

Capital Structure: With
Corporate Income Taxes

(Welch, Chapter 18-1)

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M&M Insight I

Does M&M 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.

Large 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 Among Others

- ▶ In private firms, with too much debt, the equity holder may be poorly diversified and really 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%:

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%:

Corporate Income, Post-Tax:

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 also be **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-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),
- ▶ because this CoC “mistake” is second-order (importantly, this is not the CoC on the entire firm, but just on a small part of firm value).

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

$$APV = PV =$$

$$= \frac{\$256}{(1 + 12\%)} + \frac{\overbrace{30\% \cdot (9\% \cdot \$139.156)}^{=\$3.7572}}{\overbrace{(1 + 12\%)}^{\$12.52}} = \$231.92.$$

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

Multiply by $1 + E(R_{FM})$

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

$$[1 + E(R_{FM})] \cdot PV$$

$$= E(CF) + \tau \cdot E(R_{DT}) \cdot DT.$$

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)

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

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

- ▶ 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

$$E(R_{FM}) - \tau \cdot E(R_{DT}) \cdot w_{DT}$$

$$= 12\% - 30\% \cdot 9\% \cdot 60\%$$

$$= 10.38\%.$$

$$= w_{EQ} \cdot E(R_{EQ}) + w_{DT} \cdot E(R_{DT}) \cdot (1 - \tau)$$

$$= 40\% \cdot 16.5\% + 60\% \cdot 9\% \cdot (1 - 30\%)$$

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 formula.

- ▶ 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 com
ICM	Flow-To- Equity	\$280 – \$24.00 \$280 – \$20.24	12.00% 12.00%	not used \$25
ICM	WACC	\$256	10.38%	\$25
ICM	APV	\$256 + \$3.76	12.00%	\$25

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 across countries — most of Google's assets are in Ireland, where they were developed (right!?),
- ▶ headquarter locations—is Dell a U.S. company?

Debt tax sheltering works, but it is not nearly as effective as many other shelters, especially if revenues are partly foreign.