

Level I FormulaSheet Sample

Topic 24	
CALCULATION	
Futures Prices	[S is spot price of underlying, r is risk-free rate, & (T - t) is time to expiration in years]
With no income	Of foreign currency (f is foreign risk-free rate)
$F_t = Se^{r(T-t)}$	$F_t = Se^{(r-f)(T-t)}$
With dividend yld (δ)	Of physical commodity (y convenience yld, c storage)
$F_t = Se^{(r-\delta)(T-t)}$	$F_t = Se^{(r+c-y)(T-t)}$
CONCEPTUAL	
Normal Backwardation: $F < E(S_T)$	Contango: $F > E(S_T)$

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CAIA Level I

Topic 12 (cont.)

CALCULATION

Value at Market Risk^a

$$F_{t+1} = \frac{1}{\sqrt{1+\sigma^2}} \left(\sum_{i=1}^N p_i F_i + \frac{1}{N} \sum_{i=1}^N F_i^2 \right)$$

where p_i is prob., F_i is Value estimate value of i

Value at Specific Risk^a

$$F_{t+1} = 2.33 \times \sigma$$

where $\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N p_i F_i^2 - \left(\frac{1}{N} \sum_{i=1}^N F_i \right)^2}$

Total VaR Using Monte Carlo^a

$$F_{t+1} = \sqrt{(F_{t+1}^{\text{Market}})^2 + (F_{t+1}^{\text{Specific}})^2}$$

CONCEPTUAL

Parameter VaR

$$F_{t+1} = E(F) + z \cdot \sigma$$

Incremental VaR^a

$$F_{t+1} = \sqrt{(F_{t+1}^{\text{Market}})^2 + (F_{t+1}^{\text{Specific}})^2}$$

Component VaR^a

$$F_{t+1} = \sum_{i=1}^N C_i F_{t+1}$$

where C_i is weight of asset i

Topic 16

CALCULATION

Future Value (FV) of Cash Flows (CF)

$$CF_t(1+r)^t \quad \text{for different } t$$

Present Value^a

$$PV = \frac{CF}{(1+r)^t} \quad \text{for different } t$$

PV of a Property^a

$$PV = \frac{CF}{(1+r)^t} \quad \text{for different } t$$

Reversion/Terminal Value at end of year t

$$\frac{NCF}{(1+r)^t} \quad \text{where } NCF = \text{Net Operating Income} - \text{Expenses} + \text{Interest} + \text{Capital Gains}$$

Net Present Value (NPV)

$$NPV = \sum_{t=1}^T \frac{CF_t}{(1+r)^t} - \text{Initial Cost}$$

Loan Payment

$$P = \frac{L(1+r)^n}{(1+r)^n - 1}$$

Total Rental Income

$$(\text{Rg} \times \text{Rg}) + (\text{Rg} \times \text{Rg}) + \text{Change}$$

Depreciation

$$\frac{\text{Price of Structure Investment} - \text{Depreciable Life}}{\text{Depreciable Life}}$$

Present Value of Real Estate Company

$$\frac{CF}{(1+r)^t} \quad \text{for different } t$$

Value of Real Estate Company

$$\frac{CF}{(1+r)^t} \quad \text{for different } t$$

Net Asset Value (NAV) of Real Estate Company

$$\frac{CF}{(1+r)^t} \quad \text{for different } t$$

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Topic 17

CALCULATION

Loan to Value (LTV) Ratio

$$\frac{\text{Loan}}{\text{Value}}$$

Loan-Principal

$$\frac{\text{Loan}}{\text{Value}}$$

Interest Coverage Ratio

$$\frac{\text{Interest}}{\text{Coverage}}$$

Annual Coverage Ratio

$$\frac{\text{Annual Coverage}}{\text{Ratio}}$$

Annual Yield on Mortgage Pool

$$\frac{\text{Annual Yield}}{\text{Mortgage Pool}}$$

Topic 18

CALCULATION

Total Capital Gains Tax

$$(\text{Capital Gains Tax Rate}) \times \text{Accumulated Depreciation Tax}$$

Topic 19

CALCULATION

Weighted Average Beta of a Stock in Relation to a Portfolio

$$\beta_{\text{portfolio}} = w_1 \beta_1 + w_2 \beta_2$$

Debt to Capitalization Ratio

$$\frac{\text{Debt}}{\text{Capitalization}}$$

Debt to Equity Ratio

$$\frac{\text{Debt}}{\text{Equity}}$$

Debt to Total Capitalization Ratio

$$\frac{\text{Debt}}{\text{Total Capitalization}}$$

Topic 20

CALCULATION

Variance of

$$\sigma^2 = \sigma_1^2 + \sigma_2^2 + 2\rho\sigma_1\sigma_2$$

Debt Ratio^a

$$D_t = \frac{D_t}{D_t + E_t}$$

Debt to Equity Ratio

$$\frac{D_t}{E_t}$$

Debt to Total Capitalization Ratio

$$\frac{D_t}{D_t + E_t}$$

Debt to Total Capitalization Ratio

$$\frac{D_t}{D_t + E_t}$$

Topic 24

CALCULATION

Future Price^a

$$F_t = \frac{CF_t}{(1+r)^t}$$

Risk-Adjusted Return

$$R_{\text{adj}} = \frac{R_t - R_f}{\sigma_t}$$

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Topic 25

CALCULATION

Total Rental Income

$$(\text{Rg} \times \text{Rg}) + (\text{Rg} \times \text{Rg}) + \text{Change}$$

Depreciation

$$\frac{\text{Price of Structure Investment} - \text{Depreciable Life}}{\text{Depreciable Life}}$$

Present Value of Real Estate Company

$$\frac{CF}{(1+r)^t} \quad \text{for different } t$$

Value of Real Estate Company

$$\frac{CF}{(1+r)^t} \quad \text{for different } t$$

Net Asset Value (NAV) of Real Estate Company

$$\frac{CF}{(1+r)^t} \quad \text{for different } t$$

Topic 26

CONCEPTUAL

Present Value of Real Estate Company

$$\frac{CF}{(1+r)^t} \quad \text{for different } t$$

Value of Real Estate Company

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Topic 28

CALCULATION

Total Capital Gains Tax

$$(\text{Capital Gains Tax Rate}) \times \text{Accumulated Depreciation Tax}$$

Topic 29

CALCULATION

Future Price^a

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