Capital Structure: With **Corporate** Income Taxes

(Welch, Chapter 18-1)

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M&M Insight I

▶ Does M&M (Modigliani-Miller) teach us that even in a PCM, capital structure does not matter?

M&M Insight II

- ▶ Does M&M teach us that managers in a PCM do not care about capital structure?

M&M Insight III

- ▶ Does M&M teach us that capital structure in the real world does not have value consequences?

M&M Insight IV

▶ Why study capital structure if it makes no difference?

What Matters?

WTH?

- ▶ If even capital structure does not matter, does anything matter?
- ▶ Next, you will tell us that even price-earnings ratios do not matter?!

Who Owns The Firm?

- ▶ Do debt and equity together really own the entire firm?

Do Corporations Pay Taxes?

- Do corporations pay taxes?

Who Pays Taxes?

- ▶ Does your house pay taxes?
- ▶ But here, we have different house owners!

Before or After-Tax Income?

- ▶ Does any one specific investor care about before-tax or after-tax income?

- ▶ Think $200 in income taxed at 50%, vs
- ▶ $100 in income taxed at 0%.

Symmetric Insight I

- Which form of financing is preferable, if debt and equity are treated symmetrically? I.e.,
  - corporate payments to creditors and shareholders are deducted from profits (before calculating corporate income taxes), and
  - shareholders and creditors pay equal taxes on receipts.

Asymmetric Insight II

- Which form of financing is preferable, if debt and equity are **not** treated symmetrically? I.e.,
  - corporate payments to creditors but **not to shareholders** can be deducted from profits, and
  - shareholders and creditors pay equal taxes on receipts.

Tax Code

- ▶ Recall Imperfect Capital Markets Chapter 11:
  - ▶ Taxes and the tax code change often.
- ▶ Taxes are different across types of income
  - ▶ Ordinary W-2 Labor Income (high),
  - ▶ Interest Income (high),
  - ▶ Dividend Payments (medium),
  - ▶ Capital Gains (low).
- ▶ Applies also (mostly) to corporations.

Investor Heterogeneity

- ▶ Endowments of churches, charities, and many not-for-profits are tax-exempt.
  - ▶ Mormon Church, United Way, Harvard University.
- ▶ Your 401-K is (partly) tax-exempt (tax-delayed).
- ▶ Foreign holders are mostly US tax-exempt.
  - ▶ Saudi royal family; Chinese princelings, Russian oligarchs, Foreign Dictators, Complex foreign vehicles by US corps and billionaires.

Corporate Heterogeneity

- ▶ Some firms with NOLs may have almost no corporate income tax obligations,
  - ▶ but this is relatively rare.
- ▶ Some firms enjoy preferred income-tax and other treatment,
  - ▶ because Congress often passes new corporate exemptions and shelters, some targeted at single companies!
- ▶ Many large **Tech** companies either pay zero or top rate.

Do Taxes Favor Infinite Debt?

- Cliff-hanger—this will be covered later.
- For now, assume there are none.
- In real life:
  - The IRS may not play along.
  - Financial distress costs may increase.
  - Other debt advantages and disadvantages may appear (e.g. ex-post expropriation, under-investment, free cash flow discipline).
  - See Chapter 19.

Tax Forces: One Among Others

- In private firms, with too much debt, the equity holder may be poorly diversified and dislike owning only equity.
- The lower personal capital gains on equity sheltering may take effort and costs:
  - May not always be shelterable to inheritance.
  - There are also special capital-gains tax rules for controlling and foreign equity.
- "Good model sketch," but not perfectly accurate.

Thought Experiment: Own Both

- For now, think of yourself as *both* the full debt *and* the full equity holder.
    - this makes understanding concepts easier, and
    - is kosher if debt can be issued at fair price.
    - "Near-Perfect" *except* for corporate income tax.

- Assume **zero** *personal* income tax
- Worry only about *corporate* income tax.

Hypothetical Firm I

- ▶ Investment Cost: $200
- ▶ Operating Income (before tax): $80
- ▶ Interest: $0
- ▶ Income before tax: +$80
- ▶ Corporate Income Taxes To Pay (Paid) at 30%:
- ▶ Note: Return next year will be $280
- ▶ Work out Corporate Income, Post-Tax:

Hypothetical Firm II

▶ How much will you vs Uncle Sam, respectively, receive from the corporation **next year**?

Your Take of PV I

- ▶ As the holder of all debt and equity
- ▶ if the firm issued bonds worth \$139.16 today at an interest rate of 9% (which comes to $r_D \cdot D_0 = 9\% \cdot \$139.16 \approx \$12.52$ interest payments next year), then
  - ▶ ▶ What will be your tax payments?
    - ▶ What will be your receipts?
    - ▶ What is the PV to you (at 12%)?

Your Take of PV II

- ► Investment Cost: $200
- ► Operating Income (before tax): $80
- ► Interest: $12.52
- ► Income before tax:
- ► Corporate Income Taxes To Pay (Paid) at 30%:
- ► Work out Corporate Income, Post-Tax:
- ► Work out PV:

Check: Debt-to-Value Ratio

- *Check*: What is the debt-to-value ratio?

Flow-To-Equity: PV and Taxes

- ▶ What is the difference between corporate income taxes in the two scenarios?
- ▶ What is the difference between your net receipts in the two scenarios?
- ▶ What is the PV of this difference?

Flow-To-Equity: Method

- ▶ You build the complete pro-forma, and you subtract out interest before you calculate corporate income taxes.

- ▶ Of course, you will need to estimate the appropriate CoC when changing debt.

- ▶ Method is a little misnamed. Could instead be called **Flow-To-Debt-and-Equity** or **Pro-Forma Method**.

Debt-to-Value Ratio

- Compared to 100% equity financing ($V = \$256/1.12$), how much tax-shelter are you getting from a debt/value ratio of 60%?

- What if you take time-discounting into account?

Value of Tax Shelter

- ▶ If you have created only the set of financials without debt, then how can you assess the PV of the tax shelter by formula?

Refinanced Value

- If you start with the *as-if-100%-equity-financed-and-fully-taxed* cash flows of $228.57 today (and contemplated a leverage restructuring),
- then what (APV) formula would you use to compute the value if you go to a 60/40 debt-capital refinanced value?

APV First Base Term

- ► In APV, what exactly is the first-term cash flow that is then adjusted up?
- ► Is it the *current as-is* capital-structure cash flow?

Nerd: Tax Shield CoC

- ▶ Why does the tax shield have a CoC of R_{FM}?
  - ▶ Because we punted on a variety of issues (such as promised vs expected rates),
  - ▶ This CoC is a mistake but one of second-order.
    - ▶ Importantly, not on CoC on the entire firm, but on just on a small part of firm value (tax deduction aspect).

- ▶ Nerds can read more details in the textbook.

WACC (with Taxes) vs APV

- ► Like APV, WACC starts with the *fully-taxed as-if-100%-equity-financed* value of the firm.

- ► But whereas APV adds back the tax shelter,

- ► WACC instead reduces the effective CoC.
  - ► WACC is more convenient for a firm with a constant **ratio** of debt over time.
  - ► APV is more convenient for a firm with a constant **amount** of debt over time.

WACC Derivation from APV

$$APV = PV =$$

$$= \frac{\$256}{(1 + 12\%)} + \frac{30\% \cdot (\overbrace{9\% \cdot \$139.156}^{\$12.52})}{(1 + 12\%)} = \$231.92.$$

where $30\% \cdot \$12.52 = \$3.7572$

$$PV = \frac{E(CF)}{[1 + E(R_{FM})]} + \frac{\tau \cdot (E(R_{DT}) \cdot DT)}{[1 + E(R_{FM})]}.$$

Multiply by 1+ERfm

$$(1 + 12\%) \cdot \$231.92 = \$256 + 30\% \cdot (9\% \cdot \$139.156)$$

$$[1 + E(R_{FM})] \cdot PV = E(CF) + \tau \cdot E(R_{DT}) \cdot DT.$$

Move Tax Term To The LHS

$$(1 + 12\%) \cdot \$231.92 - 30\% \cdot (9\% \cdot \$139.156) = \$256.$$

$$[1 + E(R_{FM})] \cdot PV - \tau \cdot E(R_{DT}) \cdot DT = E(CF).$$

Pull out PV (Divide by it)

$$\{1 + 12\% - 30\% \cdot 9\% \cdot (\$139.156/\$231.92)\} \cdot \$231.92 \ = \ \$256.$$

$$\{ \quad [1 + E(R_{FM})] - \tau \cdot E(R_{DT}) \cdot (DT/PV) \quad \} \cdot PV \ = \ E(CF).$$

- ▶ Note: $30\% \cdot 9\% \cdot (\$139.156/\$231.92)$, which is
  $= 30\% \cdot 9\% \cdot 60\% = 1.62\%$.

What is DT/PV?

$DT/PV = \$139.156/\$231.92 = 60\%.$

$$[1 + 12\% - 30\% \cdot 9\% \cdot 60\%] \cdot \$231.92 = \$256$$

$$[1 + E(R_{FM}) - \tau \cdot E(R_{DT}) \cdot (w_{DT})] \cdot PV = E(CF)$$

Move Long CoC Factor to RHS

$$\$231.92 = \frac{\$256}{[1 + 12\% - 30\% \cdot 9\% \cdot (60\%)]}$$

$$PV = \frac{E(CF)}{[1 + E(R_{FM}) - \tau \cdot E(R_{DT}) \cdot (w_{DT})]}$$

▶ $\tau \cdot E(R_{DT}) \cdot w_{DT}$ "tax-adjusts" the WACC.

Almost Done!

- ▶ OK, we will just rewrite this a little,
- ▶ Let us express the tax-adjusted WACC in terms of its components—that is, not in terms of FM, but in terms of DT and EQ.
  - ▶ Check: $40\% \cdot 16.5\% + 60\% \cdot 9\% = 12\%$.

Expand ERFM and Rearrange

$$E(R_{FM}) - \tau \cdot E(R_{DT}) \cdot w_{DT}$$
$$= 12\% - 30\% \cdot 9\% \cdot 60\%$$
$$= 10.38\%.$$

$$= w_{EQ} \cdot E(R_{EQ}) + w_{DT} \cdot E(R_{DT}) \cdot (1 - \tau)$$
$$= 40\% \cdot 16.5\% + 60\% \cdot 9\% \cdot (1 - 30\%)$$
$$= 10.38\%.$$

Final WACC Formula

▶ The WACC-adjusted present value is

$$\frac{E(CF)}{1 + [w_{EQ} \cdot E(R_{EQ}) + w_{DT} \cdot E(R_{DT}) \cdot (1 - \tau)]}.$$

WACC Special Zero-Tax Case

- ▶ If the corporate tax-rate is zero, our new WACC formula collapses to the PCM WACC fomula.
  - ▶ The non-tax-adjusted WACC is not in practical use,
  - ▶ but every CFO is familiar with *and uses* the WACC formula with the tax-adjustment;
  - ▶ (and maybe half of them even do so correctly.)

Comparison of Tax Methods I

Situation	Method	Cash Flow Used	CoC	Value
PCM	WACC	$280	12.00%	not comparable
ICM	Flow-To-Equity	$280 – $24.00	12.00%	not used
		$280 – $20.24	12.00%	$259.8/1.12
ICM	WACC	$256	**10.38%**	$256/1.1038
ICM	APV	**$256 + $3.76**	12.00%	$259.8/1.12

Comparison of Tax Methods II

All three methods have the same goal:

- ► Flow-To-Equity means "go through pro-formas."
- ► APV and WACC adjust *as-if-fully-taxed* cash flows.
- ► The results should be (roughly) the same.

All three serve their purpose and can be useful.

Comparison Footnotes

- I prefer Flow-To-Equity, then APV, then WACC.
- WACC and APV add a tax subsidy for debt to a hypothetically *fully-taxed* firm.
- For long-lived firms, methods give slightly different numbers (due to E(r) & debt path).
- Mostly, all are ok, but:

Avoid *double-counting* mistakes!

Double-Counting Mistakes

- ▶ $259.75 already contains the tax benefit:
  - ▶ Never discount the $259.75 by the tax-adjusted WACC of 10.38%.
  - ▶ Never add the tax-shelter of $3.36, as in the APV calculation, to the $259.75.
- ▶ Use tax adjustments only on $256.
  - ▶ Never on current cash flows in WACC or APV, *unless* the firm happens to be 100% equity. There must be no *interest payments* in the IS.

A Quick Tax Savings Formula

One-Time Tax Saving

▶ If your firm levers up by $1 billion **for one year**, roughly how much will you be saving in corporate income tax?

Forever Tax Savings

- If your firm levers up by $1 billion **forever**, roughly how much will you be saving in corporate income tax?

WAZOO

- Why don't firms lever up to the wazoo?

Investment & Financing Decisions

- Are investment and financing decisions still separate in a world with corporate taxes?

- That is, can you first consider projects and worry about financing later?

Other Corporate Tax Shelters

- ▶ NOLs,
- ▶ Leasing,

Transfer Pricing

- ▶ Transfer pricing across countries — most of Google's assets are in Ireland.
  - ▶ where they were developed (right!?),
- ▶ Is Dell a U.S. company?
- ▶ Debt tax sheltering works but is not as effective as other shelters, especially if revenues are foreign.
- ▶ Transfer pricing is usually more effective.