Does Debt Policy Matter?

Chapter 18

Capital Structure

• The mix of a firm’s debt and equity financing is called its capital structure.

• If a firm is 100% equity, cash flows belong to stockholders. If a firm is financed with both stock and bonds, the cash flows are split into two streams.

• There can be many choices of financing (more than bonds and equity).
  – Some are preferred stock, convertible bonds, lower class bonds, etc.

Leverage Impact

Consider Two Hypothetical Firms:

Firm U  Firm L

| No debt | $10,000 of 12% debt |
| $20,000 in assets | $20,000 in assets |
| 40% tax rate | 40% tax rate |

Both firms have same operating leverage, business risk, and EBIT of $3,000. They differ only with respect to use of debt. The assets of Firm L are split between bond and stockholders.

Impact of Leverage on Returns

<table>
<thead>
<tr>
<th>Firm U</th>
<th>Firm L</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT</td>
<td>$3,000</td>
</tr>
<tr>
<td>Interest</td>
<td>0</td>
</tr>
<tr>
<td>EBT</td>
<td>$3,000</td>
</tr>
<tr>
<td>Taxes (40%)</td>
<td>1,200</td>
</tr>
<tr>
<td>NI</td>
<td>$1,800</td>
</tr>
<tr>
<td>ROE</td>
<td>9.0%</td>
</tr>
</tbody>
</table>

1,800/20,000 = 9% 1,080/10,000 = 10.8%

Capital Structure

• Who are Modigliani and Miller?
  – They published theoretical papers that changed the way people thought about financial leverage.
  – They won Nobel prizes in economics because of their work.
  – MM’s papers were published in 1958 and 1963. Miller had a separate paper in 1977. The papers differed in their assumptions about taxes.

Capital Structure Theory

• MM theory
  – Zero taxes
  – Model Assumptions
    • Firms can be grouped into homogeneous classes based on business risk.
    • Investors have identical expectations about firms’ future earnings.
    • There are no transactions costs.
    • All debt is riskless, and both individuals and corporations can borrow unlimited amounts of money at the risk-free rate.
    • All cash flows are perpetuities. This implies perpetual debt is issued, firms have zero growth, and expected EBIT is constant over time.
MM with Zero Taxes (1958)

- Proposition I:
  - $V_L = V_U$
    - The market value of any firm is independent of its capital structure

- Proposition II:
  - $r_e = r_A + (r_A - r_d)(D/E)$
    - The expected rate of return on the common stock of a levered firm increases in proportion to the debt-equity ratio
  - $r_A$ is the expected rate of return on a portfolio of all the firm’s securities
  - $r_d$ is the expected return on the debt
  - $r_e = r_A$ if the firm has no debt

MM Results: Zero Taxes

- MM assume: (1) no transactions costs; (2) no restrictions or costs to short sales; and (3) individuals can borrow at the same rate as corporations.
- Under these assumptions, MM prove that if the total CF to investors of Firm U and Firm L are equal, then the total values of Firm U and Firm L must be equal:
  - $V_L = V_U$
- Because the values of firms L and U are equal, their WACCs are equal.
- Therefore, capital structure is irrelevant.

Given the following data, find $V$, $S$, $r_s$, and WACC for Firms U and L.

- Firms U and L are in same risk class.
- $EBIT_{UL} = $500,000.
- Firm U has no debt; $r_e = 14\%$.
- Firm L has $1,000,000$ debt at $r_d = 8\%$.
- The basic MM assumptions hold.
- There are no corporate or personal taxes.

1. Find $V_U$ and $V_L$

$$V_U = \frac{EBIT}{r_e} = \frac{500,000}{0.14} = 3,571,429.$$  
$$V_L = V_U = 3,571,429.$$  

2. Find the market value of Firm L’s debt and equity.

$$V_L = D + E = 3,571,429$$  
$$3,571,429 = 1,000,000 + E$$  
$$E = 2,571,429.$$
3. Find $r_e$

- $r_e = r_A + (r_A - r_d)(D/E)$
- $= 14.0\% + (14.0\% - 8.0\%)(1,000,000/2,571,429)$
- $= 14.0\% + 2.33\% = 16.33\%$.

4. Proposition I implies $WACC = r_e$.
Verify for L using WACC formula.

$$WACC = \frac{D}{V}r_d + \frac{E}{V}r_s$$

$$= \left(\frac{\$1,000,000}{\$3,571,429}\right)(8.0\%)$$
$$+ \left(\frac{\$2,571,429}{\$3,571,429}\right)(16.33\%)$$
$$= 2.24\% + 11.76\% = 14.00\%.$$