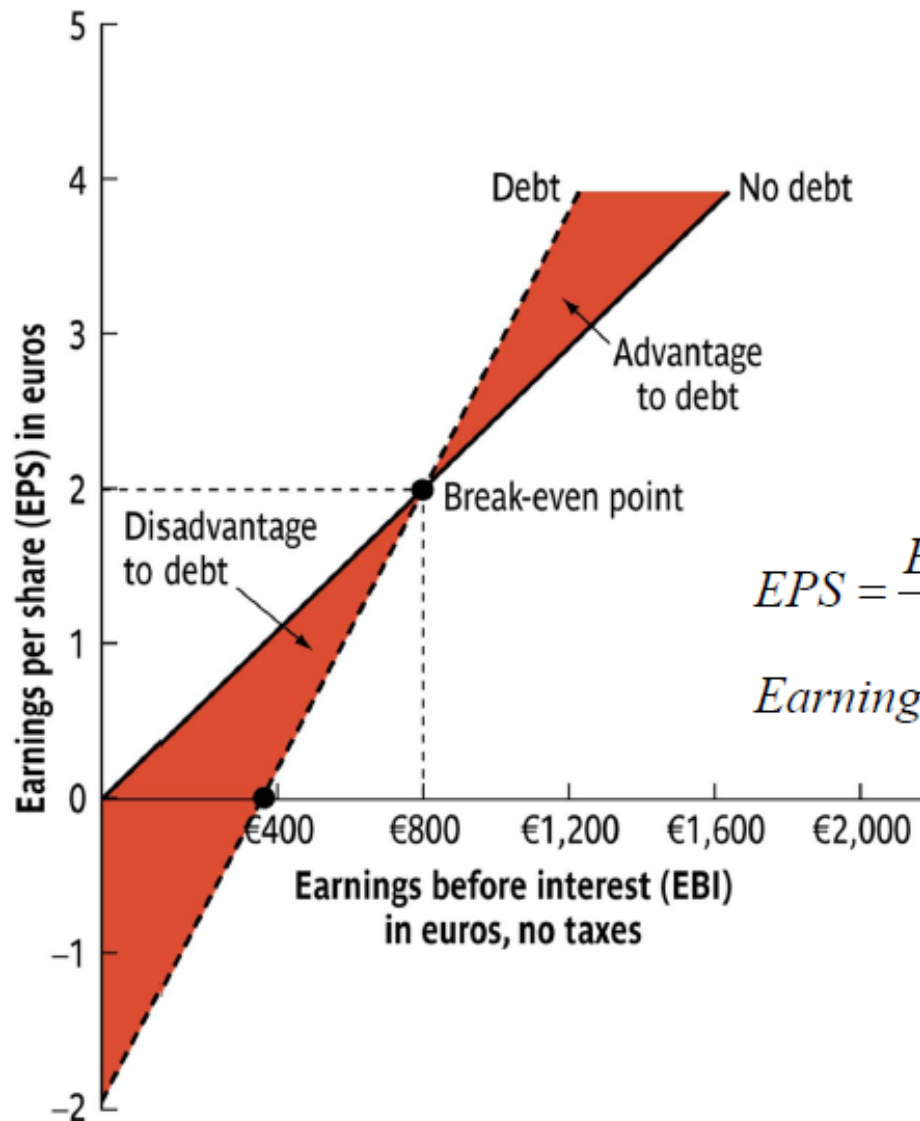
Current Capital Structure: No Debt

	Recession	Expected	Expansion
Return on assets (ROA)	5%	15%	25%
Earnings	€400	€1,200	€2,000
Return on equity (ROE) = Earnings/Equity	5%	15%	25%
Earnings per share (EPS)	€1.00	€3.00	€5.00

Proposed Capital Structure: Debt = 4,000

	Recession	Expected	Expansion
Return on assets (ROA)	5%	15%	25%
Earnings before interest (EBI)	€400	€1,200	€2,000
Interest	<u>-400</u>	<u>-400</u>	<u>-400</u>
Earnings after interest	€0	€800	€1,600
Return on equity (ROE)			
= Earnings after interest/Equity	0	20%	40%
Earnings per share (EPS)	0	€4.00	€8.00

The effect of **Financial Leverage** depends on the company's **earnings before interests**



$$EPS = \frac{EBI - I}{N} = \frac{EBI - 0}{400} = \frac{EBI - €400}{200}$$

$$Earnings = €800$$

The effect of Financial Leverage

The effect of financial leverage depends upon EBIT

- When EBIT is high, financial leverage raised ROE and EPS

The variability of ROE and EPS is increasing with financial leverage

- Higher financial leverage magnifies the effect of changes in EBIT on ROE and EPS. Using more debt makes ROE and EPS more risky

Homemade Leverage

Homemade Leverage: the use of **personal borrowing/lending** to change the overall amount of **financial leverage** to which the individual is exposed.

Example:

Suppose the firm **did not change** its capital structure.

Investors can replicate the returns from the proposed capital structure by **borrowing on their own**.

Suppose a shareholder **wants to invest 2,000** in the firm, and **prefers** the **proposed** capital structure **rather** than the **current** capital structure

If the proposed capital structure is not adopted, he/she **buys 100 shares** with his/her own money, and additional **100 shares by borrowing 2,000** at **10% interest**

He/she **replicates** the returns from the proposed capital structure while the cost of the **investment is the same**

The choice between debt and Equity

	Recession	Expected	Expansion
Strategy A: Buy 100 shares of levered equity			
EPS of <i>levered</i> equity	€0	€4	€8
Earnings per 100 shares	0	400	800
Initial cost = 100 shares @ €20/share = €2,000			
Strategy B: Homemade leverage			
Earnings per 200 shares in current <i>unlevered</i> firm	€1 × 200 = 200	€3 × 200 = 600	€5 × 200 = 1,000
Interest at 10% on €2,000	<u>- 200</u>	<u>- 200</u>	<u>- 200</u>
Net earnings	€0	€400	€800
Initial cost = Cost of equity – Amount borrowed = 200 shares @ €20/share – €2,000 = €2,000			

The firm neither **helps** nor **hurts** its stockholders by restructuring

Homemade Leverage (cont.)

Suppose that investors can **borrow** or **lend** at the same rate as the corporation.

Then investors can always use **homemade leverage** to “undo” in their own portfolios any change in a firm’s capital structure choice.

So, they can achieve the **same cash flows** that they would have accomplished **without the firm’s leverage change**.

Therefore, **investors are indifferent** to changes in the **firm’s capital structure** and **share prices** should be the **same** regardless of the **firm’s capital structure**.

Modigliani and Miller (MM) Proposition I (No Taxes)

The value of the levered firm is the same as the value of the unlevered firm

Because stockholders' welfare is directly related to the firm's value, the changes in capital structure cannot affect the stockholders' welfare



MM Proposition I: Key Assumptions

- Individuals can borrow as cheaply as corporations. Is this realistic?
- No taxes
- No transaction Costs

MM Proposition II (No Taxes)

Proposition II

Leverage **increases** the **risk** and **return** to stockholders

$$R_S = R_0 + (B/S_L) \times (R_0 - R_B)$$

R_S is the return on (levered) equity (cost of equity)

R_0 is the return on (unlevered) equity (cost of capital)

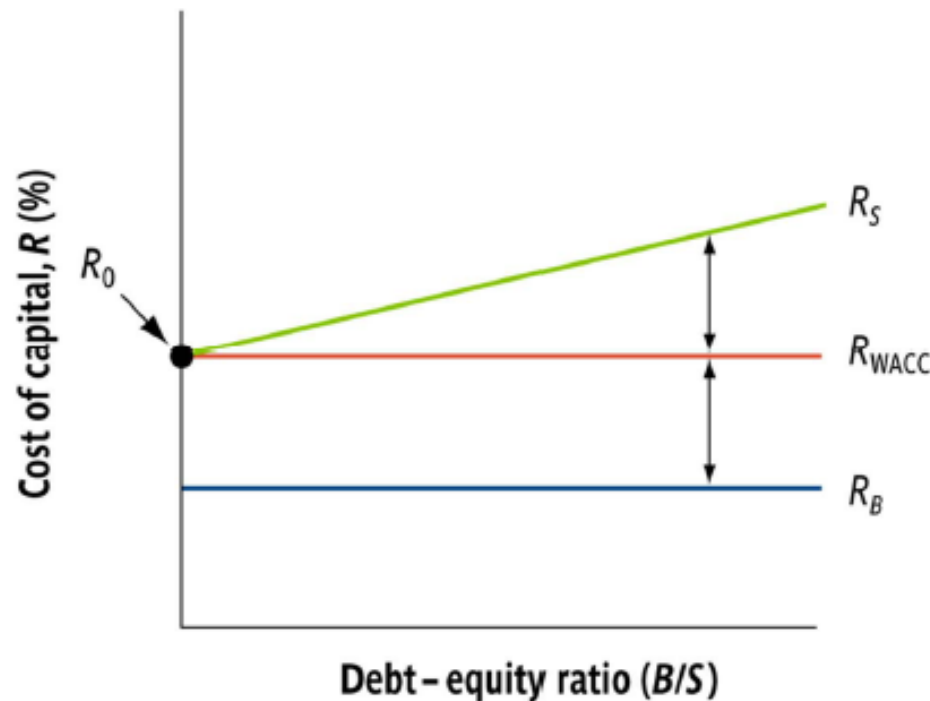
B is the value of debt

S_L is the value of levered equity

R_B is the interest rate (cost of debt)

Because levered equity has **greater risk**, it should have a **greater expected return** as compensation.

MM Proposition II (No Taxes)



$$R_S = R_0 + (R_0 - R_B)B/S$$

R_S is the cost of equity.

R_B is the cost of debt.

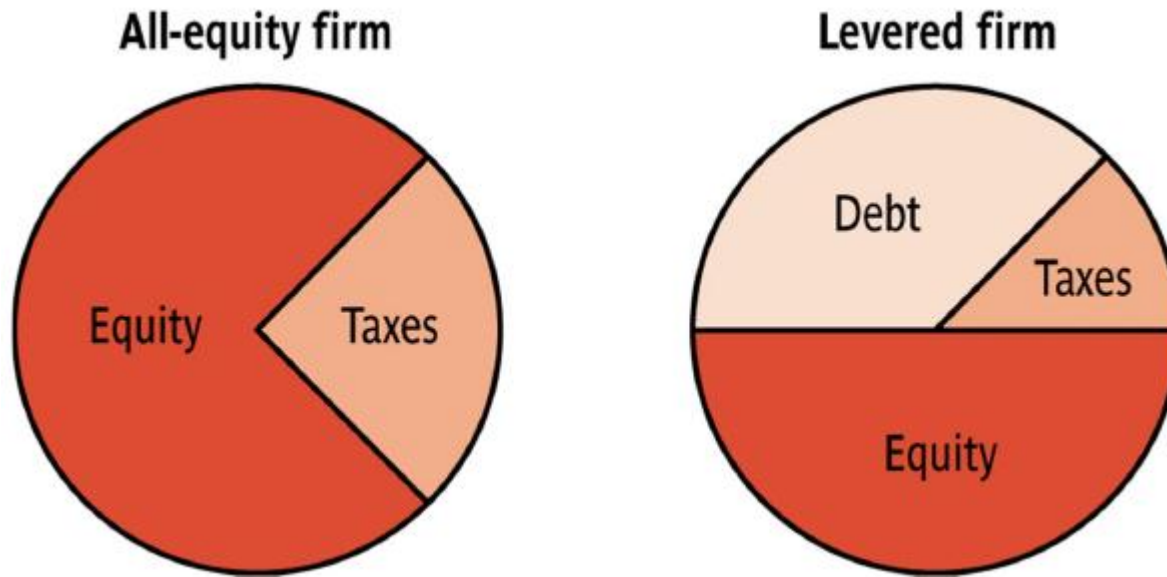
R_0 is the cost of capital for an all-equity firm.

R_{WACC} is a firm's weighted average cost of capital. In a world with no taxes, R_{WACC} for a levered firm is equal to R_0 .

R_0 is a single point whereas R_S , R_B and R_{WACC} are all entire lines.

The cost of equity capital, R_S , is positively related to the firm's debt-equity ratio. The firm's weighted average cost of capital, R_{WACC} , is invariant to the firm's debt-equity ratio.

Corporate Taxes



The levered firm **pays less in taxes** than does the all-equity firm.

Thus the sum of the **debt plus the equity** of the **levered** firm is **greater** than the **equity of the unlevered firm**

Taxes and Cash Flow

Example

ABC Company has a corporate tax rate, τ_C , of 35% and expected earnings before interest and taxes (EBIT) of £1 million each year. Its entire earnings after taxes are paid out as dividends

The firm is considering **two alternative capital structures**.

Under Plan I, ABC would have **no debt** in its capital structure

Under Plan II, the company would have **£4 million of debt**, B. The cost of debt, R_B is 10%.

What is the total cash flow to shareholders and bondholders under each scenario?

Taxes and Cash Flow

Example

	Plan I (€)	Plan II (€)
Earnings before interest and corporate taxes (EBIT)	1,000,000	1,000,000
Interest ($R_B B$)	<u>0</u>	<u>400,000</u>
Earnings before taxes (EBT) = $(EBIT - R_B B)$	1,000,000	600,000
Taxes ($t_C = 0.35$)	<u>350,000</u>	<u>210,000</u>
Earnings after corporate taxes (EAT) = $[(EBIT - R_B B) \times (1 - t_C)]$	650,000	390,000
Total cash flow to both shareholders and bondholders $[EBIT \times (1 - t_C) + t_C R_B B]$	<u><u>650,000</u></u>	<u><u>790,000</u></u>

Present Value of the Tax Shield

$$\text{Interest} = \underbrace{R_B}_{\text{Interest rate}} \times \underbrace{R}_{\text{Amount borrowed}}$$

Reduction in Corporate Taxes

$$\underbrace{t_C}_{\text{Corporate tax rate}} \times \underbrace{R_B \times B}_{\text{interest paid}}$$

Assuming Cash Flows are Perpetual, Present Value of Tax Shields

$$\frac{t_C R_B B}{R_B} = t_C B$$

MM Proposition I with Corporate Taxes

The value of an unlevered firm

$$V_U = \frac{\text{EBIT} \times (1 - t_C)}{R_0}$$

MM Proposition I with Corporate Taxes

$$V_L = \frac{\text{EBIT} \times (1 - t_C)}{R_0} + \frac{t_C R_B B}{R_B} = V_U + t_C B$$

MM Proposition I with Corporate Taxes

Example

ABC Airlines is currently an unlevered firm. The company expects to generate £153.85 in earnings before interest and taxes (EBIT) in perpetuity. The corporate tax rate is 35%, implying after tax earnings of £100. All earnings after tax paid out as dividends

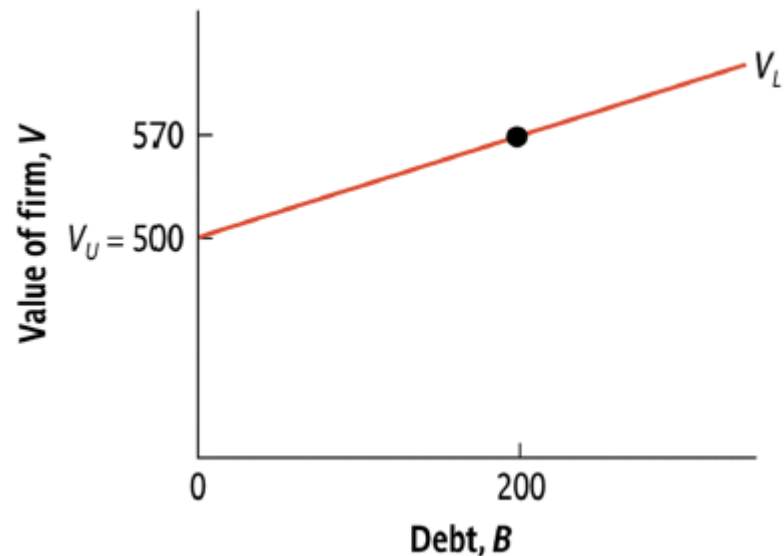
The firm is considering a capital restructuring to allow £200 of debt. Its cost of debt capital is 10%. Unlevered firms in the same industry have a cost of equity capital of 20%.

What will the new value of ABC Airlines be?

MM Proposition I with Corporate Taxes

Example

$$\begin{aligned} V_L &= \frac{\text{EBIT} \times (1 - t_c)}{R_0} + t_c B \\ &= \frac{\text{€}100}{.20} + (.35 \times \text{€}200) \\ &= \text{€}500 + \text{€}70 = \text{€}570 \end{aligned}$$

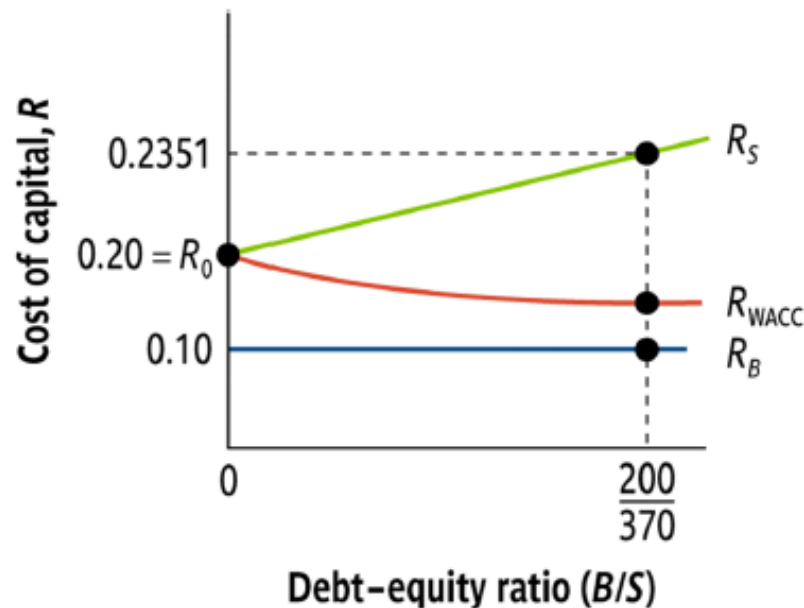


MM Proposition I with Corporate Taxes

Example

MM Proposition II (Corporate Taxes)

$$R_S = R_0 + \frac{B}{S} \times (1 - t_C) \times (R_0 - R_B)$$



- Leverage adds risk to the firm's equity.
 - As compensation, the cost of equity rises with the firm's risk.
- Debt is tax-advantaged relative to equity, so R_{WACC} declines with leverage

WACC and Corporate Taxes

$$R_{WACC} = \frac{S}{V_L} R_S + \frac{B}{V_L} R_B (1 - t_C)$$

$$R_{WACC} = \left(\frac{370}{570} \times 0.2351 \right) + \left(\frac{200}{570} \times 10\% \times 65\% \right) = 17.54\%$$

So reduced its R_{WACC} from .20 (with no debt) to .1754 with reliance on debt.

When a firm lowers its R_{WACC} , the firm's value will increase.

$$V_L = \frac{EBIT \times (1 - t_C)}{R_{WACC}} = \frac{100}{0.1754} = 570$$

MM Propositions with Taxes

Summary

Assumptions

- Corporations are taxed at the rate t_C , on earnings after interest
- No transaction costs
- Individuals and corporations borrow at same rate

Proposition I

- $V_L = V_U + t_C B$ (for a firm with perpetual debt)
- Because corporations can deduct interest payments, corporate leverage lowers tax payments

MM Propositions with Taxes

Summary (Cont.)

Proposition II

$$R_S = R_0 + \frac{B}{S}(1 - t_C)(R_0 - R_B)$$

- The cost of equity rises with leverage because the risk to equity rises with leverage
- Value is positively related to leverage.

Recap

Understanding the effect of financial leverage (i.e. capital structure) on firms earnings

Critically discuss capital structure theories with and without taxes (MM Proposition I and II)

Be able to compute the value if the unlevered and levered firm

Understand the effect of corporate taxes on capital structure

Define the costs associated with bankruptcy

Understand the theories that address the level of debt a firm carries

- Trade-off
- Signaling
- Agency Cost
- Pecking Order

Critically discuss real world factors that effect the debt to equity ratio

The Weighted Average Cost of Capital

Review: Modigliani and Miller (MM) Proposition I Assumptions

Individuals and corporations borrow at same rate

No tax (for MM Proposition without tax)

No transaction costs

No costs of financial distress

Description of Financial Distress Costs

Direct Costs

Legal and Administrative Costs

Indirect Costs

Impaired ability to conduct business (e.g., lost sales)

Agency costs

Incentive to take large risks

Incentive toward underinvestment

Milking the property

Can costs of debt be reduced?

Protective covenants

Incorporated as part of the loan document (or indenture) between stockholders and bondholders

A negative covenant limits or prohibits actions that the company may take

A positive covenant specifies an action that the company agrees to take or a condition the company must bear by

Debt consolidation

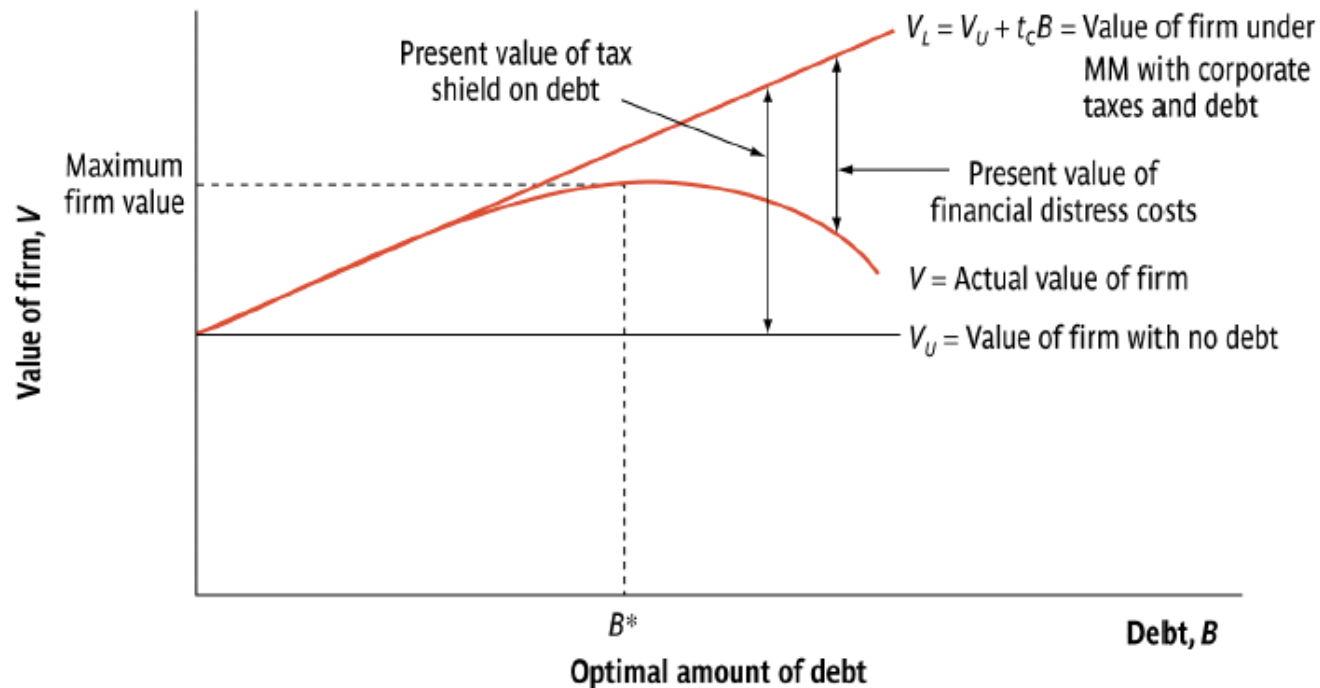
If we minimize the number of parties, contracting costs fall.

Protective covenants Example

Positive	Negative
Maintain working capital at a minimum level	Limitations on the amount of dividends a company may pay
Provide periodic financial statements to the lender	Cannot pledge any of its assets to other lenders
	Cannot merge with another firm
	Cannot sell or lease major assets without approval by the lender
	Cannot issue additional long-term debt

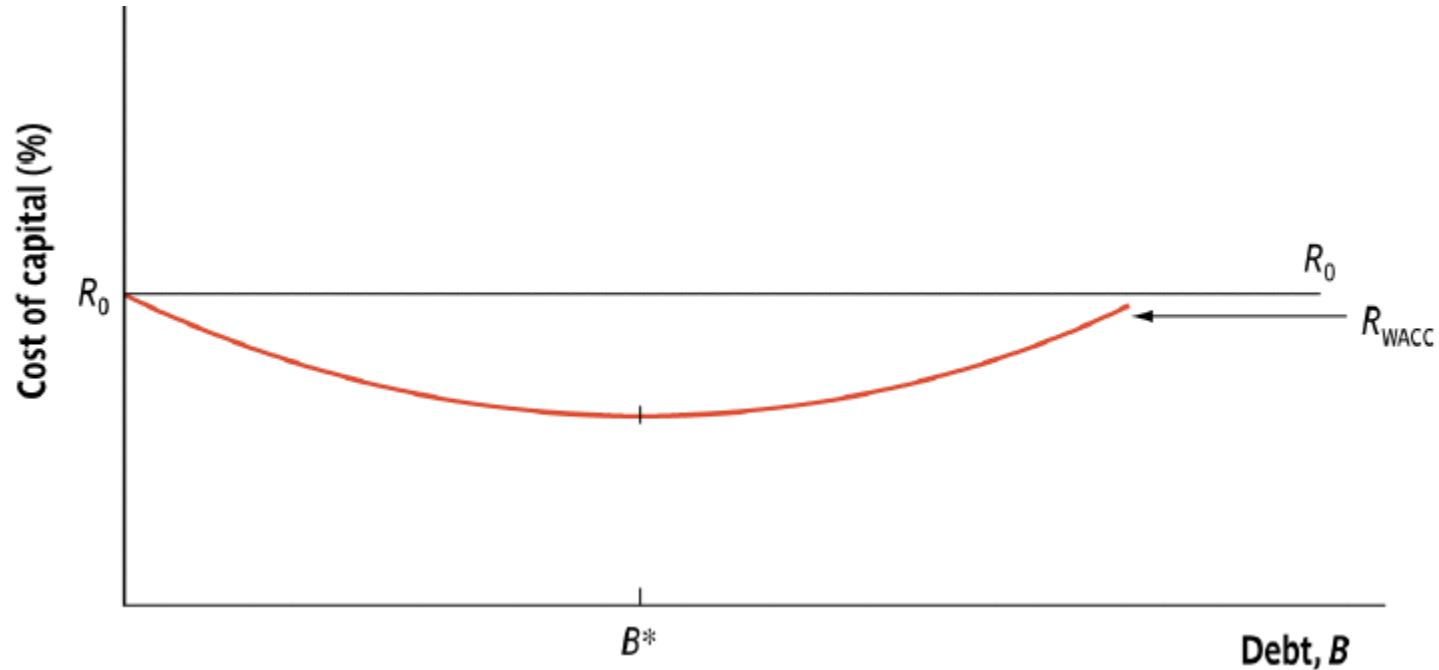
Tax effects and Financial Distress

There is a trade-off between the tax advantage of debt and the costs of financial distress



The tax shield increases the value of the levered firm.
Financial distress costs lower the value of the levered firm
Two offsetting factors produce an optimal amount of debt at B^*

Integration of Tax Effects and Financial Distress Costs

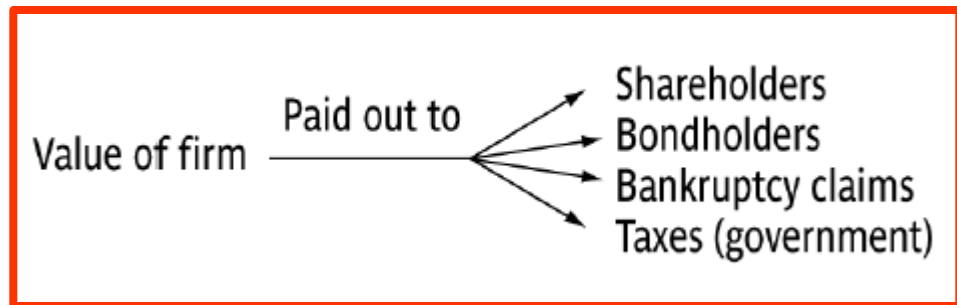
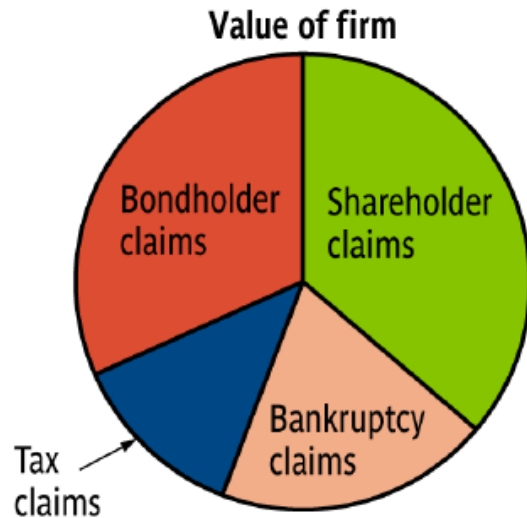


R_{WACC} falls initially because of the tax advantage of debt

Beyond point B^* , it begins to rise because of financial distress costs

Bankruptcy costs increase faster than the tax shield beyond B^* , implying a reduction in firm value further leverage.

The Pie Model Revisited



Taxes and bankruptcy costs can be viewed as just another claim on the cash flows of the firm.

The essence of the M&M is that the value of firm depends on the cash flow of the firm; capital structure just slices the pie.

Signalling

The firm's capital structure is optimized where the **marginal subsidy to debt equals the marginal cost**.

Investor's view debt as a **signal of firm value**

Firms with **low** anticipated profits will take on a **low** level of debt

Firms with **high** anticipated profits will take on a **high** level of debt

A manager that takes on **more debt** than is **optimal** in order to fool investors will pay the cost in the long run.

The Pecking-Order Theory

The theory provides the following two rules for the real world

Rule 1

Use internal financing first

Rule 2

Issue debt next, new equity last

The **Pecking-order theory** is at odds the **trade-off theory**:

- There is **no** target D/E ratio

- Profitable firms use **less** debt

- Companies **like** financial slack

How Firms establish Capital Structure

Most non-financial corporations have **low** debt-asset ratios

There are **differences** in capital structure **across industries**

A number of firms **use no debt**

Most corporations **employ** target debt-equity ratios

Factors in Target D/E ratio

Taxes

Since interest is tax deductible, highly profitable firms should use more debt (i.e., greater tax benefit)

Types of assets

The costs of financial distress depend on the types of assets the firm has.

Uncertainty of Operating Income

Even without debt, firms with uncertain operating income have a high probability of experiencing financial distress

What managers consider important in deciding on how much debt to carry...

A survey of Chief Financial Officers of large U.S. companies provided the following ranking (from most important to least important) for the factors that they considered important in the financing decisions

Factor	Ranking(0-5)
Maintain financial flexibility	4.55
Ensure long-term survival	4.55
Maintain Predictable Source of Funds	4.05
Maximize Stock Price	3.99
Maintain financial independence	3.88
Maintain high debt rating	3.56
Maintain comparability with peer group	2.47

Preference rankings long-term finance: Results of a Survey

Ranking	Source	Score
1	Retained Earnings	5.61
2	Straight Debt	4.88
3	Convertible Debt	3.02
4	External Common Equity	2.42
5	Straight Preferred Stock	2.22
6	Convertible Preferred	1.72

Levered and Unlevered Beta

In a perfect world... we would estimate the beta of a firm by doing the following:

- 1) Start with the **beta of the business** that the firm is in
- 2) Adjust the business beta for the **operating leverage** of the firm to arrive at the **unlevered beta for the firm**.
- 3) Use the financial leverage of the firm to estimate the equity beta for the firm

$$\text{Levered Beta} = \text{Unlevered Beta} (1 + (1 - \text{tax rate})(\text{Debt}/\text{Equity}))$$

Within any business:

Firms with lower fixed costs (as a percentage of total costs) should have lower unlevered betas.

If you can compute: fixed and variable costs for each firm in a sector, you can break down the unlevered beta into business and operating leverage components.

$$\text{Unlevered Beta} = \text{Pure Business Beta} \times (1 + (\text{Fixed Costs}/\text{Variable Costs}))$$

The biggest problem with doing this is **informational**.

It is difficult to get information on **fixed** and **variable** costs for **individual** firms.

In practice, we tend to assume that the **operating leverage** of firms within a **business are similar** and use the same unlevered beta for every firm.

Adjusting for financial leverage

Conventional approach

If we assume that **debt** carries **no market risk** (has a beta of zero), the **beta of equity** alone can be written as a function of the **unlevered beta** and the **debt-equity ratio**

$$\beta_U = \frac{\beta_L}{\left[1 + (1 - \tau_C) \times \frac{D}{E}\right]}$$

Where:

β_L is the firm's beta with leverage.

β_U is the firm's beta without leverage

τ_C is the corporate tax rate.

D/E is the company's debt/equity ratio.

Metric that compares the risk of an **unlevered company** to the risk of the **market**.

The unlevered beta is the beta of a company without any debt.

Unlevering a beta **removes** the financial effects from leverage.

The formula to calculate a company's unlevered beta is:

Debt Adjusted Approach

If beta carries market risk and you can estimate the beta of debt, you can estimate the levered beta as follows:

$$\beta_L = \beta_U(1 + (1 - \tau_c) D/E) - \beta_{Debt}(1 - \tau_c)(D/E)$$

While the latter is more realistic, estimating betas for debt can be difficult to do.

Evidence on Capital Structure

More profitable firms tend to use less leverage

High-growth firms borrow less than mature firms do

Stock market generally views leverage-increasing events positively

Tax deductibility of interest gives firms an incentive to use debt

Recommended Reading

Debt and Taxes: Evidence from Bank-financed Small and Medium-sized Firms

<http://ssrn.com/abstract=672104> or <http://dx.doi.org/10.2139/ssrn.672104>

Financing of SME's: And Asset Side Story

<http://ssrn.com/abstract=1098347> or <http://dx.doi.org/10.2139/ssrn.1098347>

Taxes and Corporate Debt Policy: Evidence for Unlisted Firms of Sixteen European Countries

<http://ssrn.com/abstract=1098370> or <http://dx.doi.org/10.2139/ssrn.1098370>

The Weighted Average Cost of Capital

- The weighted average cost of capital (WACC or k_0) is the benchmark required rate of return used by a firm to evaluate its investment opportunities
 - The discount rate used to evaluate projects of **similar risk to the firm**
- It takes into account **how** a firm finances its investments
 - How much debt versus equity does the firm employ?
- The WACC depends on...
 - Qualitative factors
 - The market values of the alternative sources of funds
 - The market costs associated with these sources of funds

Estimating the WACC

- The main steps involved in the estimation of the WACC are...
 - Identify the financing components
 - Estimate the current (or market) values of the financing components
 - Estimate the cost of each financing component
 - Estimate the WACC
- We will consider each step for typical financing components

Identify the Financing Components

- Debt
 - Identify all externally supplied debt items
 - Do not include creditors and accruals as these costs are already included in net cash flows
- Ordinary shares
 - Obtain number of issued shares from the balance sheet
 - Do not include reserves and retained earnings
- Preference shares
 - Obtain number of issued shares from the balance sheet

Valuing the Financing Components

- Use market values and **not** book values
- Value coupon paying debt using the following pricing relation (see Lecture 3)

$$P_0 = \frac{C_1}{(1+k_d)} + \frac{C_2}{(1+k_d)^2} + \dots + \frac{C_n}{(1+k_d)^n} + \frac{F_n}{(1+k_d)^n}$$

$$P_0 = \sum_{t=1}^n \frac{C_t}{(1+k_d)^t} + \frac{F_n}{(1+k_d)^n}$$

where P_0 = Market price of the debt security
 C_t = Periodic interest payment on debt in period t
 k_d = Required rate of return on debt

Valuing Long Term Debt

Example: BLD Ltd has 10,000 bonds outstanding and each bond has a face value of \$1,000 with two years remaining to maturity. The bonds pay coupons (or interest) at a rate of 10% p.a. every six months. If the market interest rate appropriate for the bond is 15% p.a., what is the current price of each bond? What is the total market value of debt in BLD Ltd's capital structure?

Valuing Long Term Debt

- Coupon (or interest) payments are made every six months
- Number of payments, $n = 4$, semi-annual payments
- Annual interest payments = $0.10(1000) = \$100.00$
 - So, semi-annual interest payments = $\$50.00$
- Repayment of principal at the end of year 2 = $\$1000.00$
- Required return on debt, $k_d = 15\%$ p.a.
- So, semi-annual required return on debt, $k_d = 7.5\%$

Valuing Long Term Debt

The price of the bond is...

$$P_0 = \frac{50}{(1.075)^1} + \frac{50}{(1.075)^2} + \frac{50}{(1.075)^3} + \frac{1050}{(1.075)^4}$$

$$P_0 = \$916.27$$

- So, total value of debt = $10000(916.27) = \$9,162,700$
- **Note:** As the coupon rate is lower than the market rate, the price is less than the face value, that is, the bond is selling at a **discount** to face value
 - If the coupon rate is greater than the market rate, the price would be at a **premium** to face value

Valuing Ordinary Shares

- **Example:** ABC Ltd has 300,000 shares on issue which each have a par value of \$1.00. If the shares are currently trading at \$3.50 each what is the total market value of ABC's ordinary shares?
- There are 300,000 shares on issue with a market value of \$3.50 per share
- Market value of equity = $300000 \times 3.50 = \$1,050,000$
 - The par (or book) value of shares is **not** relevant here

Valuing Preference Shares

- Preference shares pay a fixed dividend at regular intervals
- If the shares are non-redeemable, then the cash flows represent a perpetuity and the market value can be computed as...
- $P_0 = D_p / k_p$

Where

P_0 = The current market price

D_p = Value of the periodic dividend

k_p = Required return on preference shares

Valuing Preference Shares

- Example: Assume the preference shares of XYZ Ltd pay a dividend of \$0.40 p.a. and the cost of preference shares is 10% p.a. What is the price of the preference shares? If XYZ Ltd has 500,000 preference shares outstanding, what is the market value of these shares?
- The cash flows from the preference shares are...
 - $D_p = \$0.40$ per share
 - So, $P_0 = 0.40/0.10 = \$4.00$
 - Market value of shares = $500000 \times 4.00 = \$2,000,000$

Estimating the Costs of Capital

- The costs of a firm's financing instruments can be obtained as follows...
 - Use observable market rates - may need to be estimated
 - Use effective annual rates
 - For the cost of debt use the market yield
- Focus here is on the costs of debt, ordinary shares and preference shares
 - **Note:** We ignore the complications of flotation costs and franking credits associated with dividends (sections 15.5.3 and 15.5.5 of the text)

Cost of Debt

- **Example:** The bonds of ABD Ltd have a face value of \$1,000 with one year remaining to maturity. The bonds pay coupons at the rate of 10 percent p.a. If the current market price of the bonds is \$1,018.50, what is the firm's cost of debt?
- The annual interest (coupon) paid on the debt is...
 - $1000 \times 0.10 = \$100$
- So, $1018.50 = (1000 + 100)/(1 + k_d)$
- $k_d = (1100/1018.50) - 1 = 8.0\%$

Cost of Ordinary Shares

It is common to use CAPM to estimate the cost of equity capital, where the cost of equity is...

$$k_e = r_f + [E(r_m) - r_f]\beta_e$$

where $E(r_m) - r_f$ = Expected market risk premium

r_f = Risk free rate

β_e = Equity beta

- Note that the equity beta is the estimate of the firm's relative “risk” compared to movements in the market portfolio
 - The market risk premium is typically estimated using historical market data
 - The riskfree rate is typically based on the long term government bond rate

Cost of Ordinary Shares

Example: Assume that the risk free rate is 6 percent, the expected market risk premium is 8 percent and the equity beta of XYZ Ltd's equity is 1.2. What is the firm's cost of equity capital?

Using the CAPM, we have...

$$\begin{aligned} \diamond k_e &= r_f + [E(r_m) - r_f]\beta_e \\ \diamond k_e &= 0.06 + 0.08 \times 1.2 = 15.6\% \end{aligned}$$

Note: Can also use the dividend discount models covered in Lecture 4 (but not commonly used by managers...)

$$\begin{aligned} \diamond P_0 &= D_1 / (k_e - g) \\ \diamond \text{So, } k_e &= D_1 / P_0 + g \end{aligned}$$

Cost of Preference Shares

- Recall that, $P_0 = D_p/k_p$
- Thus, $k_p = D_p/P_0$
- **Example:** The preference shares of DBB Ltd pay a dividend of \$0.50 p.a. If the preference shares are currently selling for \$4.00 per share, what is the cost of these shares to the firm?
- The cost of preference shares is given as...
$$k_p = D_p/P_0$$
$$\text{So, } k_p = 0.50/4.00 = 12.5\%$$

Weighted Average Cost of Capital

The weighted average cost of capital (k_o) uses the cost of each component of the firm's capital structure and weights these according to their relative market values

Assuming that only debt and equity are used, we have...

$$k_o = k_d(D/V) + k_e(E/V)$$

where k_d = Cost of debt

k_e = Cost of equity

D = Market value of debt

E = Market value of equity

$V = D + E$

Weighted Average Cost of Capital

Assuming that preference shares are used as well as debt and equity...

$$k_o = k_d(D/V) + k_e(E/V) + k_p(P/V)$$

where P = Market value of preference shares

k_p = Cost of preference shares

$$V = D + E + P$$

- Be careful of rounding errors in initial calculations
- Be careful to work in consistent terms
 - Calculations in percentages versus decimals
- Check your answers with some common sense logic...

$$\diamond k_e > k_p > k_d > k_d(1 - t_c) \text{ (Why?)}$$

Taxes and the WACC

- Under the classical tax system...
 - Interest on debt is tax deductible
 - Dividends have no tax effect for the firm
- The after-tax cost of debt, $k'_d = (1 - t_c) k_d$
where t_c corporate tax rate
- The cost of equity (k_e) is unaffected
- The after-tax WACC is defined as...

$$k_o = k_d(1 - t_c)(D/V) + k_e(E/V) \quad \text{and}$$
$$k_o = k_d(1 - t_c)(D/V) + k_e(E/V) + k_p(P/V)$$

Calculating and Using the WACC

Example: You are given the following information for BCA Ltd. Note that book values are obtained from the firm's balance sheet while market values are based on market data.

The firm's marginal tax rate is 30%. Estimate the firm's before-tax and after-tax weighted average costs of capital

	Book values	Market values	Market costs
Bonds	\$30,000,000	\$50,000,000	8.0%
Preference shares	\$10,000,000	\$20,000,000	10.0%
Ordinary shares	\$60,000,000	\$80,000,000	14.0%
Total	\$100,000,000	\$150,000,000	

Calculating and Using the WACC

- Before-tax weighted average cost of capital
 - WACC weights are based on market values so book values are not relevant

$$k_o = k_d(D/V) + k_e(E/V) + k_p(P/V)$$
$$V = D + E + P$$

	Market values	Weights	Market costs	Weights×Costs
Bonds	\$50,000,000	0.333	8.0%	2.67%
Preference shares	\$20,000,000	0.133	10.0%	1.33%
Ordinary shares	\$80,000,000	0.533	14.0%	7.47%
Total	\$150,000,000	1.000		11.47%

Note: Weight in bonds, $D/V = 50/150 = 0.333$, and so on

- Before-tax cost of capital = **11.47%**

Calculating and Using the WACC

The after-tax cost of capital requires the after tax **cost of debt**

$$k'_d = k_d (1 - t_c)$$

$$k'_d = 0.08(1 - 0.30) = 5.6\%$$

	Market values	Weights	After tax market costs	Weights×Costs
Bonds	\$50,000,000	0.333	5.6%	1.87%
Preference shares	\$20,000,000	0.133	10.0%	1.33%
Ordinary shares	\$80,000,000	0.533	14.0%	7.47%
Total	\$150,000,000	1.000		10.67%

- **Note:** Weight in bonds, $D/V = 50/150 = 0.333$, and so on
 - After-tax cost of capital = 10.67%

Dividend Policy

Analyze the circumstances when dividend policy is irrelevant

Examine dividend policy in a classical taxation system and an imputation tax system

Summarize the main factors affecting dividend policy

Cash Dividends

Regular cash dividend: cash payments made directly to stockholders,

Extra cash dividend: indication that the “extra” amount may not be repeated in the future

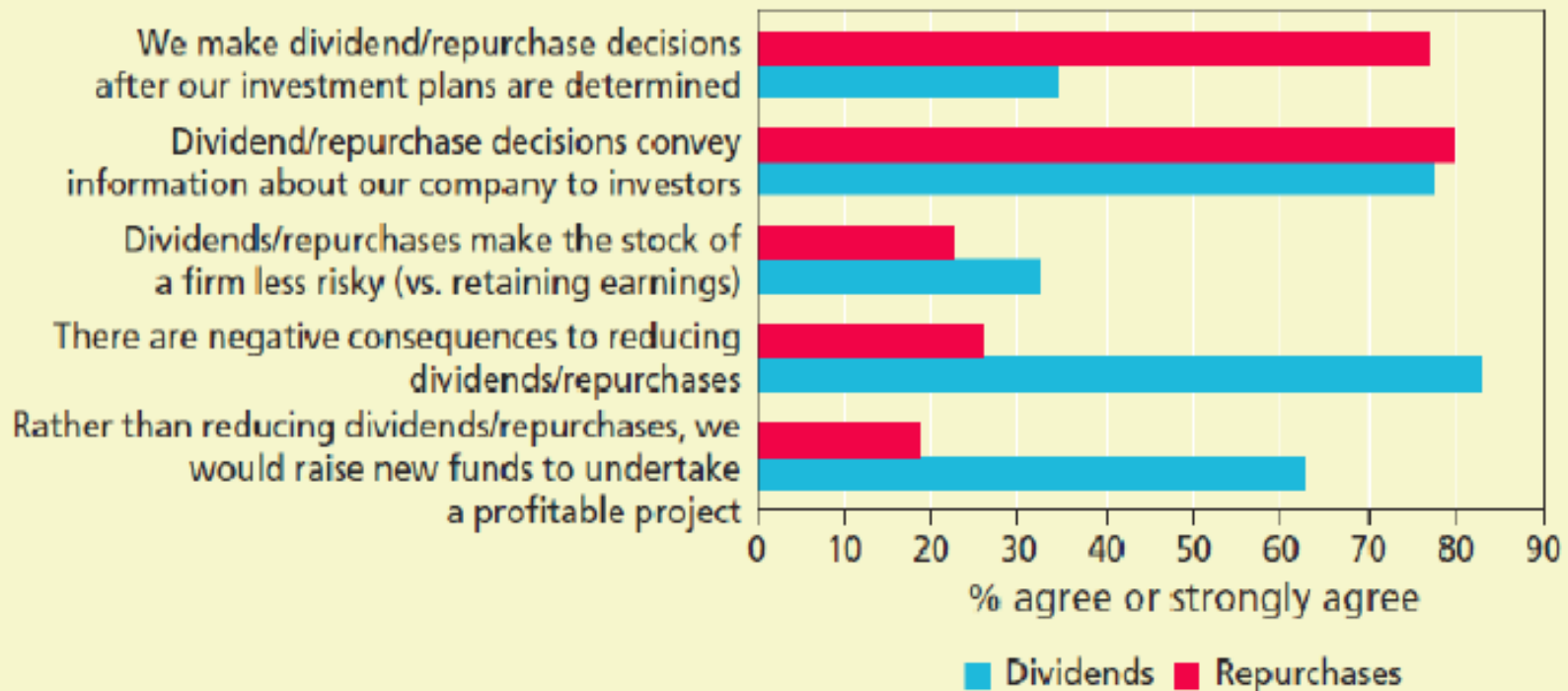
Special cash dividend: similar to extra dividend, but definitely won't be repeated

Liquidating dividend: some or all of the business has been sold

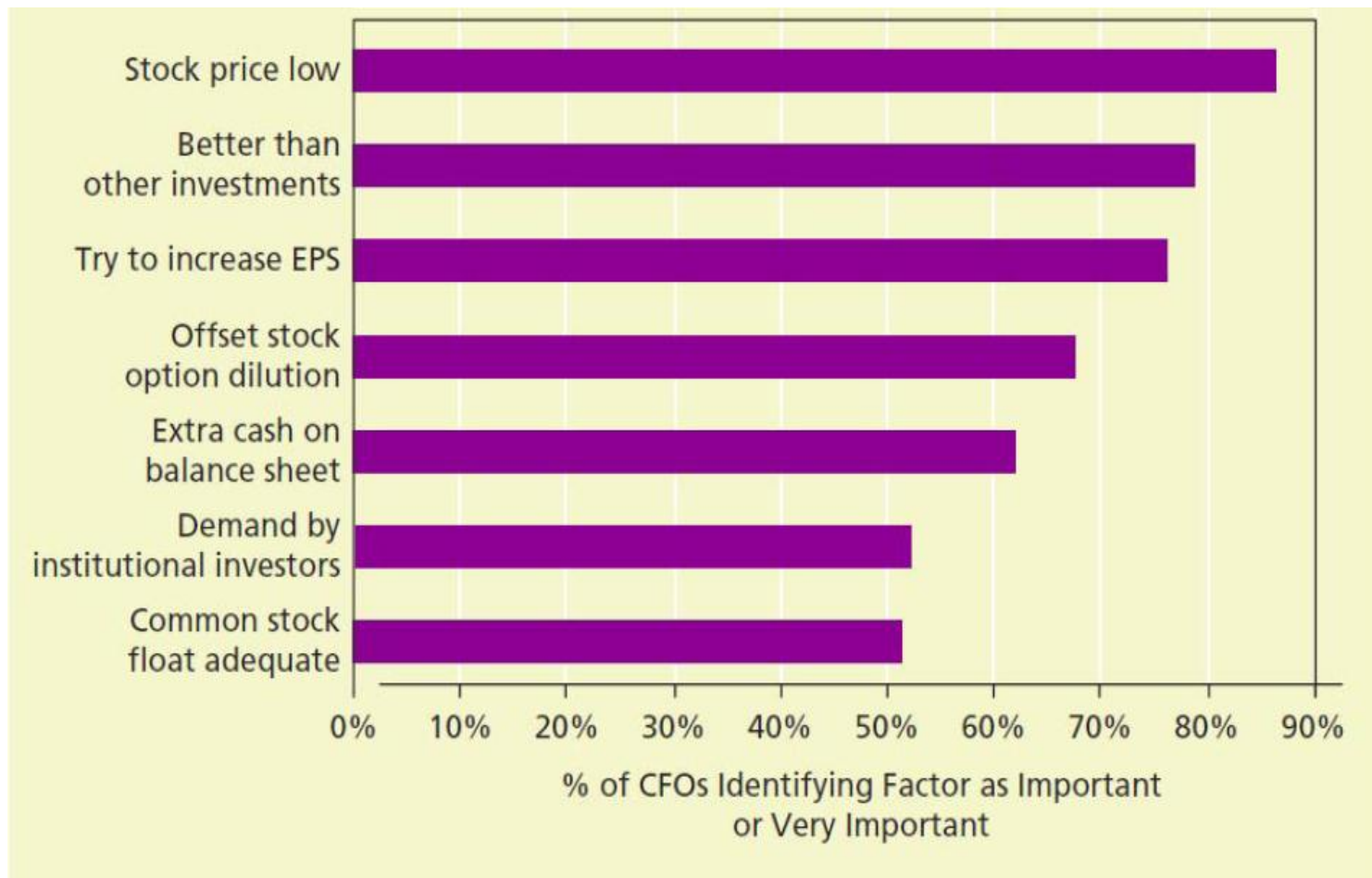
CFOs' views on Dividends and Repurchases

CFOs were asked: "Do these statements agree with your company's views?"

Responses from Dividend Payers and Repurchasers



Important Factors in the decision to repurchase Shares



Institutional Features of Dividends

Dividend declaration (or announcement) date

Ex-dividend date, which is 4 (?) business days before the record date

Record (or books closing) date

The date on which shareholders of record receive the announced dividend
This gives brokers time to notify the share register and ensure that the new shareholders receive the dividend

Payment date

Date dividend is mailed or paid electronically

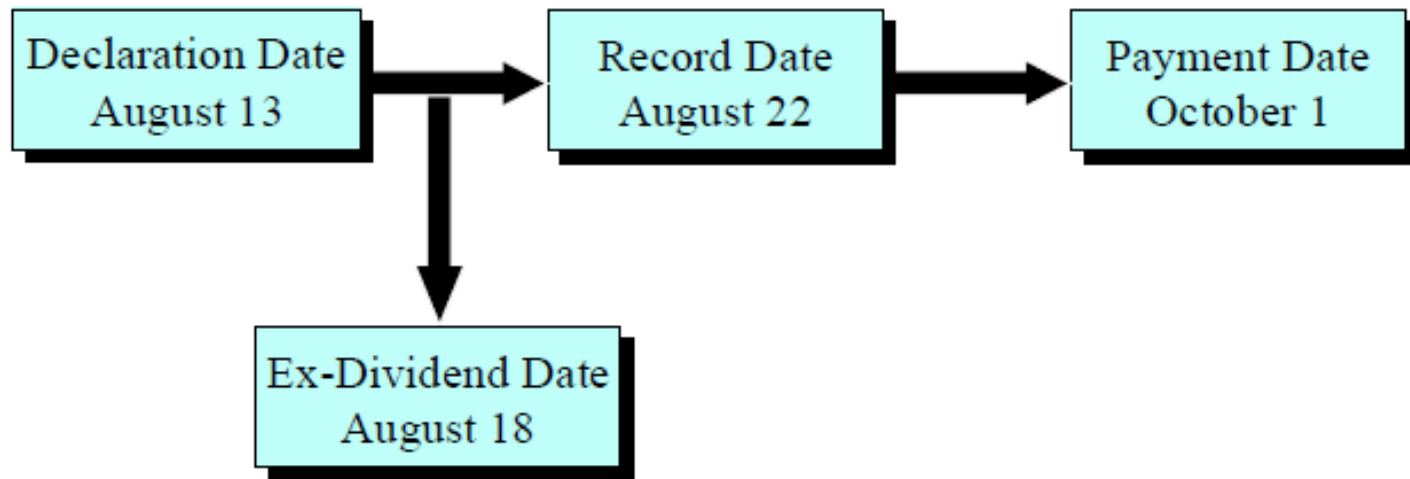
Institutional Features of Dividends

Interim and final dividends announced by the Commonwealth Bank (ASX code: CBA) in 2008

\$1.13 interim dividend announced	13 February 2008 (Wednesday)
Ex-dividend date	18 February 2008 (Monday)
Record date	22 February 2008 (Friday)
Interim dividend payment date	2 April 2008 (Wednesday)
\$1.53 final dividend announced	13 August 2008 (Wednesday)
Ex-dividend date	18 August 2008 (Monday)
Record date	22 August 2008 (Friday)
Final dividend payment date	1 October 2008 (Wednesday)

Source: CBA's website at shareholders.commbank.com.au

Institutional Features of Dividends



The final dividend of \$1.53 declared by CBA on August 13 is payable on October 1 to shareholders of record at August 22

The ex-dividend date is 4 business days (?) before the record date

Stock trades without the dividend (“ex dividend”) from August 18 onwards
It trades with the dividend (“cum dividend”) up to and including August 17
What will happen to the price of shares on the ex-dividend date?

Dividend Payout Policies

Pure residual dividend policy

Pay out any earnings that the firm does not need to reinvest

Dividends and dividend payout ratios tend to be unstable

Smoothed (or fixed) dividend policy

Target a proportion of earnings to be paid out as dividends

Objective here is for the dividends to equal the long run difference between expected earnings and expected capital expenditures - Stable dividends over time

Constant payout dividend policy

Pay a constant proportion of earnings as dividends

Stable dividend payout ratio but unstable dividends

MM and the Dividend Irrelevance Theory

The main assumptions underlying the irrelevance theory are...

Perfect capital market

The firm can issue and sell new shares when needed

No personal taxes

The firm is all equity financed

The firm has a given investment plan which is not affected by changes in dividends

Firm value is determined only by what earnings are generated by the firm's assets

The manner in which the earnings stream is divided between dividends and retained earnings **does not** affect shareholders' wealth

MM and the Dividend Irrelevance Theory

Recall that the price of ordinary shares is...

$$P_0 = (D_1 + P_1)/(1 + k_e)$$

Since the price at time 1 depends on the dividend in time 2, and so on, we get...

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + k_e)^t}$$

The puzzle...

If the price today depends on the stream of future dividends how can a firm's dividend policy be irrelevant?

Investors **should care** about how much of earnings are paid out as dividends!

MM and the Dividend Irrelevance Theory

Dividend policy is a trade-off between...

Retaining profits, versus

Paying dividends and issuing new share issues to replace the dividends paid out

The overall effect of paying a dividend and issuing new shares to replace the cash is...

No change in the value of the firm

No change in the wealth of the old shareholders

The value of their shares will fall by an amount equal to the cash paid to them

MM and the Dividend Irrelevance Theory

<i>Sources of funds</i>	
Cash from operations	X
Cash from <i>new</i> shares issued (Number of shares = m)	mP_1
<i>Uses of funds</i>	
Dividends paid (Number of shares = n)	nD_1
Investments	I

Since the sources and uses of funds must be equal, we have...

$$X + mP_1 = nD_1 + I$$

$$\text{Alternatively, } mP_1 = nD_1 + I - X$$

MM and the Dividend Irrelevance Theory

If the firm has n shares outstanding, the value of the firm is...

$$V_0 = nP_0 = (nD_1 + nP_1)/(1 + k_e)$$

To replace the dividend paid out (nD_1), the firm sells m new shares at a price of P_1 each...

$$V_0 = [nD_1 + (n + m)P_1 - mP_1]/(1 + k_e)$$

Substituting for $mP_1 = nD_1 + I - X$ in the above expression, we get...

$$V_0 = [(n + m)P_1 - I + X]/(1 + k_e)$$

Note that D_1 does not appear in the above equation so dividend policy is irrelevant to firm value

MM and the Dividend Irrelevance Theory

Illustration:

TXT Ltd has 1,000,000 shares outstanding, and its current market price is \$5.00. Assume that the firm operates in a perfect capital market and is considering paying a dividend of \$0.50 per share one year from now. The required rate of return on its shares is 10% p.a. and cash from operations is \$100,000 while its investment requirement is \$500,000

Given:

$P_0 = \$5.00$, $k_e = 10\%$, $D_1 = \$0.50$, $X = \$100,000$ and $I = \$500,000$

The current total shareholder wealth is...

$$1000000 \times 5.00 = \$5,000,000$$

MM and the Dividend Irrelevance Theory

Recall that...

- ❖ $P_0 = (D_1 + P_1)/(1 + k_e)$

Case 1: If the dividend *is* paid, we have...

- ❖ So, $P_1 = P_0(1 + k_e) - D_1$

- ❖ $P_1 = 5.00(1.10) - 0.50 = \5.00

Case 2: If the dividend *is not* paid, we have...

- ❖ $D_1 = 0$

- ❖ $P_1 = P_0(1 + k_e)$

- ❖ $P_1 = 5.00(1.10) = \$5.50$

MM and the Dividend Irrelevance Theory

Case 1: If the dividend is paid the firm will need to issue new shares in the amount of...

$$mP_1 = nD_1 + I - X$$
$$m(5.00) = 1,000,000(0.50) + 500,000 - 100,000$$

$$\text{So, } m = \frac{900,000}{5.00} = 180,000 \text{ shares}$$

Case 2: If the dividend is not paid the firm will need to issue new shares in the amount of...

$$\frac{(\text{Investment} - \text{Cash from Operations})}{5.50} = 72,727 \text{ shares}$$

MM and the Dividend Irrelevance Theory

What happens to shareholder wealth in each case?

Case 1: If the dividend **is** paid...

$$\begin{aligned}\text{Shareholder wealth} &= [(1,180,000) (5.00) + 100,000 - 500,000] / 1.10 \\ &= \$5,000,000\end{aligned}$$

Case 2: If the dividend is **not** paid...

$$\begin{aligned}\text{Shareholder wealth} &= [(1,072,727) (5.50) + 100,000 - 500,000] / 1.10 \\ &= \$5,000,000\end{aligned}$$

The decision **to pay or not pay** a dividend does not affect firm value and **dividend policy is irrelevant** under these assumptions

Is dividend policy really irrelevant in the “real world”?

Dividends and Taxes

The **differential tax treatment** of dividend income versus capital gains (arising from retained earnings) can result in shareholders preferring the **payment of dividends, or not**

We examine this difference in the tax treatment of dividends by comparing a **firm's dividend policy under...**

A **classical** tax system

An **imputation** tax system

Dividend Policy in a Classical Tax System

Under the classical tax system...

From a dollar of corporate earnings, the shareholder ends up with

$(1 - \tau_C)(1 - \tau_P)$ dollars of after-personal-tax dividend

That is, dividends are **effectively taxed twice**

Capital gains are **taxed at a lower rate** and the **effective tax rate** on capital gains may even approach zero if share sale are **postponed well into the future**

Does it make sense for firms to ever pay dividends under the classical tax system?

Dividend Policy in a Classical Tax System

A classical tax system will tend to lead to the creation of different shareholder “clienteles” depending on their tax rates

Shareholders who pay higher tax on dividends than on capital gains would choose a low dividend paying firm

Shareholders who pay lower tax on dividends than on capital gains would choose a high dividend paying firm

What should the firm do?

Bottom line?

Dividend policy may still be irrelevant via the shareholder clientele effect

Low Payout Please

Why might a low payout be desirable?

Individuals in upper income tax brackets might prefer lower dividend payouts, with the immediate tax consequences, in favor of higher capital gains

Dividend restrictions: debt contracts might limit the percentage of income that can be paid out as dividends

High Payout Please

Why might a high payout be desirable?

Desire for current income

Individuals in low tax brackets

Groups that are prohibited from spending principal (trusts and endowments)

Uncertainty resolution: no guarantee that the higher future dividends will materialize

Taxes

Tax-exempt investors don't have to worry about differential treatment between **dividends and capital gains**

Imputation and Dividend Policy

Under the imputation tax system...

Earnings distributed as **franked dividends** to **resident shareholders** is effectively **taxed once** at the shareholder's (marginal) personal tax rate

If all a firm's shares were held by resident shareholders with marginal tax rates ***less than the corporate tax rate***, then the optimal dividend policy would be to pay dividends and **exhaust the available franking credits**

However...

Many individuals have personal marginal tax rates **that are higher** than the corporate tax rate who may prefer the retention of earnings

Not all shareholders **are resident shareholders**

Imputation and Dividend Policy

Bottom line?

The interaction of **capital gains tax** and the **imputation tax system** means that shareholders with low marginal tax rates **would** prefer earnings to be paid out as dividends

Those in **high marginal tax rates** may tend to prefer earnings to be retained
“**Imputation clienteles**” may exist at the firm level

Does Dividend Policy Matter?

Probably not a resounding “yes”, but a qualified “yes”...

Markets are not perfect and market imperfections drive managers to pay attention to do “what the market wants”

Taxes are the obvious market imperfection but in some cases the irrelevance of dividend policy may still hold

The classical tax system versus the imputation tax system

Dividends do contain information and possess strong “signaling” elements as well

Dividends also result in lowering the agency costs between management and shareholders

Clientele Effect

Some investors prefer **low dividend payouts** and will buy stock in those companies that offer **low dividend payouts**

Some investors prefer **high dividend payouts** and will buy stock in those companies that offer **high dividend payouts**

Implications

What do you think will happen if a firm changes its policy **from a high payout to a low payout**?

What do you think will happen if a firm changes its policy **from a low payout to a high payout**?

If this is the case, **does dividend POLICY matter**?

Information Content of Dividends

Stock prices generally rise with **unexpected** increases in dividends and fall with **unexpected** decreases in dividends

The stock market reacts **positively** to dividend increases and **negatively** to decreases or cuts.

Empirical evidence shows that tax increases lead to **higher payouts**, rather than lower.

Dividend Policy in Practice

Residual dividend policy

Constant growth dividend policy – dividends increased at a constant rate each year

Constant payout ratio: pay a constant percent of earnings each year

Compromise dividend policy

Residual Dividend Policy

Determine capital budget

Determine target capital structure

Finance investments with a combination of debt and equity in line with the target capital structure

Remember that retained earnings are equity

If additional equity is needed, issue new shares

If there are excess earnings, then pay the remainder out in dividends

Example – Residual Dividend Policy

Given

Need \$5 million for new investments

Target capital structure: $D/E = 2/3$

Net Income = \$4 million

Finding dividend

40% financed with debt (2 million)

60% financed with equity (3 million)

Net Income – equity financing = \$1 million, paid out as dividends

Compromise Dividend Policy

Goals, ranked in order of importance

Avoid cutting back on positive NPV projects to pay a dividend

Avoid dividend cuts

Avoid the need to sell equity

Maintain a target debt/equity ratio

Maintain a target dividend payout ratio

Companies want to accept positive NPV projects, while avoiding negative signals

Stock Repurchase

Company buys back its own shares of stock

Tender offer: company states a purchase price and a desired number of shares

Open market: buys stock in the open market

Similar to a cash dividend in that it returns cash from the firm to the stockholders

This is another argument for **dividend policy irrelevance** in the absence of taxes or other imperfections

Real-World Considerations

Stock repurchase allows investors **to decide** if they want the current cash flow and associated tax consequences

Investors face capital gains taxes **instead** of ordinary income taxes (lower rate)

In our current tax structure, repurchases may be more desirable due to the options provided stockholders

Information Content of Stock Repurchases

Stock repurchases sends a positive signal that management believes that the current price is low

Tender offers send a more positive signal than open market repurchases because the company is stating a specific price

The stock price often increases when repurchases are announced

Stock Repurchase Announcement

“America West Airlines announced that its Board of Directors has authorized the purchase of up to **2.5 million shares** of its Class B common stock on the open market as circumstances warrant **over the next two years ...**

“Following the approval of the stock repurchase program by the company’s Board of Directors earlier today. W. A. Franke, chairman and chief officer said ‘The stock repurchase program reflects our belief that America West stock may be an attractive investment opportunity for the Company, and it underscores our commitment to enhancing long-term shareholder value.’

“The shares will be repurchased with cash on hand, but only if and to the extent the Company holds unrestricted cash in excess of **\$200 million to ensure that an adequate level of cash and cash equivalents is maintained.**”

Stock Dividends

Pay additional shares of stock instead of cash

Increases the number of outstanding shares

Small stock dividend

Less than 20 to 25%

If you own 100 shares and the company declared a 10% stock dividend, you would receive an additional 10 shares

Large stock dividend: more than 20 to 25%

Stock Splits

Stock splits: essentially the same as a stock dividend except expressed as a ratio

For example, a 2 for 1 stock split is the same as a 100% stock dividend

It is often claimed that stock splits, in and of themselves, **lead to higher stock prices**; research, however, does not bear this out. What is true is that **stock splits are usually initiated after a large run up in share price**

Common explanation for split is to return price to a **“more desirable trading range”**

Quick Quiz

What are the different types of dividends and how is a dividend paid?

What is the clientele effect and how does it affect dividend policy relevance?

What is the information content of dividend changes?

What is the difference between a residual dividend policy and a compromise dividend policy?

What are stock dividends and how do they differ from cash dividends?

How are share repurchases an alternative to dividends and why might investors prefer them?

Key Relationships/Formula Sheet

Price at time 0: $P_0 = (D_1 + P_1)/(1 + k_e)$

Sources and uses of funds: $X + mP_1 = nD_1 + I$

Dividend irrelevance: $V_0 = [(n + m)P_1 - I + X]/(1 + k_e)$

Key Concepts

Dividend policy is about the trade-off between retaining profit and paying out dividends

Dividend policy does not affect shareholders' wealth in a perfect capital market

Dividend policy becomes important when we consider taxes and other market imperfections

The imputation tax system does eliminate double taxing of dividend income and encourages higher dividend payout ratios