# DCF Q

## PRESENT VALUE

*) TVM OF MONEY

1) ONE RUPEE TODAY VS ONE RUPEE TOMMORROW

- $r$ = REQUIRED RATE OF RETURN (OPPURTUNITY COST)

2. IMAGINE YOU INVEST ₹1 TODAY AT RATE $r$ →

AFTER 1 YEAR.

$$FV = 1 \cdot (1+r)$$

3. FLIP IT: IF YOU'LL RECEIVE ₹1 IN A YEAR, HOW MUCH IS IT WORTH TODAY?

SOLVE FOR PV:

$$PV = \frac{1}{1+r}$$

HERE DIVISION OPERATION ACT AS A UNDOING GROWTH

PRESENT VALUE IS THE INVERSE OF GROWTH AND COMPOUNDING

$FV = 1*(1+r) \rightarrow FV = PV \cdot (1+r)^n \rightarrow \frac{PV}{(1+r)^n} \rightarrow PV \times (1+r)^n$

$PV = \frac{1}{(1+r)} \rightarrow PV = \frac{FV}{(1+r)} \rightarrow \frac{FV}{(1+r)^n} \rightarrow \frac{FV}{(1+r)} + \frac{FV}{(1+r)^2} + \cdots \frac{FV}{(1+r)^n}$

*) MULTIPLE PERIOD COMPOUNDING

1) IF A PAYMENT OF ₹1 COMES IN N YEARS

$$PV = \frac{1}{(1+r)^n}$$

2) NOW CONSIDER DIFFERENT CASH FLOW $C_1, C_2, C_3 \ldots$ ARRIVING IN YEARS 1, 2, 3.

$$PV = \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{C}{(1+r)^3} + \cdots \frac{C}{(1+r)^n}$$

⇒ TIME SHIFTING A PAYMENT BY 1 EXTRA YEAR MULTIPLIES DENOMINATOR $(1+r)$

INFINITE STREAM & GORDAN GROWTH

1) ASSUME CASH FLOW GROW AT RATE G

$$C_t = C_1(1+g)^{t-1}$$

2) SUBSTITUTE INTO FORMULA

$$PV = \sum_{t=1}^{\infty} \frac{C_1(1+g)^{t-1}}{(1+g)^t}$$

3) FACTOR TERMS REWRITE AS GEOMETRIC SERIES

$$PV = \frac{C_t}{r-g}$$

* ENTERPRISE DCF STRUCTURE

1) LINK FREE CASH FLOW (FCF) TO ENTERPRISE VALUE

$$EV = \sum_{t=1}^{n} \frac{FCF_t}{(1+WACC)^t} + \frac{TV}{(1+WACC)^n}$$

* ENTERPRISE DCF STRUCTURE

ENTERPRISE VALUE IS SIMPLY ALL FUTURE FREE CASH FLOW DISCOUNTED TO TODAY

$$EV = \sum_{t=1}^{n=\infty} \frac{FCF}{(1+WACC)^t} + \frac{TV}{(1+WACC)^n}$$

• FCF = FREE CASHFLOW IN YEAR t

- WACC = WEIGHTED AVERAGE COST OF CAPITAL (DISCOUNT RATE FOR ALL PROVIDERS)

TV = TERMINAL VALUE (FUTURE CASHFLOW BEYOND N, SUMMARIZED).

TERMINAL VALUE PROOF:

$$TV = \frac{FCF_{n+1}}{WACC - g}$$

- $FCF_{n+1} = FCF_n (1+g)$
- g = PERPETUAL GROWTH RATE

TV AT YEAR N AND DISCOUNT BACK BY $(1+WACC)^n$.

3) WHY WACC IS USED

- EQUITY HOLDERS EXPECT $r_e$.
- DEBT HOLDERS EXPECT $r_d$, ADJUSTED FOR TAX
- FIRM VALUE IS FINANCIAL PROPORTIONALLY BY EQUITY E AND DEBT D.

$$WACC = \frac{E}{E+D} r_e + \frac{D}{E+D} r_d (1-T)$$