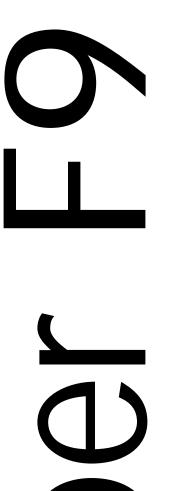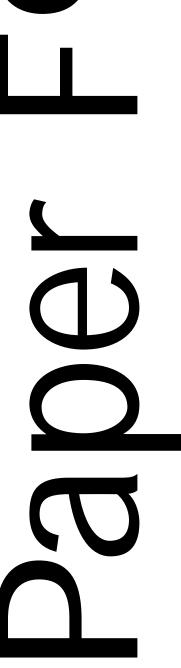Fundamentals Level – Skills Module

Financial Management

Explanation of Formulae Sheet

Got it Pass

Paper F9

Economic Order Quantity

$$= \sqrt{\frac{2C_0 D}{C_h}}$$

Where

D = Demand per annum
C_0 = Cost per order
C_h = Holding cost per unit per annum

Q: Which area of EOQ relevant?
A: EOQ is relevant under working capital management. It is the model to find the optimal point of lowest costs in holding inventory.

Q: What is EOQ?
A: The EOQ is a model created to determine the order quantity to be placed on each purchase so as to minimise **total costs** with regards to inventories.

Q: What does total costs include? Does EOQ consider all of them?
A: Total costs include ordering costs, the cost of materials itself (purchase costs) and inventory holding costs. EOQ assumes no change in purchase costs no matter there is bulk purchase or not, it only considers ordering costs and inventory holding costs.

Q: When does EOQ achieve at its optimum?
A: EOQ occurs when ordering costs equal to inventory holding costs.

Q: Is it any extension of EOQ?
A: Yes, Baumol's model under treasury model follows the similar logic of EOQ but it's application is under treasury management.

Miller-Orr Model

$$\text{Return point} = \text{Lower limit} + \left(\frac{1}{3} \times \text{spread}\right)$$

$$\text{Spread} = 3\left[\frac{\frac{3}{4} \times \text{transaction cost} \times \text{variance of cash flows}}{\text{interest rate}}\right]^{\frac{1}{3}}$$

Where

Spread	=	Upper limit – Lower limit
Variance of cash flows	=	Variance of daily cash flows
Interest rate	=	Interest rate per day

Q: Which area of Miller-Orr Model relevant?

A: Miller-Orr model is relevant under working capital management. It is the model to determine when to buy or sell short term investments to maintain cash balances. Minimum level of cash balance (lower limit) must be defined by company first.

Q: What is Miller-Orr Model?

A: It helps finance manager to keep cash balances within defined limits by buying short-term investments whenever cash goes over the upper limit, and selling them when the cash balances fall below the lower limit.

Q: How does Miller-Orr Model operate?

A: Every time cash balances hit the upper limit, send the balances back to the return point by buying short-term investments. Every time the cash balances falls to the lower limit, replenish it back to the return point by selling short-term investments.

The Capital Asset Pricing Model (CAPM)

$$E\left(r_i\right) = R_f + \beta_i\left(E\left(r_m\right) - R_f\right)$$

Where

$E(r_i)$	=	return required on financial asset i
R_f	=	risk-free rate of return
β_i	=	beta value for financial asset i
$E(r_m)$	=	average return on the capital market

Q: Which area of capital asset pricing model (CAPM) relevant?

A: CAPM is relevant under business finance. It is the model to find the cost of equity by considering systematic risk (beta) of particular financial asset.

Q: What does CAPM assume?

A: The CAPM assumes that investors hold fully diversified portfolios. This means that investors are assumed by the CAPM to want a return on an investment based on its systematic risk alone, rather than on its total risk. The measure of risk used in the CAPM, which is called 'beta', is therefore a measure of systematic risk.

Q: What is CAPM?

A: CAPM formula expresses the required return on a financial asset as the sum of the risk-free rate of return and a risk premium - β_i $(E(r_m) - R_f)$ – which compensates the investor for the systematic risk of the financial asset. If shares are being considered, $E(r_m)$ is the required return of equity investors, usually referred to as the 'cost of equity'.

The Asset Beta Formula

$$\beta_a = \left[\frac{V_e}{\left(V_e + V_d\left(1 - T\right) \right)} \beta_e \right] + \left[\frac{V_d\left(1 - T\right)}{\left(V_e + V_d\left(1 - T\right) \right)} \beta_d \right]$$

Where

β_a	=	asset beta
β_e	=	equity beta
β_d	=	debt beta
V_e	=	market value of company's shares
V_d	=	market value of company's debt
$V_e + V_d(1 - T)$	=	after tax market value of company
T	=	company profit tax rate

Q: Which area of asset beta formula relevant?

A: Asset beta is relevant under business finance. It reflects business risk only as the beta value of company's business operations without any financial risk involved.

Q: What is asset beta?

A: If a company has no debt, it has no financial risk and its beta value reflects business risk alone. The beta value of company's business operations as a whole is called the 'asset beta'.

Q: What is equity beta?

A: When a company takes on debt, it's gearing increases and financial risk is added to its business risk. The ordinary shareholders of the company face an increasing level of risk as gearing increases and the return they require from the company increases to compensate for the increasing risk. This means that the beta of the company's shares, called the equity beta, increases as gearing increases.

Q: Is asset beta increased in line with equity beta increased due to gearing is up?

A: As a company gears up, the asset beta remains constant, even though the equity beta is increasing, because the asset beta is the weighted average of the equity beta and the beta of the company's debt.

The Growth Model

$$P_0 = \frac{D_0(1+g)}{(r_e - g)} \qquad r_e = \frac{D_0(1+g)}{P_0} + g$$

Where,

r_e	=	cost of equity
D_0	=	current dividend
P_0	=	ex –dividend share price
g	=	the expected annual constant rate of dividend growth

Q: Which area of growth model relevant?
A: Dividend growth model is relevant under business finance.

Q: What is growth model?
A: It is 1 of methods to find rate of return that investors require to persuade them to invest in company's ordinary shares.

Q: What is the limitation of growth model?
A: 1 of key assumptions is growth rate cannot exceed cost of equity. This presumption of a steady and perpetual growth rate less than the cost of capital may not be reasonable.

Gordon's growth approximation

$$g = br_e$$

Where,

b	=	retention rate
r_e	=	return on new investment, may be estimated by using ROCE

Q: Which area of Gordon's growth approximation relevant?
A: Gordon's growth approximation is relevant under business finance.

Q: What is Gordon's growth approximation?
A: It is 1 of two commonly methods to estimate the likely growth rate of dividend.

Q: What is the major assumption of Gordon's growth approximation?
A: The higher the level of retentions in a business, the higher the potential growth rate.

The weighted average cost of capital (WACC)

$$\text{WACC} = \left[\frac{V_e}{V_e + V_d}\right]k_e + \left[\frac{V_d}{V_e + V_d}\right]k_d\left(1 - T\right)$$

Where,

V_e	=	market value of equity which is share price ex-div X number of shares
V_d	=	market value of debt which is market value of debentures + loan amount
k_e	=	cost of equity
k_d	=	cost of debt
T	=	company profit tax rate

Q: Which area of WACC relevant?
A: WACC is relevant under business finance.

Q: What is WACC?
A: This is found by multiplying the costs of the various sources of finance used by the company by their proportion of the total market value of the company.

Q: When is WACC applied?
A: WACC is calculated and adopted in investment appraisal as cost of capital, i.e. the discount rate. If the NPV is positive then the project will generate sufficient cash flows to pay to the providers of the capital used to finance it the return that they require and then a bit extra (the NPV).

Q: What is the limitation of WACC?
A: WACC is limited to evaluating projects (NPV method) that do not change the risk of the company (business and financial risk).

The Fisher Formula

$$(1 + i) = (1 + r)(1 + h)$$

Where,

i	=	nominal interest rate
r	=	real interest rate
h	=	inflation rate

Q: Which area of The Fisher Formula relevant?
A: The Fisher Formula is relevant under risk management.

Q: What is The Fisher Formula?
A: The nominal interest rate is made up of two parts: the real interest rate plus a premium for inflation.

Q: What does The Fisher Formula imply?
A: The nominal interest rate differentials between countries provide an unbiased predictor of future changes in spot exchange rates. A country with relatively higher nominal interest rate due to higher inflation, it's currency is expected to depreciate against another country's currency with relatively lower inflation.

Purchasing Power Parity

$$S_1 = S_0 \times \frac{\left(1 + h_c\right)}{\left(1 + h_b\right)}$$

Where,

S_1	=	Expected spot rate in period 1
S_0	=	Current spot rate
h_c	=	Expected inflation rate in country c
h_b	=	Expected inflation rate in country b

Q: Which area of purchasing power parity relevant?
A: Purchasing power parity is relevant under risk management.

Q: What is purchasing power parity?
A: Purchasing power parity (PPP) is an economic theory that states that the exchange rate between two currencies is equal to the ratio of the currencies' respective purchasing power.

Q: What does purchasing power parity indicate?
A: PPP formula indicates that a country with relatively higher expected inflation will be suffered from currency depreciation against another country with lower expected inflation.

Q: What does purchasing power parity apply?
A: With strong economic theory support, PPP is a widely accepted tool in forecasting an exchange rate movement between two currencies in long run.

Interest rate parity

$$F_0 = S_0 \times \frac{\left(1 + i_c\right)}{\left(1 + i_b\right)}$$

Where,
F_0 = Forward rate (quoted now)
S_0 = Current spot rate
ic = Interest rate in country c
ib = Interest rate in country b

Q: Which area of interest rate parity relevant?
A: Interest rate parity is relevant under risk management.

Q: What is interest rate parity?
A: Interest rate parity is a theory in which the interest rate differential between two countries is equal to the differential between the forward exchange rate and the spot exchange rate. Interest rate parity plays an essential role in foreign exchange markets, connecting interest rates, spot exchange rates and foreign exchange rates.

Q: What does interest rate parity indicate?
A: IRP formula indicates that a country (e.g. Country C) quoted forward rate will be at premium if its interest rate is lower than another country (e.g. Country B). In other words, fewer amount of Country C currency can exchange the same amount of Country B currency under the forward rate arrangement than spot rate.

Q: What does interest rate parity apply?
A: IRP is generally applied in forward rate quotation in which it is not a forecasting model in guiding the exchange rate movement in future.