Capital Structure and the effect of Corporate Taxes

Gestão Financeira II

Undergraduate Courses

2010-2011

Capital Structure in the presence of Tc

- We depart from Modigliani-Miller's perfect world, adjusting their original analysis in order to include real-life imperfections.
- We start by examining the effect of Corporate Taxes.
- Corporations pay taxes on their profits after interest payments are deducted. Thus, interest expense reduces the amount of corporate taxes. This creates an incentive to use debt.
- Later we will see that there are also disadvantages in using debt. Otherwise, firms would choose 100% Debt as their capital structures.

Interest Tax Deduction

- Example: Consider Safeway, Inc. which had earnings before interest and taxes of approximately $1.85 billion (EBIT) in 2008, and interest expenses of about $350 million. Safeway's marginal corporate tax rate was 35%.
  - Safeway's net income in 2008 was lower with leverage than it would have been without leverage.

	With Leverage	Without Leverage
EBIT	$1850	$1850
Interest expense	–350	0
Income before tax	1500	1850
Taxes (35%)	–525	–648
Net income	$975	$1202

  - Safeway's debt obligations reduced the value of its equity. But the total amount available to all investors was higher with leverage (350+975).
  - Where does the additional $123 million come from?

Interest Tax Shield

- The Interest Tax Shield is the reduction in taxes paid due to the tax deductibility of interest.

- In Safeway's case, the gain is equal to the reduction in taxes with leverage:
  - Look: $648 million − $525 million = $123 million.
  - The interest payments provided a tax savings of 35% × $350 million = $123 million.

Computing the Interest Tax Shield

- Example:

Computing the Interest Tax Shield

Problem

Shown below is the income statement for D.F. Builders (DFB). Given its marginal corporate tax rate of 35%, what is the amount of the interest tax shield for DFB in years 2006 through 2009?

DFB Income Statement ($ millions)	2006	2007	2008	2009
Total sales	$3369	$3706	$4077	$4432
Cost of sales	–2359	–2584	–2867	–3116
Selling, general, and administrative expense	–226	–248	–276	–299
Depreciation	–22	–25	–27	–29
Operating income	762	849	907	988
Other income	7	8	10	12
EBIT	769	857	917	1000
Interest expense	–50	–80	–100	–100
Income before tax	719	777	817	900
Taxes (35%)	–252	–272	–286	–315
Net income	$467	$505	$531	$585

Computing the Interest Tax Shield

Solution

From Eq. 15.1, the interest tax shield is the tax rate of 35% multiplied by the interest payments in each year:

($ millions)	2006	2007	2008	2009
Interest expense	–50	–80	–100	–100
Interest tax shield (35% × interest expense)	**17.5**	**28**	**35**	**35**

Thus, the interest tax shield enabled DFB to pay an additional $115.5 million to its investors over this period.

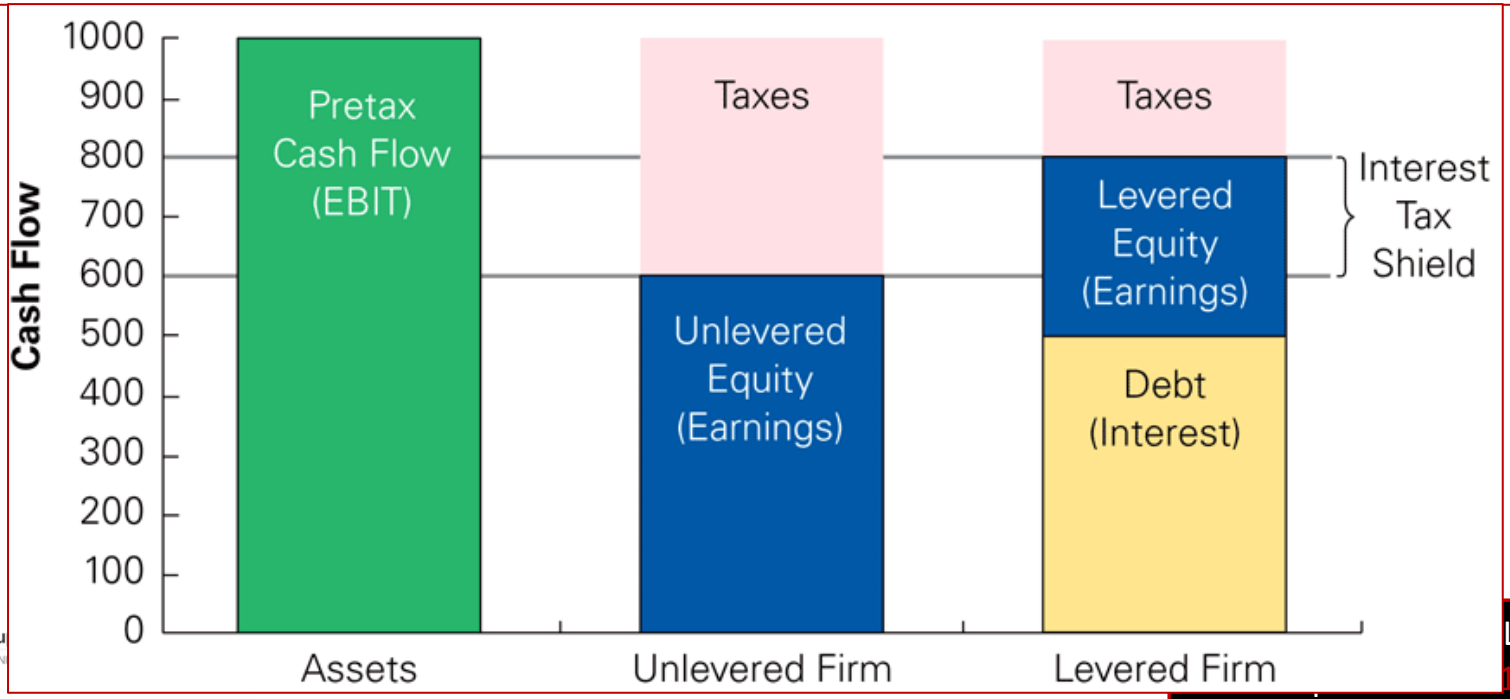
What's the Present value of the Interest Tax Shield?

- When a firm uses debt, the interest tax shield provides a corporate tax benefit each year.
- This benefit is the computed as the present value of the stream of future interest tax shields the firm will receive.
- *We will see that when securities are fairly priced, the original shareholders of a firm capture the full benefit of the interest tax shield from an increase in leverage*.

The Interest Tax Shield and Firm Value

- The cash flows that a levered firm (i.e., a firm with debt financing) pays to investors will be higher than they would be without leverage (i.e., without debt) by the amount of the interest tax shield.

$$\begin{pmatrix}\text{Cash Flows to Investors}\\ \text{with Leverage}\end{pmatrix} = \begin{pmatrix}\text{Cash Flows to Investors}\\ \text{without Leverage}\end{pmatrix} + (\text{Interest Tax Shield})$$



MM Proposition I (with Tc)

- We can adjust MM's Proposition I, to consider the effect of corporate taxation.
- MM Proposition I with Corporate Taxes:
  - *The total value of the levered firm exceeds the value of the firm without leverage due to the present value of the tax savings from debt.*

$$V^L = V^U + PV(\text{Interest Tax Shield})$$

Value of the **L**evered firm

Value of the **U**nlevered firm

The Interest Tax Shield and Firm Value

- Example: **Valuing the interest tax shield of Riskless Debt**
  - Suppose ALCO plans to pay $60 million in interest each year for the next 8 years, and then repay the principal of $1 billion in year 8.
  - These payments are risk free, and ALCO's marginal tax rate will remain 39% throughout this period.
  - If the risk-free interest rate is 6%, by how much does the interest tax shield increase the value of ALCO?
  - The annual interest tax shield is:
    - $60 million × 39% = $23.4 million for 8 years.

$$PV(\text{Interest Tax Shield}) = \$23.4 \text{ million} \times \frac{1}{6\%}\left(1 - \frac{1}{1.06^{8}}\right)$$

$$= \$145.31 \text{ million}$$

The Interest Tax Shield with Permanent Debt

- Typically, the level of future interest payments is uncertain due to changes in the marginal tax rate, the amount of debt outstanding, the interest rate on that debt, and the risk of the firm.
- For simplicity, we will consider the special case in which the above variables are kept constant.
- Suppose **a firm borrows debt *D* and keeps the level of debt permanently**. If the firm's marginal tax rate is τ_c, and if the debt is riskless with a risk-free interest rate r_f, then the interest tax shield each year is $\tau_c \times r_f \times D$, and the tax shield can be valued as a perpetuity.

$$PV(\text{Interest Tax Shield}) = \frac{\tau_c \times \text{Interest}}{r_f} = \frac{\tau_c \times (r_f \times D)}{r_f}$$

$$= \tau_c \times D$$

The Weighted Average Cost of Capital with Corporate Taxes

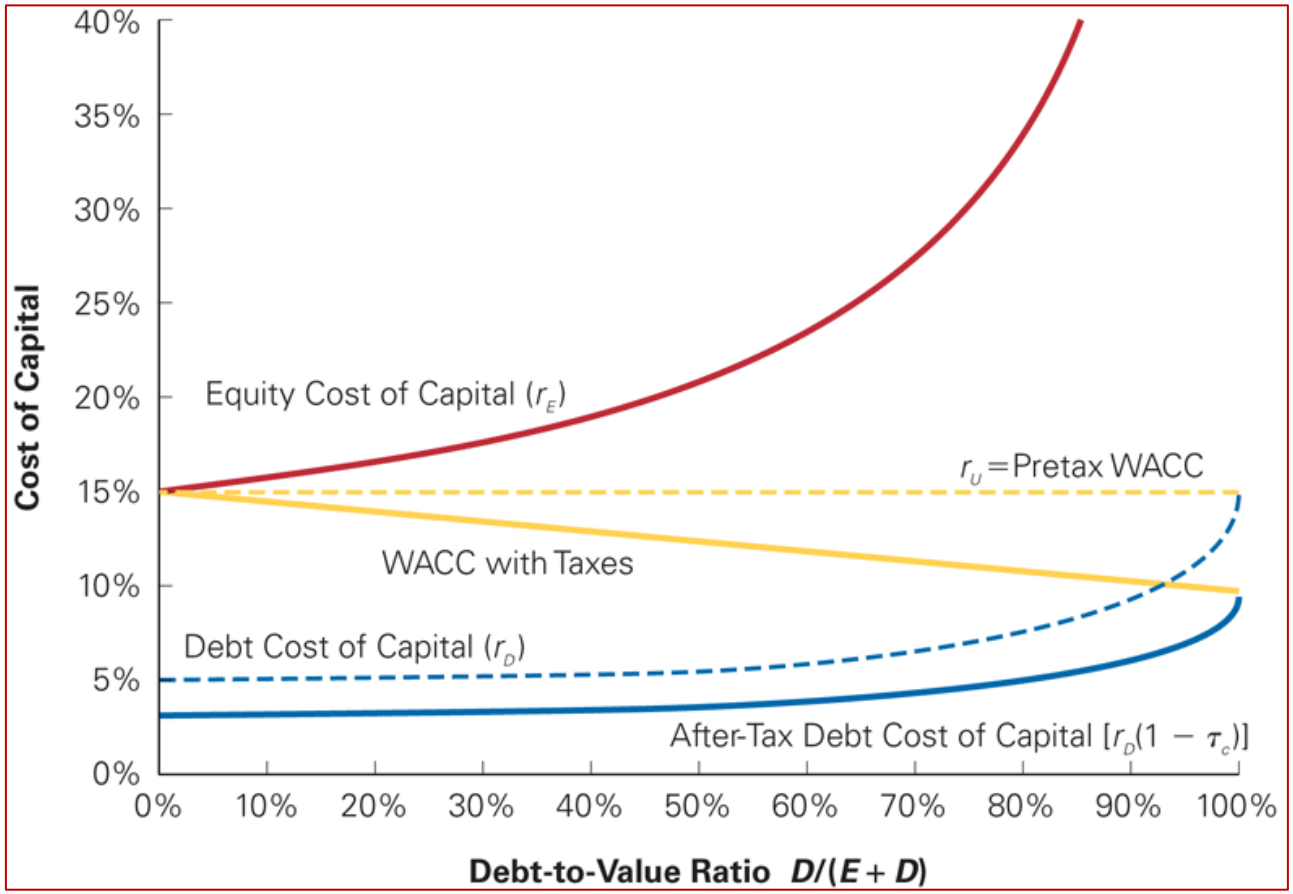
- With tax-deductible interest, the effective after-tax borrowing rate is $r_D(1 - \tau_c)$ and the weighted average cost of capital becomes

$$r_{wacc} = \frac{E}{E + D} r_E + \frac{D}{E + D} r_D (1 - \tau_c)$$

$$r_{wacc} = \underbrace{\frac{E}{E + D} r_E + \frac{D}{E + D} r_D}_{\text{Pretax WACC}} - \underbrace{\frac{D}{E + D} r_D \tau_c}_{\text{Reduction Due to Interest Tax Shield}}$$

The Weighted Average Cost of Capital with Corporate Taxes

- For different target Debt-to-Value ratios, the WACC with taxes will change:



The Interest Tax Shield with a Target D/E ratio

- When a firm adjusts its leverage to maintain a **target debt-equity ratio**, we can compute its value with leverage, V^L, by discounting its free cash flow using the weighted average cost of capital.

- The Unlevered value of the firm, V^U, can be computed by discounting the FCFs at the firm's unlevered cost of capital, the pretax WACC.

- The value of the interest tax shield can be found by comparing the difference between V^L and V^U.

The Interest Tax Shield with a Target D/E ratio

- Example: Western Lumber Company expects to have
  - FCF in the coming year of $4.25 million;
  - The FCF is expected to grow at a rate of 4% per year thereafter;
  - Equity Cost of Capital (r_E) is 10%;
  - Debt Cost of Capital (r_D) is 6%;
  - Pays a corporare tax rate (T_C) of 35%;
  - If Western Lumber maintains a debt-equity ratio (D/E) of 0.50, what is the value of its interest tax shield?

The Interest Tax Shield with a Target D/E ratio

- If the firm were Unlevered we could compute its value by discounting the FCFs at the Pre-tax WACC:

$$\text{Pre-Tax wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D = \frac{1}{1+0.5} 10\% + \frac{0.5}{1+0.5} 6\% = 8.67\%$$

$$V^U = \frac{\$4.25}{0.0867 - 0.04} = \$91 \text{ million}$$

- Given that the firm has a target ratio D/E=0.50, we can value it by discounting its FCFs at the WACC:

$$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1-\tau_C) = \frac{1}{1+0.5} 10\% + \frac{0.5}{1+0.5} 6\% (1-0.35) = 7.97\%$$

$$V^L = \frac{\$4.25}{0.0797 - 0.04} = \$107 \text{ million}$$

- The present value of the interest tax shield is the difference between the two valuations:
  - PV(Interest Tax Shield)= \$107 - \$91 = \$ 16 million.

Recapitalizing to capture the Interest tax Shield

- Firms may be tempted to repurchase shares with new issued debt in order to capture a higher interest tax shield. It is the original shareholders who benefit from the tax shield of increased leverage!
- Example: Midco Industries wants to boost its stock price. The company currently has:
  - Shares Outstanding: 20 million;
  - With a Stock Price: $15 per share;
  - No Debt;
  - Stable earnings;
  - Pays a 35% corporate tax rate.

Recapitalizing to capture the Interest tax Shield

- The company plans to borrow $100 million on a permanent basis, and use the funds to repurchase outstanding shares.

- Without leverage
  - V^U = (20 million shares) × ($15/share) = $300 million
- If Midco borrows $100 million using permanent debt, the present value of the firm's future tax savings is
  - PV(interest tax shield) = $\tau_c D$ = 35% × $100 million = $35 million

- Thus the total value of the levered firm will be
  - $V^L = V^U + \tau_c D$ = $300 million + $35 million = $335 million

Recapitalizing to capture the Interest tax Shield

- Because the value of the debt is $100 million, the new value of the equity must be:
  - $E = V^L - D$ = $335 million − $100 million = $235 million
- Total value of outstanding equity drops, BUT shareholders will also receive the $100 million that Midco will pay out through the share repurchase.
- In total, equity-holders will receive the full $335 million, a gain of $35 million over the value of their shares without leverage.
- Given the higher total value that accrues to equity-holders, we should actually expect a stock price increase to:
  - Stock Price = $335 million/20 million = $16.75

Recapitalizing to capture the Interest tax Shield

- With a repurchase price of $16.75, the shareholders who tender their shares and the shareholders who hold their shares both gain $1.75 per share as a result of the transaction.
  - $16.75 – $15 = $1.75
- The company repurchases how many shares?
  - $100 million/$16.75 = 5 970 149 .3 (needs rounding for integer number of shares)
  - Spending the $100 million raised
- The number of shares that remains outstanding is:
  - 20 000 000 – 5 970 149 = 14 029 851
  - With a total market capitalization of 14 029 851*$16.75= $235 million