CAPITAL STRUCTURE AND FIRM VALUE

ASSUMPTIONS

To examine the relationship between capital structure and cost of capital, the following simplifying assumptions are commonly made:

- No income tax
- 100 percent dividend payout
- Identical subjective probability distributions of operating income
- No growth

FOCUS OF ANALYSIS

$$r_D = \frac{I}{D} = \frac{\text{Annual interest charges}}{\text{Market value of debt}}$$

$$r_E = \frac{P}{E} = \frac{\text{Equity earnings}}{\text{Market value of equity}}$$

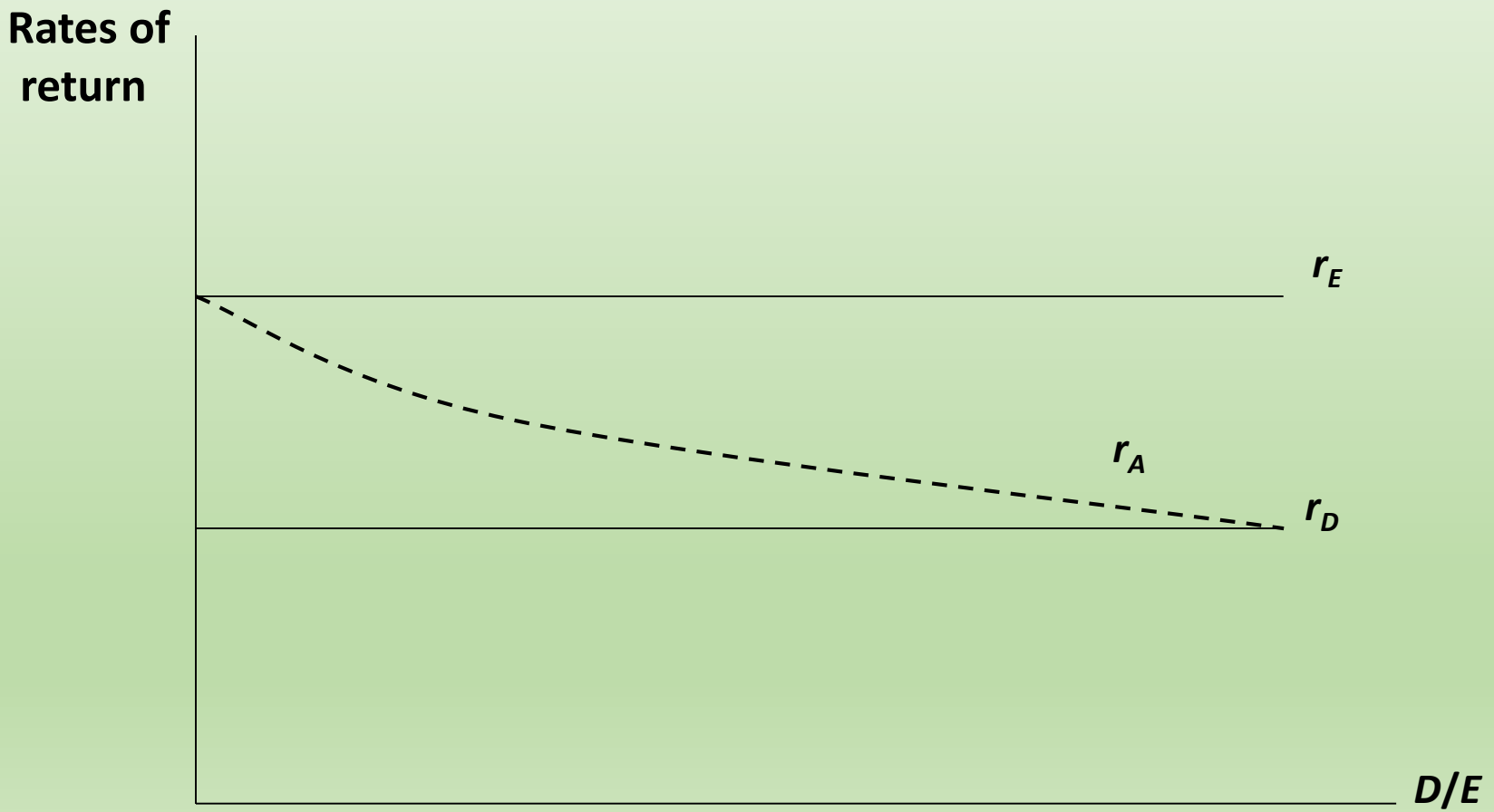
$$r_A = \frac{O}{V} = \frac{\text{Operating income}}{\text{Market value of the firm}}$$

$$r_A = r_D \left(\frac{D}{D + E} \right) + r_E \left(\frac{E}{D + E} \right)$$

What happens to r_D, r_E, and r_A when financial leverage, D/E, changes?

NET INCOME APPROACH

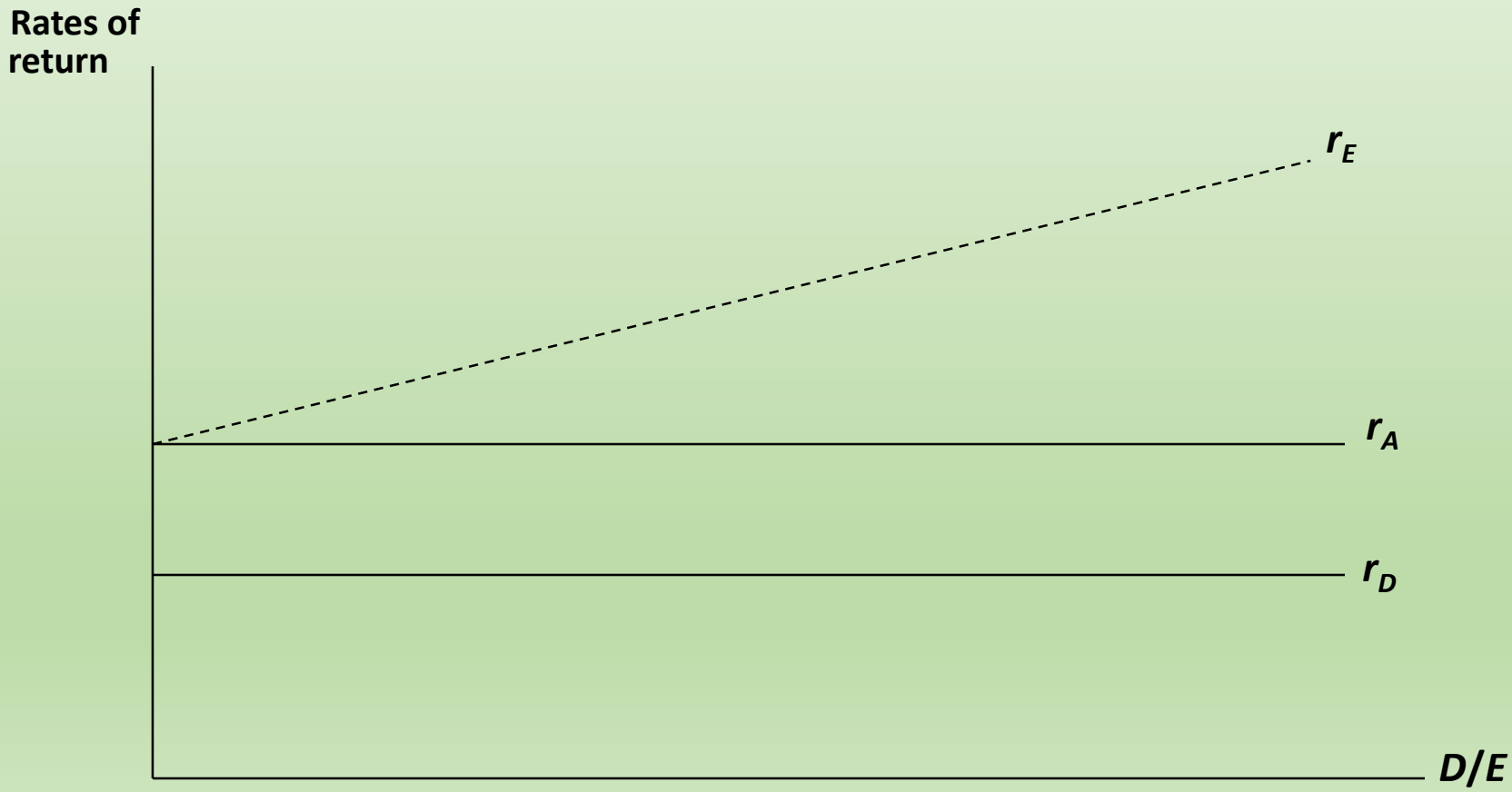
According to this approach, r_D and r_E remain unchanged when *D/E* varies. The constancy of r_D and r_E with respect to *D/E* means that r_A declines as *D/E* increases.



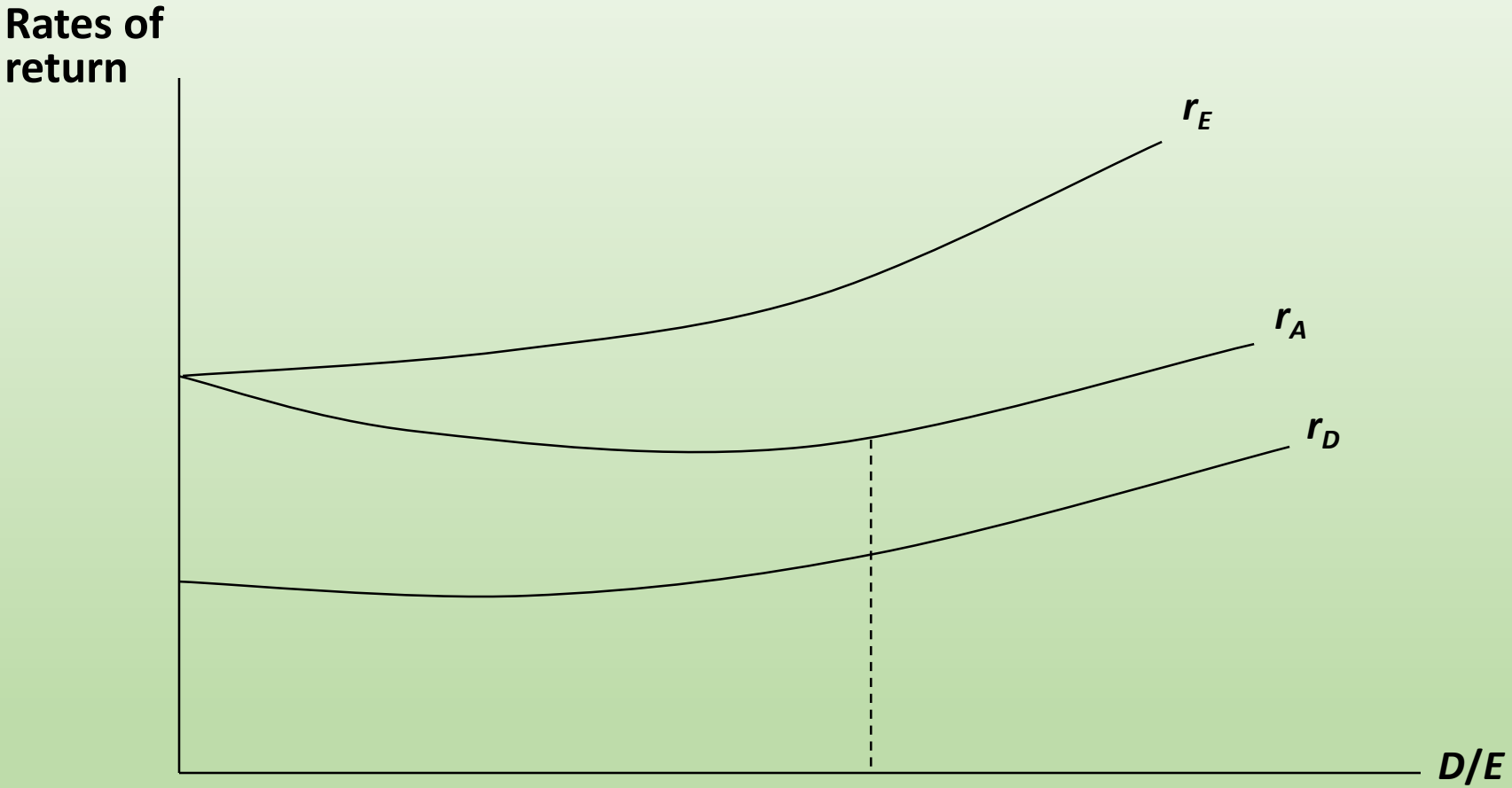
NET OPERATING INCOME APPROACH

According to this approach the overall capitalisation rate (r_A) and the cost of debt (r_D) remain constant for all degrees of leverage. Hence

$$r_E = r_A + (r_A - r_D)\,(D/E)$$



TRADITIONAL POSITION



MODIGLIANI AND MILLER (MM) POSITION

- Perfect Capital Market
- Rational Investors and Managers
- Homogenous Expectations
- Equivalent Risk Classes
- Absence of Taxation

MM PROPOSITION I

The value of a firm is equal to its expected operating income divided by the discount rate appropriate to its risk class. It is independent of its capital structure.

$$V = D + E = O/r$$

where V **= market value of the firm**

D **= market value of debt**

E **= market value of equity**

O **= expected operating income**

r **= discount rate applicable to the risk class to which the firm belongs**

MM PROPOSITION II

The expected return on equity is equal to the expected rate of return on assets, plus a premium. The premium is equal to the debt-equity ratio times the difference between the expected return on assets and the expected return on debt

$$r_E = r_A + (r_A - r_D)\,(D/E)$$

THE RISK-RETURN TRADEOFF

As leverage increases, equity shareholders require a higher return because equity beta increases.

$$\beta_E = \beta_A + D/E\ (\beta_A - \beta_D)$$

where β_E = equity beta

β_A = asset beta

D/E = debt-equity ratio

β_D = debt beta

CRITICISMS OF MM THEORY

- Firms and investors pay taxes
- Bankruptcy costs can be high
- Agency costs exist
- Managers tend to prefer a certain sequence of financing
- Informational asymmetry exists
- Personal and corporate leverage are not perfect substitutes

CORPORATE TAXES

When taxes are applicable to corporate income, debt financing is advantageous as interest on debt is a tax-deductible expense.

In general

$$V = \frac{O\,(1 - t_C)}{r} + t_C D$$

where V = value of the firm
O = operating income
t_C = corporate tax rate
r = capitalisation rate applicable to the unlevered firm
D = market value of debt

It means:

Value of levered firm = Value of unlevered firm + Gain from leverage

$$V_L = V_U + t_C D$$

CORPORATE TAXES AND PERSONAL TAXES

When personal taxes are considered along with corporate taxes, the tax advantage of a rupee of debt is:

$$1 - \frac{(1 - t_c)(1 - t_{pe})}{(1 - t_{pd})}$$

where t_c = corporate tax rate

t_{pd} = personal tax rate on debt income

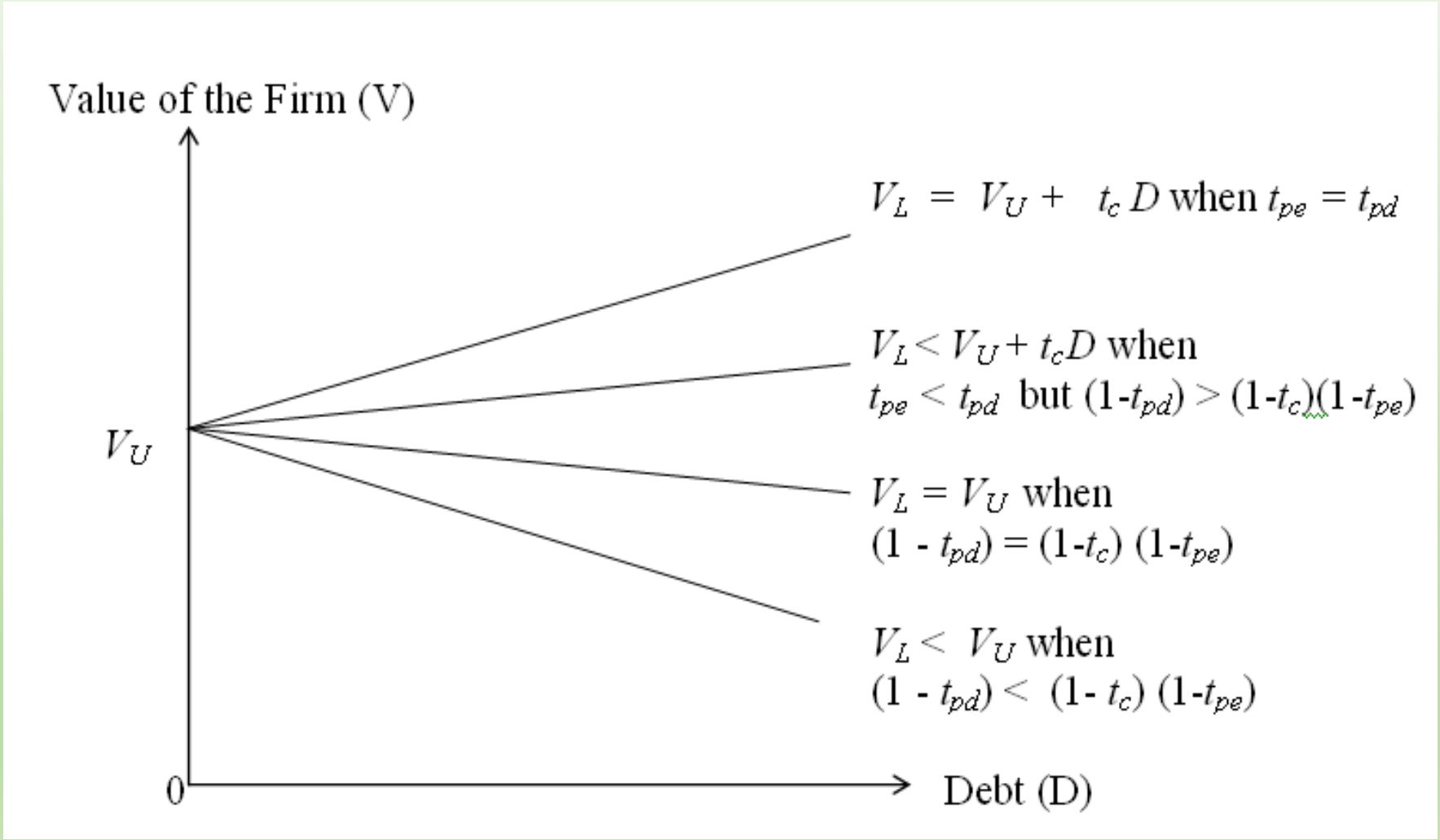
t_{pe} = personal tax rate on equity income

Example : Suppose t_c = 50 percent, t_{pe} = 5 percent, and t_{pd} = 30 percent.

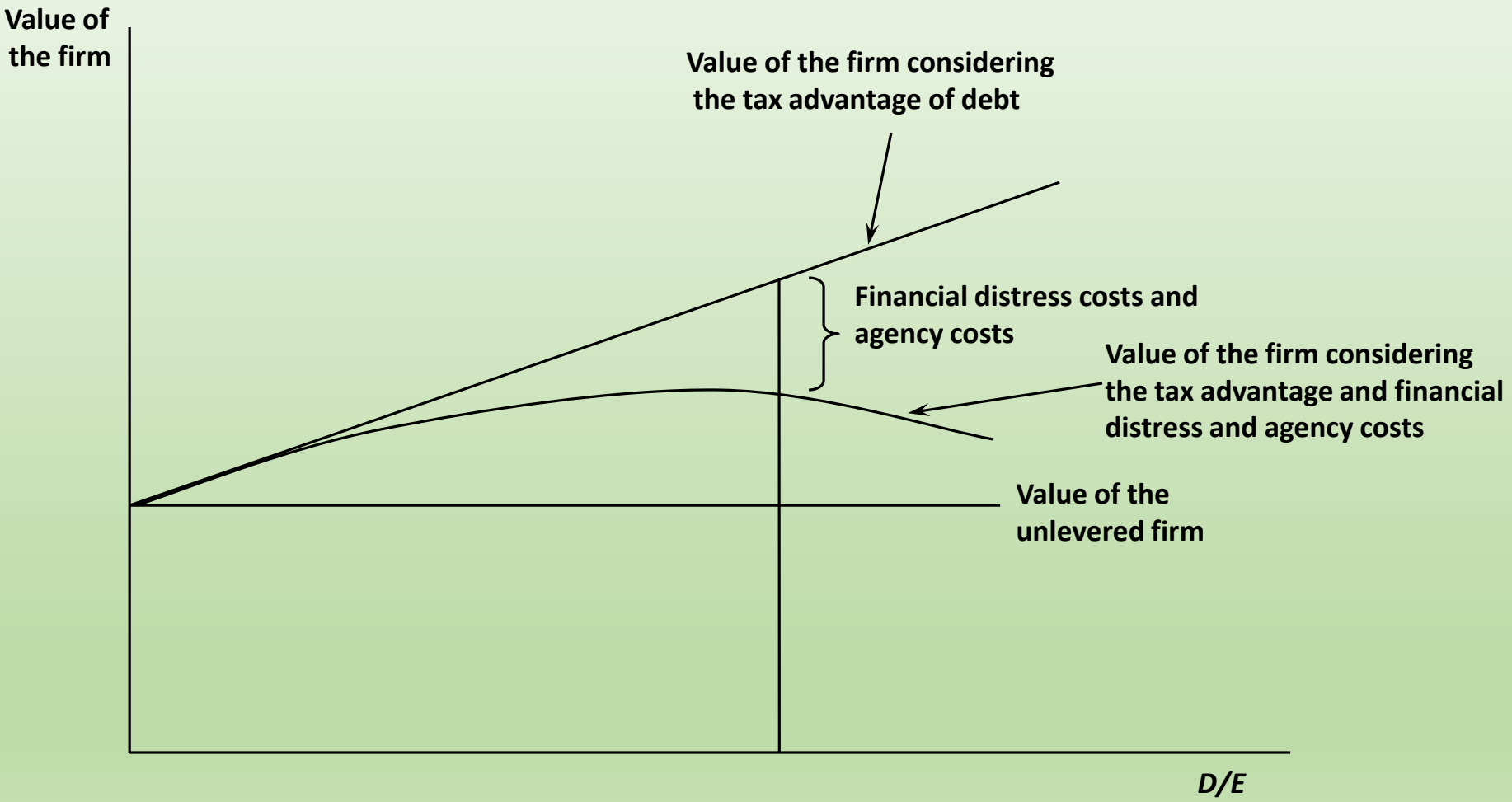
The tax advantage of every rupee of debt is:

$$1 - \frac{(1 - 0.5)(1 - 0.05)}{(1 - 0.3)} = 0.32 \text{ rupee}$$

LEVERAGE AND FIRM VALUE IN THE PRESENCE OF TAXES



TRADEOFF MODEL



PECKING ORDER OF FINANCING

- There is a pecking order of financing which goes as follows:
    - Internal finance (retained earnings)
    - Debt finance
    - External equity finance
- Given the pecking order of financing, there is no well-defined target debt-equity ratio, as there are two kinds of equity, internal and external. While the internal equity is at the top of the pecking order, the external equity is at the bottom.