CHARTA LEARNING · LESSON NOTES

# The cost of capital: debt, equity and WACC

CFA Level I · Corporate Issuers

**You will learn:** How to price debt after tax, preferred shares and common equity, blend them into the weighted average cost of capital (WACC), and use it as a hurdle rate for projects.

**Running example:** Examples use made-up figures: a bond with a 5% coupon trading at $926.40, a 25% tax rate, a risk-free rate of 3% and an equity risk premium of 5%. The company's capital is debt $400m, preferred $100m and common equity $500m at market value.

## 1. The cost of debt: what borrowing costs today

- Every funder wants a return, so a firm has a cost for each source and an average of them all. That average is what the business must beat or it destroys value. The plan: price debt after tax, price preferred and common equity, then weight and add.
- The cost of capital is about the next dollar raised, so use the rate borrowing would cost today, never the old coupon (the fixed interest rate set when the bond was issued).
- If the firm has a traded bond, use its yield to maturity: the single yearly return an investor earns buying at today's price and holding to repayment. It is found on a financial calculator.
- With no traded bond, use comparable issuers: the same credit rating and similar maturity. A weaker rating or a longer maturity means a higher yield. This yield is the pre-tax cost of debt.

BOND: $50 COUPON, $1,000 FACE VALUE, 10 YEARS

| | | |
|---|---|---|
| **Price of the bond today** | what investors pay | **$926.40** |
| **Yield to maturity** | found on a calculator | **6.00% (the pre-tax cost of debt)** |

## 2. The tax shield and the after-tax cost of debt

- Interest is deductible: it cuts the profit that is taxed. Dividends are not deductible. The tax saved by interest is the tax shield, so the true cost of borrowing is lower than the loan rate, and a higher tax rate makes debt cheaper.
- The firm bears 1 − t of the interest; the tax office pays the rest. The after-tax figure goes into the WACC.
- The trap: using the old coupon times (1 − t) is wrong because the coupon is history.

> **After-tax cost of debt = rd × (1 − t)**

PROFIT BEFORE INTEREST AND TAX $1,000, TAX RATE 25%; THEN THE COST OF DEBT

| | | |
|---|---|---|
| **Tax with no interest** | 25% × 1,000 | **$250** |
| **Tax with $60 of interest (6% on $1,000)** | 25% × 940 | **$235** |
| **Tax saved; net cost** | 250 − 235; 60 − 15 | **$15; $45 (4.5%, not 6%)** |
| **After-tax cost of debt** | 6.00% × 0.75 | **4.50%** |
| **Trap: old 5% coupon × 0.75** | wrong: it is history | **3.75%** |

**Watch out:** Using the old coupon; forgetting the tax adjustment on debt, or applying it to preferred or common equity.

## 3. The cost of preferred and common equity

- Owners are promised nothing and are paid last, so they need a higher return, and dividends give no tax shield. Equity is the more expensive source and must be estimated.
- Preferred shares pay a fixed dividend forever, so the cost is a perpetuity: dividend ÷ current price, with no tax adjustment. A lower price means a higher cost.
- Common equity, method 1, the capital asset pricing model (CAPM): risk-free rate plus beta times the equity risk premium. Do not stop at beta × premium, and use the premium, not the market return.
- Method 2, dividends and growth: next year's dividend ÷ price + growth. Use next year's dividend; if given the dividend just paid, multiply by (1 + g) first.
- Method 3, bond yield plus a risk premium (analysts often use 3 to 5 points). If estimates differ, ask which inputs drive the gap and which you trust most.

**Preferred = Dp ÷ Pp; Common = rf + β × ERP or D1 ÷ P0 + g**

| COST OF EACH EQUITY SOURCE | | |
|---|---|---|
| **Preferred: dividend $4, price $50** | 4 ÷ 50 | **8.00% (at $40: 10%)** |
| **CAPM: beta 1.2, ERP 5%, rf 3%** | 3.0% + 1.2 × 5.0% | **9.0%** |
| **Dividends: just paid $2.00, g 4%, price $40** | D1 = 2.00 × 1.04 = 2.08; 2.08 ÷ 40 = 5.2%; + 4.0% | **9.2%** |
| **Bond yield plus premium** | 6% + 3% | **9.0%** |

**Watch out:** Order of cost, dearest to cheapest: common, preferred, debt (after tax).

## 4. Blending into the WACC

- The WACC is each source's cost times its weight (share of total funding), added up. Weights add to 100%. Debt enters after tax; preferred and common enter as they are. A company with no preferred drops the middle leg.
- Use market values for the weights (what each source is worth today), or the target structure if the question gives one. Book values are old and for a successful firm understate the share of equity.
- The WACC is what it costs to keep every funder happy. Check weights sum to one and costs are annual rates before multiplying.

**WACC = wd × rd × (1 − t) + wp × rp + we × re**

| DEBT $400M (40%) AT 4.5% AFTER TAX, PREFERRED $100M (10%) AT 8%, COMMON $500M (50%) AT 9% | | |
|---|---|---|
| **Debt** | 40% × 4.50% | **1.80%** |
| **Preferred** | 10% × 8.00% | **0.80%** |
| **Common equity** | 50% × 9.00% | **4.50%** |
| **WACC** | 1.80 + 0.80 + 4.50 | **7.10%** |
| **With book equity $250m: weights 53% / 13% / 33%** | | **6.47% (understated by 0.63%)** |

**Watch out:** Using book weights, which put too little weight on the dear source and pull the average down.

## 5. WACC as a hurdle rate

- The WACC is the hurdle a project must clear. A return above it creates value; below it destroys value, even if accounting profit is made. It is the discount rate in a project's net present value (NPV).
- One WACC does not fit every project. It describes the average risk of the whole company.
- A riskier project faces a bar that is too low and bad ones slip through; a safer one faces a bar that is too high and good ones are rejected. Adjust the hurdle for the project's own risk.

| WACC 7.1%; EACH PROJECT COSTS $1,000 AND REPAYS IN ONE YEAR | | |
|---|---|---|
| **Project A repays $1,085** | return 8.5% > 7.1% | **NPV +$13: accept** |
| **Project B repays $1,060** | return 6.0% < 7.1% | **NPV −$10: reject** |
| **Riskier project: add 2 points** | 7.1% + 2 | **9.1%: Project A (8.5%) would be rejected** |

## 6. Changing the capital mix

- Swapping equity for debt looks like a free gift if the costs are held fixed, but more borrowing makes everyone nervous: lenders raise their rate and shareholders, bearing more risk, raise theirs.
- As debt rises, the WACC first falls (cheap debt replaces dear equity), then turns up as the rising costs win. The lowest point is the best mix.

DEBT AND COMMON EQUITY ONLY

| | | |
|---|---|---|
| **40% debt: costs 4.50% / 9.00%** | starting mix | **7.20%** |
| **50% debt, costs unchanged** | naive: too good to be true | **6.75%** |
| **50% debt, costs rise to 5.13% / 9.90%** | | **7.52%** |
| **30% debt, costs 4.01% / 8.26%** | | **6.98%** |

## Key takeaways

- Cost of debt is today's market yield to maturity, never the old coupon.
- After-tax cost of debt = rd × (1 − t); preferred and common get no tax adjustment.
- Preferred = dividend ÷ price. Common = rf + β × ERP, or D1 ÷ P0 + g, or bond yield plus a premium.
- From dearest to cheapest: common, preferred, debt.
- WACC = wd × rd × (1 − t) + wp × rp + we × re, using market value or target weights.
- WACC is the hurdle for projects of average risk; riskier projects need a higher hurdle.

## Quick check

1. A bond yields 8% and the tax rate is 30%. What is the after-tax cost of debt?
   **Answer:** 8% × (1 − 0.30) = 5.6%. Use the market yield, then the tax adjustment.
2. Preferred pays $2.50 a year and trades at $31.25. What is its cost?
   **Answer:** $2.50 ÷ $31.25 = 8%. Dividend over today's price.
3. 60% equity at 10% and 40% debt at 5% after tax. What is the WACC?
   **Answer:** 0.6 × 10% + 0.4 × 5% = 8%.