

#### 333-201 Business Finance

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Lecture 19: Debt, Dividends and Taxes II

#### Debt, Dividends and Taxes II

- Examine the relevance of financial leverage
- Examine the effects of financial leverage on business and financial risk
- Examine capital structure theory and the Modigliani-Miller propositions



#### Required Readings: Lectures 19 - 22

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Lecture 19
PBEHP, Ch. 12 (sections 12.1 – 12.3)
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Lecture 20
PBEHP, Ch. 12 (sections 12.4.1, 12.6 – 12.7)
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Lecture 21
PBEHP, Ch. 11 (sections 11.1 – 11.2, 11.4 – 11.6)
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Lecture 22
PBEHP, Ch. 17 (sections 17.1 – 17.5.4 and 17.6)
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### What is Financial Leverage?

- The focus of this and the next lecture is on the capital structure decisions of firms
- What mix of debt and equity (ordinary shares) should be used to finance a firm's operations?
- How much financial leverage should a firm have in its capital structure?
- •The main questions we address are...
  - Can the firm's value be affected by its capital structure choices?
  - Does the value of the firm's cash flows depend on how it is divided between payments to shareholders and debtholders?
  - Is there an optimal capital structure that maximizes the value of the firm?



## What is Financial Leverage?

Two main risks faced by firms...

• Business (or operational) risk

• The variability of future net cash flows attributed to the nature of the firm's operations

• It is the risk faced by shareholders if the firm is financed only by equity

Financial risk

 The risk attributed to the use of debt as a source of financing a firm's operations



#### Do Managers Care About Leverage?

Financing Decision Factor	Ranking (0 - 5)
1. Maintain financial flexibility	4.55
2. Ensure long-term survival	4.55
3. Maintain predictable source of funds	4.05
4. Maximize stock price	3.99
5. Maintain financial independence	3.88
6. Maintain high debt rating	3.56
7. Maintain comparability with peer group	2.47

Source: Damodaran Online, pages.stern.nyu.edu/~adamodar. Based on survey of CFOs of large US firms who ranked the factors that they considered important in their financing decisions. A 0 is least important and a 5 is most important.



#### What Managers Use

Rank	Source of Capital	Score
1	Retained earnings	5.61
2	Straight debt	4.88
3	Convertible debt	3.02
4	External ordinary shares	2.42
5	Straight preference shares	2.22
6	Convertible preference shares	1.72

Source: Damodaran Online, pages.stern.nyu.edu/~adamodar. Based on survey of CFOs of large US firms who ranked the sources of long term capital used by their firm.



### Effects of Financial Leverage

• Financial risk exists if the firm's operations are financed using debt, that is, when there is financial leverage

- How much debt and equity does the firm have in its capital structure?
- Measured as the debt-to-equity or the debt-to-total-assets ratios
- Effects of financial leverage?
  - Expected rate of return on equity increases
  - The variability of returns to shareholders also increases
  - Increasing leverage involves a trade-off between risk and return
- Note that leverage varies both within and between industries
- Woolworths versus Coles and David Jones
- Telstra versus ANZ Bank and Computershare



#### Effects of Financial Leverage





# Modigliani and Miller (MM) Analysis

• The Modigliani and Miller (MM) analysis is based on the following major assumptions

- Capital markets are perfect
- Firms and individuals can borrow funds at the same interest rate
- There are no taxes
- There are no costs associated with the liquidation of a firm
- Firms have a fixed investment policy and investment decisions are not affected by financing decisions

#### Are these assumptions realistic?

•To simplify the analysis, we also assume that all cash flows from operations are perpetual and all earnings are paid out as dividends



 Proposition 1 states that the market value of a firm is independent of its capital structure

• Changing the mix of debt versus equity used to finance a firm's operations *will change the way in which the net* operating income is divided between debtholders and shareholders but it will *not change the value of the firm* 

- Value of a firm is given as...
  - V = Net operating income/ $k_0$ where  $k_0$  is the expected return on the firm's assets
- Note: We assume that the firm generates a net operating income which is perpetual over time



• Illustration: Consider two firms, U and L, which have the same assets but different capital structures. Firm U has no debt in its capital structure while firm L is leveraged. Proposition 1 states that based on the assumptions made these firms are perfect substitutes for each other and their market values will be the same

• MM proposition 1 states that...

$$V_{U} = V_{L}$$

• If the market values are not the same there are riskfree, arbitrage opportunities

- Buy low; sell high... or
- Sell high; buy back low



An investor who purchases 1% of the unleveraged firm U will receive 1% of the firm's profits for a dollar investment of 1% of  $V_U$ 

	Dollar Investment	Dollar Return
Equity	$0.01 \times V_{\rm U}$	$0.01 \times Profits$



The investor could alternatively purchase 1% of both the debt and equity of the leveraged firm L to receive 1% of the firm's interest payment on debt and 1% of the profits less interest on debt for a dollar investment of 1% in the debt and equity of L

	Dollar Investment	Dollar Return
Debt	$0.01  imes D_{ m L}$	$0.01 \times Interest$
Equity	$0.01  imes E_{L}$	$0.01 \times (Profits - Interest)$
Total	$0.01 \times V_{\rm L}$	$0.01 \times Profits$

Since the dollar return is the same in the two cases, we must have  $V_{\rm U} = V_{\rm L}$ 



An investor could also purchase 1% of the equity of the leveraged firm L to receive 1% of the firm's profits less the interest on debt for a dollar investment of 1% of  $E_L$ , which is equal to 1% of  $(V_L - D_L)$ 

	Dollar Investment	Dollar Return
Equity	$0.01  imes E_{L}$	$0.01 \times (Profits - Interest)$
Or	$0.01 \times (V_{\rm L} - D_{\rm L})$	$0.01 \times (Profits - Interest)$

Can this investment position be replicated with firm U which has no debt in its capital structure?



- An investor can replicate the previous position using homemade leverage
- Borrow on personal account 1% of firm L's borrowing, that is, 1% of DL and purchase 1% of firm U
- The dollar return is again the same in the two cases so  $V_U = V_L$

	Dollar Investment	Dollar Return
Borrowing	$-0.01  imes D_{ m L}$	$-0.01 \times Interest$
Equity	$0.01  imes V_{ m U}$	$0.01 \times Profits$
Total	$0.01 \times (V_{\rm U} - D_{\rm L})$	$0.01 \times (Profits - Interest)$

Note that when you borrow funds the dollar "investment" is a negative amount





The total market value is not altered by the capital structure because the total size of the pies remain unchanged



 Market value of debt.  $D_7 = $40m$ 

 Market value of equity,  $E_{\tau} = $60m$ 

Total market value of firm.  $V_{\rm T} = D_{\rm T} + E_{\rm T} = \$100m$ 



Illustration: ABL Ltd is currently an all-equity financed firm which is analyzing its capital structure with the intention of issuing debt and repurchasing some of its equity. Assume that all of its available earnings will be paid out as dividends to shareholders and no corporate taxes. The firm's current situation is shown in the table on the next slide. Based on an expected earnings before interest of \$1,500,000 its expected earnings and dividends per share are \$1.50. There are three other possible outcomes for the earnings before interest as shown in the table. Assume that the earnings generated by the firm are expected to be a constant perpetual stream over time.



Number of shares	1,000,000			
Price per share	\$10			
Market value of shares	\$10,000,000			
	Expected and other outcomes			
Earnings before interest	\$500,000	\$1,000,000	\$1,500,000	\$2,000,000
Earnings per share	\$0.50	\$1.00	\$1.50	\$2.00
Return on assets	5%	10%	15%	20%
Return on equity	5%	10%	15%	20%

Notes: EPS = Earnings to shareholders/Number of shares Return on assets = Earnings before interest/Market value of firm Return on equity = Earnings to shareholders/Market value of equity The shaded cells indicate the expected outcome Taxes are zero and all cash flows are perpetual With no debt, earnings to shareholders is equal to earnings before interest



• ABL's CFO is considering issuing \$5,000,000 of debt at an interest rate of 10% p.a. and using the proceeds to repurchase 500,000 shares. The CFO analyzes the effect of this new capital structure in the following table and graphs

- New debt issued = \$5,000,000
- Shares repurchased = 500,000
- Value of shares repurchased = 500000 10 = \$5,000,000
- New capital structure: 50% equity and 50% debt



Number of shares	500,000			
Price per share	\$10			
Market value of shares	\$5,000,000			
Market value of debt	\$5,000,000			
	Expected and other outcomes			
Earnings before interest	\$500,000	\$1,000,000	\$1,500,000	\$2,000,000
Interest on debt (at 10%)	\$500,000	\$500,000	\$500,000	\$500,000
Earnings to shareholders	\$0	\$500,000	\$1,000,000	\$1,500,000
Earnings per share	\$0.00	\$1.00	\$2.00	\$3.00
Return on equity	0%	10%	20%	30%

Notes: EPS = Earnings to shareholders/Number of shares Return on equity = Earnings to shareholders/Market value of equity The shaded cells indicate the expected outcome Taxes are zero and all cash flows are perpetual



Earnings before interest and EPS for the two capital structures



Return on assets and return on equity for the two capital structures



• The CFO argues that it is better to adopt the new capital structure because the return to shareholders is increased by leveraging the firm if the earnings are above \$1,000,000.

Since the expected earnings are \$1,500,000 a clear case can be made for issuing debt and repurchasing equity

- Earnings per share with debt = \$2.00 > \$1.50 (without debt)
- Return on equity with debt = 20% > 15% (without debt)
- What's the flaw in this argument?



•The argument is flawed because it assumes that shareholders cannot achieve the same outcome that the firm has and so will value the leveraged firm higher

• Shareholders can borrow on personal account and achieve the same outcome as the leveraged firm - homemade leverage!

• Illustration: A shareholder with \$10 can borrow another \$10 at an interest rate of 10% p.a. and invest \$20 in two shares of the unleveraged firm. The shareholder has invested \$10 of her own funds and the payoffs of this investment are shown in the following table.

 Note that the net earnings and return on investment to the shareholder are the same as those for an investor who purchases one share in the leveraged firm

• So, the share prices (market values) of both firms must be equal!



#### Strategy 1: Two shares of the unleveraged firm and homemade leverage

	Expected and other outcomes			
Earnings on shares	\$1.00	\$2.00	\$3.00	\$4.00
Interest on personal debt	\$1.00	\$1.00	\$1.00	\$1.00
Net earnings on investment	\$0.00	\$1.00	\$2.00	\$3.00
Return on investment	0%	10%	20%	30%

#### Strategy 2: One share of the leveraged firm

	Expected and other outcomes			
Earnings on shares	\$0.00	\$1.00	\$2.00	\$3.00
Return on investment	0%	10%	20%	30%

Notes: Return on investment = Net earnings/Investment The shaded cells indicate the expected outcome



• Note that an investor who has invested funds in the leveraged firm can undo this leverage by lending funds

• Illustration: A shareholder who has \$20 invested in the leveraged firm but wishes an unleveraged investment can invest \$10 in one share of the unleveraged firm and lend \$10 at an interest rate of 10% p.a. The shareholder's payoffs on these investments are shown in the following table

• Note again that the net earnings and return on investment to the shareholder are the same so the share prices (market values) of both firms must be equal



#### Strategy 1: Two shares of the unleveraged firm

	Expected and other outcomes			
Earnings on shares	\$1.00	\$2.00	\$3.00	\$4.00
Return on investment	5%	10%	15%	20%

#### Strategy 2: One share of the leveraged firm and lending \$10 at 10%

	Expected and other outcomes			
Earnings on shares	\$0.00	\$1.00	\$2.00	\$3.00
Interest on \$10 loan	\$1.00	\$1.00	\$1.00	\$1.00
Net earnings on investment	\$1.00	\$2.00	\$3.00	\$4.00
Return on investment	5%	10%	15%	20%

Notes: Return on investment = Net earnings/Investment The shaded cells indicate the expected outcome



## **Key Concepts**

• Business risk is the variability of future net cash flows attributed to the nature of the firm's operations

• Financial risk is the risk attributed to the use of debt as a source of financing a firm's operations

•The level of financial leverage varies across firms in the same industry as well as across firms in different industries

 Modigliani and Miller's proposition 1 states that the market value of a firm is independent of its capital structure



#### Key Relationships/Formula Sheet

- The weighted average cost of capital:  $k_o = \left(\frac{D}{D+E}\right)k_d + \left(\frac{E}{D+E}\right)k_e$
- The cost of equity:  $k_e = k_o + \frac{D}{E} (k_o k_d)$
- The systematic risk of equity:  $\beta_e = \beta_o + \frac{D}{E} (\beta_o \beta_d)$

