
Corporate Finance

Lecture 7: Firm's Capital Structure: Debt Equity and the Modigliani and Miller Theorem

Albert Banal-Estanol

Financing Decision

- How are we going to pay for any investment?
 - Internal capital: retain earnings generated
 - External capital: Debt or equity?
 - Debt holder claims must be paid in full before the claims of equity holders can be paid
 - Equity holders elect the board of directors and thus ultimately control the firm
 - Equity holders receive cash in the form of dividends, which are not tax-deductible, while the interest payments of debt are a tax-deductible expense

Firm's Capital Structure

- Definition: “Firm’s mix of debt and equity financing”
- Firms try to issue the best combination of different types of equity and debt claims

Modigliani-Miller theorem

Proposition 1: Capital structure of the firm is irrelevant in the absence of...

- ❑ Arbitrage opportunities
 - ❑ Taxes
 - ❑ Costs of bankruptcy
 - ❑ Information problems
 - ❑ Transaction costs
- } Sum of cash flows to debt and equity holders is constant

Proof (1)

- Take two identical firms, U and L, except for their capital structure

They exist for a year and produce identical pretax profits X at the end of the year

One is unleveraged (no debt) and the other is leveraged (has some debt)

Assume that its debt is riskless, at the interest rate

r_D

Total and split cash flows are...

Proof (2): Cash Flows

	Company U		Company L	
	Future Cash Flow	Current Cash Flow	Future Cash Flow	Current Cash Flow
Debt	0	0	$(1 + r_D)D$	D
Equity	X	V_U	$X - (1 + r_D)D$	E_L
Total	X	V_U	X	$V_L = D + E_L$

Proof (3): What if $V_L < V_U$?

- What if U has \$100m worth of equity (V_U) and L has \$60m of equity (V_L) and \$30m of debt (D)?
 - Buy 10% of equity of L (\$6m) and 10% of debt of L (\$3m)
 - Sell short 10% of equity of U (\$10m)
 - Cash inflow of \$1m at the beginning of the year
 - At the end of the year...
 - Receive: $.1[X - (1+r_D)D] + .1(1+r_D)D$
 - Pay: $.1X$
 - In total: 0!!
 - Arbitrage opportunity!
- Similarly, arbitrage opportunity if $V_L > V_U$
- Therefore $V_L = V_U$

Alternative Interpretation

Example: Stanley and Elco

Elco

Number of shares	1000
Price per share	\$100
Market Value of Shares	\$100,000
Market value of debt	\$10,000

Stanley

Number of shares	100
Payoff	$.1[X - (1 + r_D)10,000] = .1X - (1 + r_D)1,000$

Undoing the Capital Structure Change

Example: Stanley and Elco

Elco

Number of shares	500
Price per share	\$100
Market Value of Shares	\$ 50,000
Market value of debt	\$ 60,000

Stanley

Alternative A: Number of shares	100
Payoff	$.2[X - (1 + r_D)60,000]$
Alternative B: Number of shares	50
Payoff	$.1[X - (1 + r_D)60,000] + r_D 50,000 = .1X - (1 + r_D)10,000$

Therefore...

- Shareholders can undo the effect of a change
- Shareholder is indifferent to changes in the firm's capital structure

What if debt may not be repaid?

Example: Suppose that the ownership can costlessly move from shareholders to debt holders

Elco

Number of shares	1000
Price per share	\$100
Market Value of Shares	\$100,000
Market value of debt	\$10,000

Stanley

Number of shares	100
Payoff	$.1[X - (1 + r_{DS})10,000] = .1X - (1 + r_{DS})1,000$ (if this amount is positive!) (<i>DS</i> stands for senior debholders, "or paid first")

Suppose new debt is junior (subordinated)

Example: Elco issues again new debt and Stanley buys

	Scenario A: cash flow exceeds all obligations	Scenario B: cash flow exceeds sr but not jr debt obligations	Scenario C: cash flow does not exceed sr debt obligations
50 shares of stock	$.1[X - (1+r_{DS})10,000 - (1+r_{DJ})50,000]$	0	0
5000 of new debt	$(1+r_{DJ})5,000$	$.1[X - (1+r_{DS})10,000]$	0
Total	$.1[X - (1+r_{DS})10,000]$	$.1[X - (1+r_{DS})10,000]$	0

What if new debt is not subordinated?

- Transfer of wealth from existing debt holders to shareholders:
 - If new debt has the same seniority then the existing debt holders are worse off
 - In scenarios B and C, shareholders are better off
- Still, total value is unaltered: M&M still holds