

***EXTRACT**

❖ **THE ADJUSTED PV METHOD (APV)**

- Diff to the WACC method bc instead of incorporating the tax benefits of debt in the discount rate, it is accounted for in the CFs.
- **APV:** A valuation method to determine the levered value of an investment by first calculating its unlevered value and then adding the value of the interest tax shield (as a CF).

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

1) **The first step in the APV method is to calculate the value of the FCFs then discounting it using the project's cost of capital as if it were NOT financed with leverage.**

- **Unlevered Cost of Capital:** The cost of capital of a firm, were it unlevered. For a firm that maintains a target leverage ratio, it can be estimated as the WACC computed without taking into acct the tax benefits of debt (pre-tax WACC).

$$r_U = \frac{E}{E + D}r_E + \frac{D}{E + D}r_D = \text{Pretax WACC}$$

- The interest tax shield is valued separately as a CF.
- The firm's unlevered cost of capital equals its pre-tax WACC bc it represents investors' required return for holding the entire firm (both equity and debt).
- This argument of using unlevered WACC relies on the assumption that the overall risk of the firm is independent of the choice of leverage.
- The tax shield will have the same risk as the firm if the firm maintains a **target leverage ratio**.

Target Leverage Ratio

- When a firm adjusts its debt proportionally to a project's value or its CFs (where the proportion need not be constant).
- A constant market D/E ratio is a special case of the target leverage ratio.

Eg) Avco

- For Avco, its unlevered cost of capital is calculated as: $r_U = 0.50 \times 10.0\% + 0.50 \times 6.0\% = 8.0\%$
 - This is the same as calculating a pre-tax WACC.
- The project's value without leverage is calculated as: $V^U = \frac{18}{1.08} + \frac{18}{1.08^2} + \frac{18}{1.08^3} + \frac{18}{1.08^4} = \59.62 m

Valuing the Interest Tax Shield

- The value of \$59.62m is the value of the unlevered project and does not include the value of the tax shield provided by the interest payments on debt.

$$\text{Interest paid in year } t = r_D \times D_{t-1}$$

- The Interest Tax Shield = Interest Paid x Corporate Tax Rate
- The expected debt capacity, interest payments, and tax shield for Avco's RFX Project

	Year	0	1	2	3	4
Interest Tax Shield (\$ million)						
1 Debt Capacity, D_t		30.62	23.71	16.32	8.43	—
2 Interest Paid (at $r_D = 6\%$)			1.84	1.42	0.98	0.51
3 Interest Tax Shield (at $\tau_c = 40\%$)			0.73	0.57	0.39	0.20

2) **The next step is to find the PV of the interest tax shield.**

- When the firm maintains a target leverage ratio, its future interest tax shields have similar risk to the project's CFs so they should be discounted at the project's unlevered cost of capital.

$$PV(\text{interest tax shield}) = \frac{0.73}{1.08} + \frac{0.57}{1.08^2} + \frac{0.39}{1.08^3} + \frac{0.20}{1.08^4} = \$1.63 \text{ m}$$

- The total value of the project with leverage is the sum of the value of the interest tax shield and the value of the unlevered project.

$$V^L = V^U + PV(\text{interest tax shield}) = 59.62 + 1.63 = \$61.25 \text{ m}$$

- The project's NPV is \$61.25m – \$28m = **\$33.25m** which is the same value found using the WACC approach.

Summary of the APV Method

- 1) Determine the investment's value without leverage – Discount FCFs using unlevered cost of capital (if target leverage ratio then it is the same as pre-tax WACC).
- 2) Determine the PV of the interest tax shield.
 - a) Determine the expected interest tax shield.
 - b) Discount the interest tax shield at the unlevered cost of capital.
- 3) Add the unlevered value to the PV of the interest tax shield to determine the value of the investment with leverage.

Adv of the APV Method

- It can be easier to apply than the WACC method when the firm does not maintain a constant D/E ratio.
 - If there is a constant D/E ratio, use WACC bc a constant ratio allows us to compute the value of the firm to calculate net borrowings and interest payments. Without a constant D/E ratio, use APV.
- It also explicitly values market imperfections and thus allows managers to measure their contribution to value.
 - Can work out the tax benefit of debt to the project bc it is valued as a separate item.

❖ **THE FLOW-TO-EQUITY METHOD**

- A valuation method that calculates the CF available to equity holders **taking into acct all payments to and from debt holders**. The CFs to equity holders are then discounted using the equity cost of capital.
- **FCF to Equity (FCFE)**: The FCF that remains after adjusting for interest payments, debt issuance and debt repayments.

- 1) **The First step in the FTE method is to determine the project's FCF to equity.**