

Weeks 7&8

Capital structure policy

Lecture outline

- Cost of capital: the basics
- Raising capital
- Capital structure
 - The Modigliani-Miller (M&M) propositions
 - Static theory
 - Pecking order theory

Learning outcomes

- Be able to understand the key differences between debt financing and equity financing
- Be able to understand the M&M propositions with/without taxes, with/without bankruptcy costs
- Gain a basic understanding of the static theory and pecking order theory and applying them in choosing capital structure

Basic concepts

- A firm can raise funds by issuing both debt and equity securities - this mix is known as the capital structure
 - How should the financial manager choose the right combination between debt and equity to maximize the firm value?
 - Is equity better than debt, or vice versa?

Cost of capital

- Cost of equity: the return that equity investors require on their investment in the firm
 - Ordinary equity: equity without priority for dividends or in bankruptcy
 - Preference shares: equity with dividend priority over ordinary shares, normally with a fixed dividend rate, sometimes without voting rights
- Cost of debt: the return that lenders require on the firm's debt
 - Borrowing from banks
 - Issuing corporate bonds

Cost of equity: Constant dividend growth approach

$$R_E = \frac{D_1}{P_0} + g$$

where:

R_E : Cost of equity

D_1 : next period's projected dividend

P_0 : share price

g : dividend's constant growth rate

Cost of equity: The security market line (SML) approach

$$R_E = R_f + \beta_E \times (R_M - R_f)$$

where:

R_E : Cost of equity

R_f : risk-free rate (frequently used proxy: returns on short-term government bonds)

R_M : expected return on the overall market (frequently used proxy: returns on FTSE 100 index, returns on S&P 500 index)

β_E : systematic risk of the equity

Cost of preference shares

$$R_P = \frac{D}{P_0}$$

where D is the fixed dividend and P_0 is the current preference share price

Weighted average cost of capital (WACC)

- WACC: the weighted average of the cost of equity and the after-tax cost of debt, also can be interpreted as overall return on assets
- If firm does not use preference shares

$$WACC = \frac{E}{V} \times R_E + \frac{D}{V} \times R_D \times (1 - t_C)$$

where E is the market value of equity; D is the market value of debt; V is total market value of debt and equity ($V=E+D$); R_E is cost of equity; R_D is cost of debt; t_C is tax rate.

- If firm uses preference shares

$$WACC = \frac{E}{V} \times R_E + \frac{P}{V} \times R_P + \frac{D}{V} \times R_D \times (1 - t_C)$$

You have a brilliant idea for a new financial product targeting the elderlies. Where should you start to create your business?

Early-stage financing and venture capital


- Go to private equity and venture capital (VC) market
 - VC: financing for new, often high-risk, ventures
- A large amount of private equity investment is undertaken by professional private equity managers representing large institutional investors such as mutual funds and pension funds

Stages of financing

- Seed money:
 - A small amount of financing needed to prove a concept or develop a product. Marketing is not included in this stage.
- Start-up:
 - Financing for firms that started within the past year. Funds are likely to pay for marketing and product development expenditures.
- Later stage capital:
 - Additional money to begin sales and manufacturing after a firm has spent its start-up funds.
- Growth capital:
 - Funds earmarked for a firm to enable it to reach its potential and achieve successful growth.
- Replacement capital:
 - Financing for a company to buy out other investors in the firm.
- Buyout financing:
 - Money provided for managers and outside investors to acquire a fully functioning firm.

Going public


SEPTEMBER 14 2023



Arm Ltd

Arm shares jump by 25% on first day of trading

SoftBank-backed chip designer's stock climbed as high as \$63.59 in early trading as valuation exceeds \$65bn



Unhedged podcast 17 min listen

Three IPOs test the market

Arm, Instacart and Birkenstock are going public in the coming weeks. How will the market respond?

Source: Financial Times (2023)

The basic procedure

[IPO process explained](#)

Alternative issue methods

Method	Type	Definition
Public traditional negotiated cash offer	Firm commitment cash offer	The company negotiates an agreement with an investment firm or bank to underwrite and distribute the new shares. A specified number of shares are bought by underwriters and sold at a higher price.
	Best efforts cash offer	The company has an investment firm or bank sell as many of the new shares as possible at the agreed-upon price. There is no guarantee concerning how much cash will be raised.
	Dutch auction cash offer	The company has an investment firm or bank auction shares to determine the highest offer price obtainable for a given number of shares to be sold.
Privileged subscription	Direct rights issue	The company offers the new equity directly to its existing shareholders.
	Standby rights issue	Like the direct rights issue, this contains a privileged subscription arrangement with existing shareholders. The net proceeds are guaranteed by the underwriters.
Non-traditional cash offer	Shelf cash offer	Qualifying companies can authorize all shares they expect to sell over a two-year period and sell them when needed.
	Competitive firm cash offer	The company can elect to award the underwriting contract through a public auction instead of negotiation.
Private	Direct placement	Securities are sold directly to the purchaser, who, at least until recently, generally could not resell securities for at least two years.

The capital structure question

Now that your firm is up and running. How should you choose the “right” debt-equity ratio (i.e., the “optimal” capital structure)?

- How does financial leverage affect ROE/EPS?
- How does financial leverage affect the cost of capital/cost of equity?

Debt vs. Equity

- Interest is tax deductible → lowers the effective cost of debt
- Debt holders are limited to a fixed return → stockholders do not have to share profits if the business does exceptionally well
- Debt holders do not have voting rights
- Higher debt ratios lead to greater risk and higher required interest rates (to compensate for the additional risk)

Maximizing firm value vs. maximizing shareholders' interests

The market value of J. J. Sprint plc is £1,000. The company currently has no debt, and each of J. J. Sprint's 100 shares sells for £10. Suppose that J. J. Sprint plans to borrow £500 and pay the £500 proceeds to shareholders as an extra cash dividend of £5 per share, which leads to 3 possible outcomes below. In which scenario should the firm restructure?

	No debt (original capital structure) £	Value of debt plus equity after payment of dividend (three possibilities)		
		(a) £	(b) £	(c) £
Debt	0	500	500	500
Equity	<u>1,000</u>	<u>750</u>	<u>500</u>	<u>250</u>
Firm value	1,000	1,250	1,000	750

Maximizing firm value vs. maximizing shareholders' interests

	Pay-offs to shareholders after restructuring		
	(a)	(b)	(c)
Equity value change (Capital gain)	-250	-500	-750
Dividends	500	500	500
Net effect	+250	0	-250

- Changes in capital structure benefit the shareholders **if and only if** the value of the firm increases
- Optimal capital structure
 - maximize firm value
 - lowest possible WACC

Financial leverage and EPS: Example (1)

	Current	Proposed
Assets (£)	8,000,000	8,000,000
Debt (£)	0	4,000,000
Equity (£)	8,000,000	4,000,000
Debt-equity ratio	0	1
Share price (£)	20	20
Shares outstanding	400,000	200,000
Interest rate (10%)	10	10

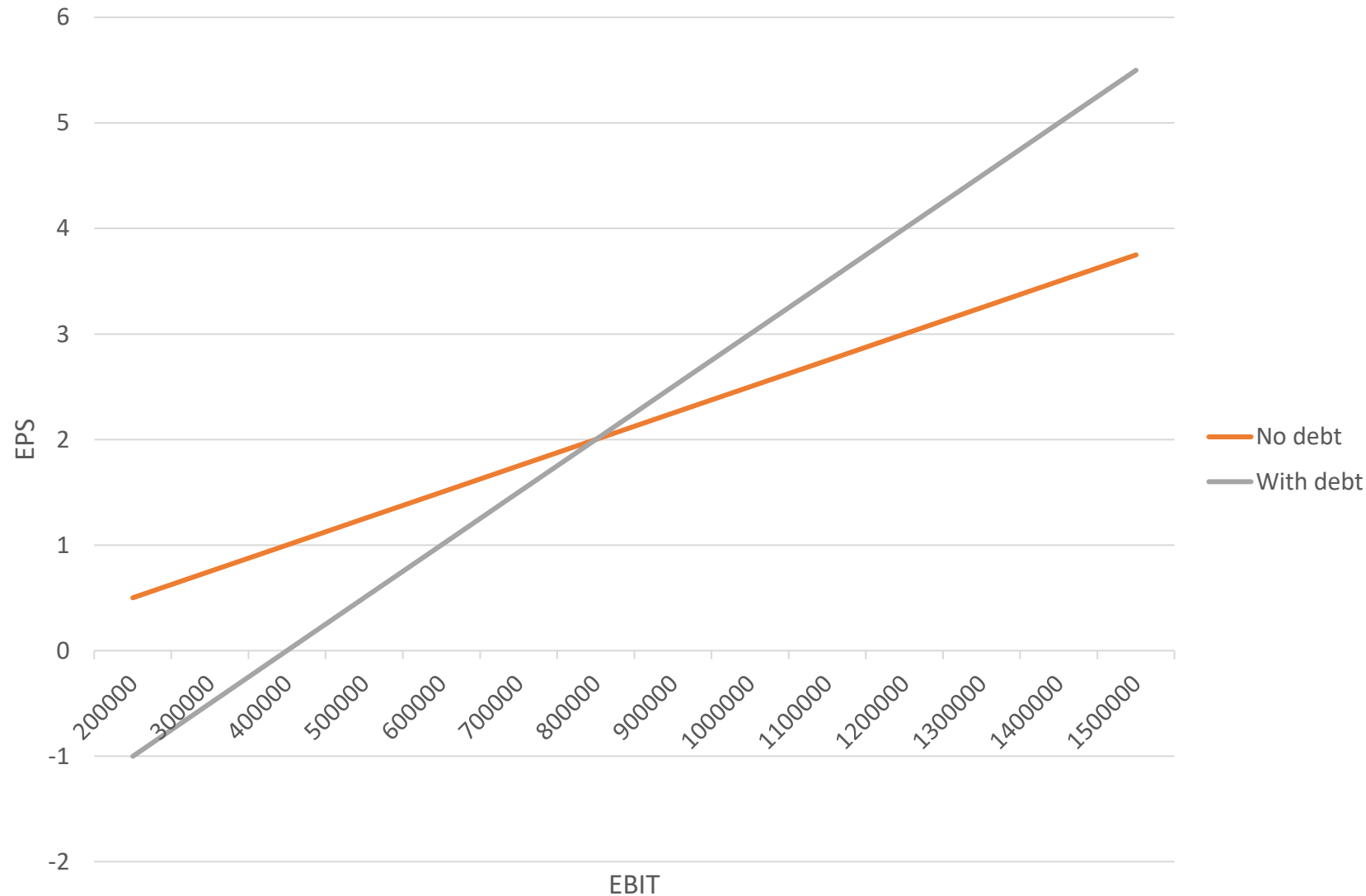
	Recession	Expected	Expansion
EBT (£)	500,000	1,000,000	1,500,000

Financial leverage and EPS: Example (2)

	Unlevered firm (no debt)		
	Recession	Expected	Expansion
EBT (£)	500,000	1,000,000	1,500,000
Interest (£)			
Net income (£)			
ROE (%)			
EPS (£)			

	Levered firm (use debt)		
	Recession	Expected	Expansion
EBT (£)	500,000	1,000,000	1,500,000
Interest (£)			
Net income (£)			
ROE (%)			
EPS (£)			

Financial leverage and firm value: Example (3)



What do we learn from the example?

- The effect of financial leverage depends on the company's EBIT
 - When EBIT is relatively high, leverage is beneficial
- Leverage:
 - magnifies returns (losses) to shareholders relative to no leverage case
 - Shareholders are exposed to more risk because the EPS and ROE are much more sensitive to changes in EBIT
- Because of the impact that financial leverage has on both the expected return to shareholders and the riskiness of the equity, capital structure is an important consideration

Does conclusion #4 necessarily follow?

- NO

Corporate borrowing and homemade leverage (1)

Assume you have a chance to invest in the firm discussed in the earlier example and you can choose 1 of the following strategies:

- Strategy A: buy 100 shares of the levered equity
- Strategy B:
 - Borrow £2,000 from a bank
 - Use the borrowed proceeds plus your own investment of £2,000 (a total of £4,000) to buy 200 shares of the current unlevered equity @ £20 per share
- Which strategy do you prefer? I.e., do you prefer investing in a levered or unlevered firm?

Corporate borrowing and homemade leverage (2)

	Recession	Expected	Expansion
Strategy A:			
EPS of levered equity	0.50	3.00	5.50
Earnings for 100 shares			
Net cost =			

Strategy B:			
Earnings for 200 shares			
Interest @10% on £2,000			
Net earnings			
Initial cost =			

So what?

- Capital structure seems to be irrelevant because shareholders can adjust the amount of financial leverage by borrowing and lending on their own
 - Homemade leverage: the use of personal borrowing to change the overall amount of financial leverage to which the individual is exposed

Notation

D = market value of debt in levered firm

E = market value of equity in levered firm

V_U = value of unlevered firm

$V_L = D + E$ = value of levered firm

EBIT = net operating income before interest and tax

r_E = return required on equity in levered firm

r_D = return required on debt in levered firm

WACC = weighted average cost of capital

t_C = rate of corporation tax

The Modigliani-Miller (M&M) propositions

Assumption: perfect capital market

- Investors and firms can trade the same set of securities at competitive market prices equal to the PV of their future cash flows
- There are no taxes, transaction costs, or issuance costs associated with security trading
- A firm's financing decisions do not change the cash flows generated by its investments, nor do they reveal new information about them

MM1 - Proof (1)

- Consider two firms in the same risk class:
 - one all-equity financed (unlevered) with value V_U
 - the other levered with debt (D) and equity (E) and value V_L
- Now consider two alternative portfolio strategies:
 - Investment 1: Buy 10% of shares in unlevered firm U
 - Investment 2: Buy 10% of equity + 10% of debt of levered firm L

MM1 - Proof (2)

- Investment 1
- Investment 2

M&M Proposition I

- In a perfect capital market, the firm's value is *independent* of its capital structure
- In other words, the firm's overall cost of capital, WACC, is *NOT* affected by the capital structure

MM2 - Proof (1)

$$r_E \times \frac{E}{D + E} + r_D \times \frac{D}{D + E} = WACC$$

MM2 - Proof (2)

- When the firm has only equity:

$$WACC = r_U \quad (1)$$

- When the firm has both equity and debt:

$$r_E = WACC + \frac{D}{E} (WACC - r_D) \quad (2)$$

M&M Proposition II

- The cost of equity increases with the firm's debt-equity ratio
- In other words
 - The expected rate of return on the common stocks of a levered firm increases with the debt/equity ratio

To sum up

- In a perfect capital market:
 - The overall return on firm, or overall return on assets, (WACC) remains constant (i.e., capital structure is irrelevant)
 - The required return on equity (r_E) increases with debt to match the increased risk
 - This is because increasing debt increases the risk exposure of shareholders (recall they are residual claimants in case of default)
 - They will require a higher rate of return for this extra risk

⇒ Implication: *In a perfect capital market, any attempt to raise the value of the firm by issuing debt will be exactly offset by the increase in the cost of equity*

What if the market is not perfect?

Tax and MM1 (1)

	Unlevered	Levered
EBIT	10,000	10,000
D	0	8,000
r_D	0	10%
Interest paid ($r_D \times D$)	0	800
Pre-tax income	10,000	9,200
Tax@35%	3,500	3,220
Net income	6,500	5,980
	Unlevered	Levered
EBIT	10,000	10,000
Tax@35%	3,500	3,220
CF	6,500	6,780

Tax and MM1 (2)

Assume that debt is permanent and constant (i.e., the firm pays a constant interest in perpetuity)

$$PV(DITS) = \frac{t_c \times r_D \times D}{r_D} = t_c \times D$$

$$V_U = \frac{EBIT \times (1 - t_c)}{r_U}$$

$$V_L = V_U + t_c \times D$$

$$WACC = \frac{E}{D + E} \times r_E + (1 - t_c) \times \frac{D}{D + E} \times r_D$$

Tax and MM2

$$WACC = \frac{E}{D + E} \times r_E + (1 - t_c) \times \frac{D}{D + E} \times r_D$$

$$r_E = r_U + (1 - t_c) \times (r_U - r_D) \times \frac{D}{E}$$

Default and bankruptcy in a perfect market

- Financial distress: when a firm has difficulty meeting its debt obligations
- Default: when a firm fails to make the required interest or principal payments on its debt, or violates a debt covenant
- After the firm defaults, debt holders are given certain rights to the assets of the firm and may even take legal ownership of the firm's assets through bankruptcy

⇒ An important consequence of leverage is the risk of bankruptcy

⇒ Equity financing does not carry this risk

Bankruptcy and capital structure

- With perfect capital markets:
 - The risk of bankruptcy is not a disadvantage of debt
 - Bankruptcy simply shifts the ownership of the firm from equity holders to debt holders without changing the total value available to all investors
- In reality:
 - Bankruptcy is often a long and complicated process that imposes both **direct** and **indirect** costs on the firm and its investors

Direct costs of bankruptcy

- The bankruptcy process is complex, time-consuming, and costly
 - Costly outside experts are often hired by the firm to assist with the bankruptcy process
 - Creditors also incur costs during the bankruptcy process
 - They may wait several years to receive payment
 - They may hire their own experts for legal and professional advice
- ⇒ The direct costs of bankruptcy reduce the value of assets that the firm's investors will ultimately receive

Indirect costs of bankruptcy

- While the indirect costs are difficult to measure accurately, they are often much larger than the direct costs of bankruptcy

- Loss of customers
- Loss of suppliers
- Loss of employees
- Fire sale of assets
- etc

British retailer Arcadia Group, owner of Topshop, files for bankruptcy.

Debenhams set to shut shop after 242 years as pandemic hammers UK retail

Sources: Reuters (2020); The New York Times (2020)

By James Davey

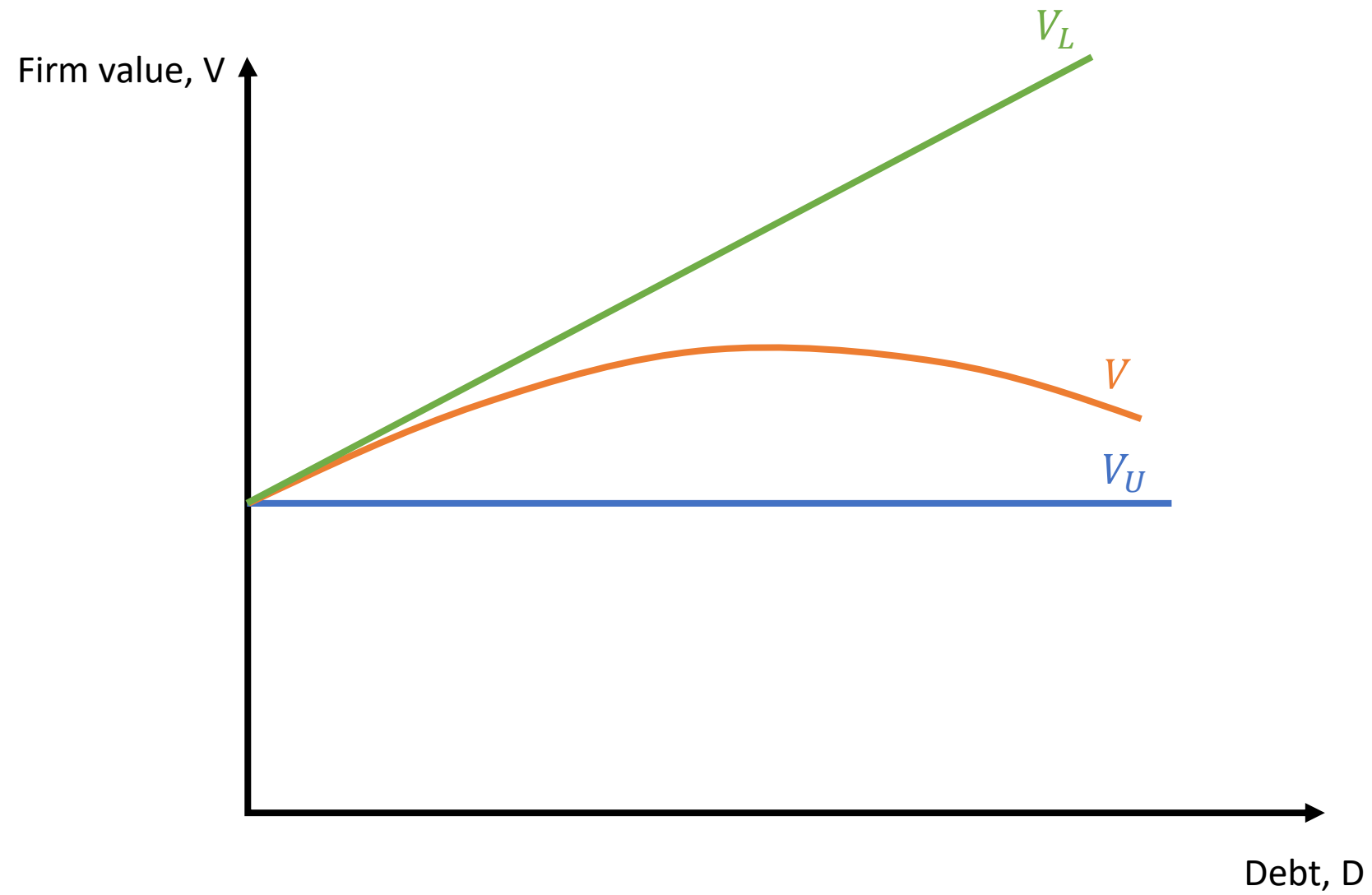
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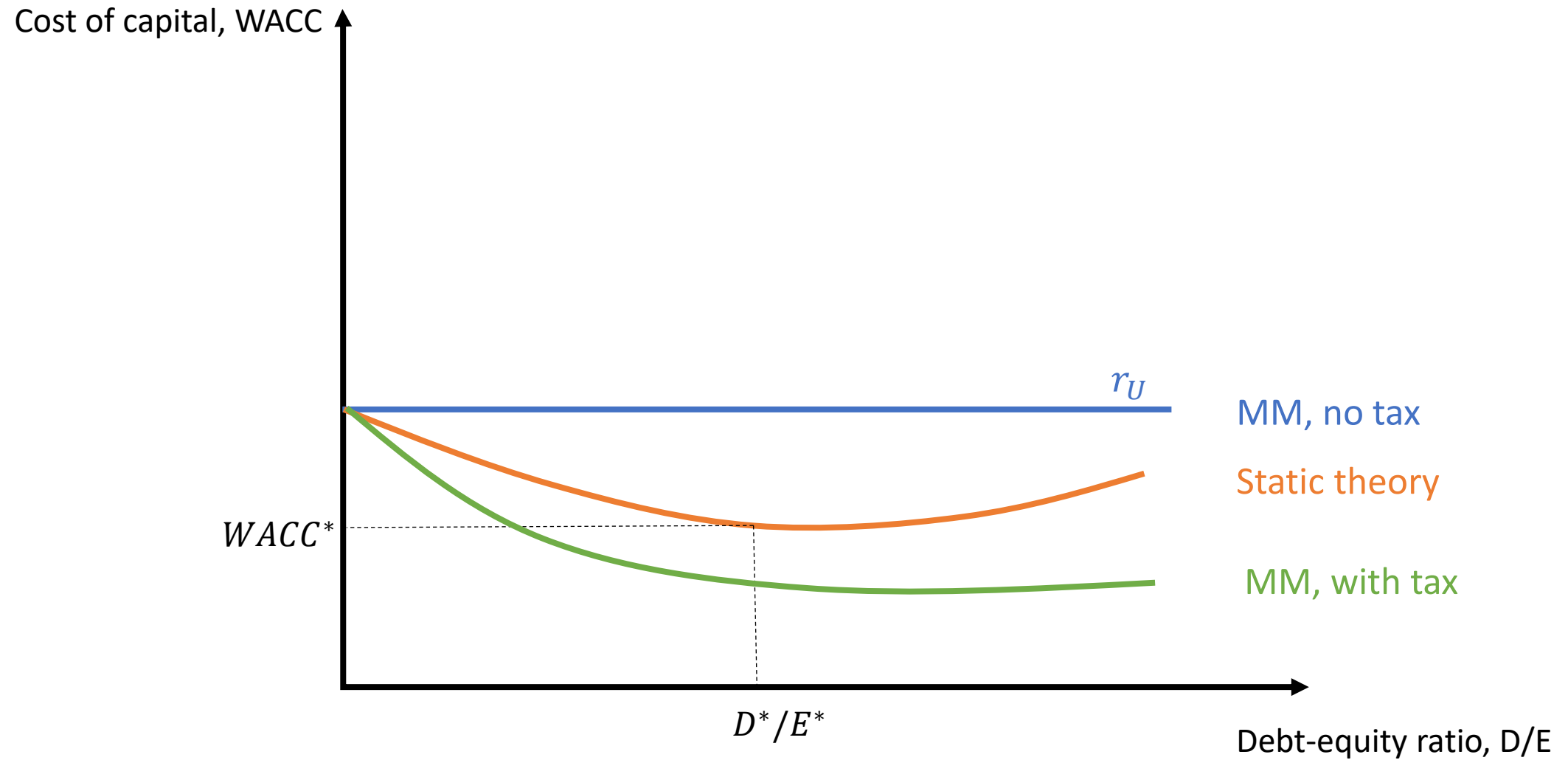


LONDON (Reuters) - British department store group Debenhams is set to close all its UK shops after 242 years in business, putting 12,000 jobs at risk in the country's second major corporate failure in as many days.

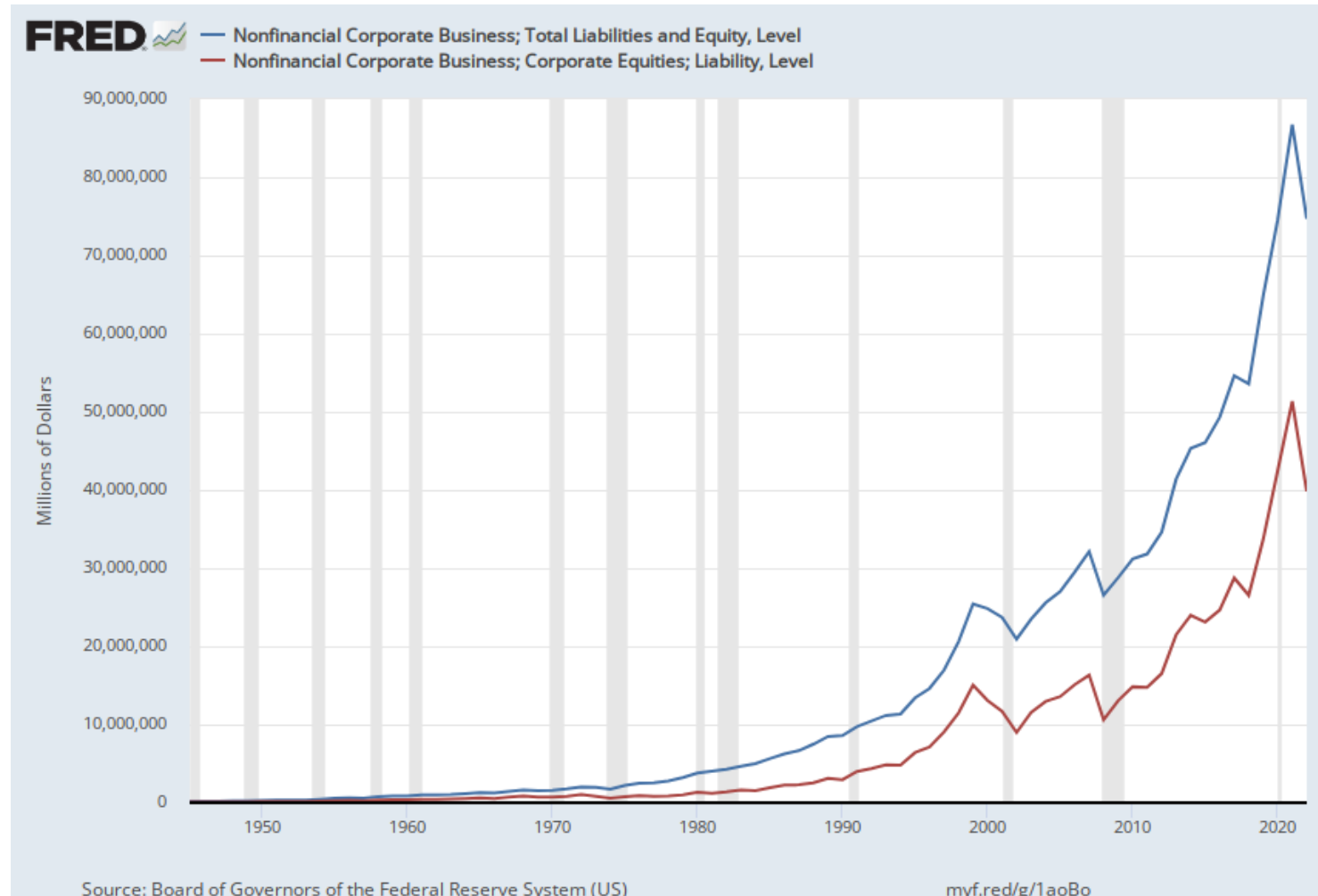
Static theory of capital structure

- At relatively low debt levels, the probability of bankruptcy and financial distress is low, and the (tax shield) benefit from debt outweighs the cost
 - At very high debt levels, the possibility of financial distress is a chronic, ongoing problem for the firm, so the benefit from debt financing may be more than offset by the financial distress costs
- => Static theory of capital structure: a firm borrows up to the point where the tax benefit from an extra pound or euro in debt is exactly equal to the cost that comes from the increased probability of financial distress





In reality, many large, financially sophisticated and highly profitable firms use little debt. This is different from what we would expect from the static theory. Why?



Managers have private information have incentives to issue overpriced risky securities but also understand that issuing such securities will result in a negative price reaction because rational investors, who are at an information disadvantage, will discount the prices of any risky securities the firm issues → riskier securities are more subjective to adverse selection

Retained earnings

- No adverse selection

Debt

- Minor adverse selection

Equity

- Serious adverse selection

Pecking order theory

- Pecking order theory:
 - Firms prefer internal to external finance
 - When external fund is necessary, firms prefer debt to equity
- Implications:
 - No target capital structure
 - Profitable firms use less debt
 - Companies will want financial slack

Quiz 1

Pelamed Pharmaceuticals has EBIT of \$347 million in 2022. In addition, Pelamed has interest expenses of \$147 million and a corporate tax rate of 30%.

- a. What is Pelamed's 2022 net income?
- b. What is the total of Pelamed's 2022 net income and interest payments?
- c. If Pelamed had no interest expenses, what would its 2022 net income be? How does it compare to your answer in part b?
- d. What is the amount of Pelamed's interest tax shield in 2022?

Quiz 2

Your firm currently has \$100 million in debt outstanding with a 10% interest rate. The terms of the loan require the firm to repay \$25 million of the balance each year. Suppose that the marginal corporate tax rate is 25%, and that the interest tax shields have the same risk as the loan. What is the present value of the interest tax shields from this debt?

Quiz 3

See the attached pdf