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FORMULA SHEET

CFA® Program Level I

Fixed Income Formula Sheet

2027 curriculum · 19 readings · 62 formulas

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ABOUT THIS EDITION

CredGuild · CFA® Program Level I · Fixed Income Formula Sheet
2027 curriculum · Version v2027.3 · Generated October 6, 2026

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USING THIS BOOK

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Every formula in the CredGuild notes for the 2027 CFA® Program Level I curriculum, Fixed Income, reading by reading, each with what it is for. Worked numbers are left out. Use it for a last check of the equations; the notes explain where each one comes from.

To learn a reading in full, open its notes at credguild.com. This sheet is free to print and share: credguild.com/cfa/level-1/formula-sheet/

CFA® PROGRAM LEVEL I · FORMULA SHEET

Fixed Income

Exam weight 11–14% · 11 readings · 62 formulas

54 Fixed-Income Markets for Corporate Issuers

Repurchase agreements

$$\text{purchase price} = \frac{\text{market value of collateral}}{\text{initial margin}}$$

$$\text{repurchase price} = \text{purchase price} \times \left(1 + \text{repo rate} \times \frac{\text{days}}{360}\right)$$

$$\text{haircut} = \frac{\text{market value} - \text{purchase price}}{\text{market value}} = 1 - \frac{1}{\text{initial margin}}$$

$$\text{variation margin} = \text{initial margin} \times \text{adjusted purchase price} - \text{market value of collateral}$$

56 Fixed-Income Bond Valuation: Prices and Yields

Price = present value of the promised cash flows

$$P = \frac{C}{(1+YTM)} + \frac{C}{(1+YTM)^2} + \cdots + \frac{C+FV}{(1+YTM)^N}$$

$$P = \sum_{t=1}^{2N} \frac{C/2}{(1+YTM/2)^t} + \frac{FV}{(1+YTM/2)^{2N}}$$

Accrued interest, flat price and full price

$$AI = \frac{t}{T} \times PMT$$

Matrix pricing

$$YTM_{target} = YTM_{short} + \frac{T_{target} - T_{short}}{T_{long} - T_{short}} (YTM_{long} - YTM_{short})$$

57 Yield and Yield Spread Measures for Fixed-Rate Bonds

Periodicity and the effective annual yield

$$EAY = \left(1 + \frac{\text{stated annual yield}}{n}\right)^n - 1$$

$$\text{stated yield}_m = m\left[(1+EAY)^{1/m} - 1\right]$$

Current yield and simple yield

$$\text{current yield} = \frac{\text{annual cash coupon}}{\text{flat price}}$$

$$\text{simple yield} = \frac{\text{annual coupon} \pm \text{straight-line amortization}}{\text{flat price}}$$

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Option-adjusted price and option-adjusted yield	$\text{callable bond value} = \text{straight bond value} - \text{call option value}$
Z-spread	$\text{price} = \sum_{t=1}^{N} \frac{CF_t}{(1 + S_t + Z)^t}$
Option-adjusted spread (OAS)	$\text{OAS} = \text{Z-spread} - \text{option value (bp)}$ $\text{option value} = \text{Z-spread} - \text{OAS}$

58 Yield and Yield Spread Measures for Floating-Rate Instruments

Simplified valuation on a reset date	$V = \sum_{t=1}^{N} \frac{(\text{MRR} + \text{QM}) \times FV/m}{\left(1 + \frac{\text{MRR+DM}}{m}\right)^t} + \frac{FV}{\left(1 + \frac{\text{MRR+DM}}{m}\right)^N}$
Key formulas: money market yields	$\text{Add-on yield (365-day)} = HPY \times \frac{365}{\text{days}}$ $\text{Discount yield} = \frac{FV - P}{FV} \times \frac{360}{\text{days}}$ $P = FV \times \left(1 - \text{discount yield} \times \frac{\text{days}}{\text{year}}\right)$ $FV = PV \times \left(1 + \text{add-on yield} \times \frac{\text{days}}{\text{year}}\right)$
Comparing with a semiannual-pay bond	$EAY = (1 + HPY)^{365/\text{days}} - 1$ $\text{semiannual bond basis} = 2\left[(1 + EAY)^{1/2} - 1\right]$

59 The Term Structure of Interest Rates: Spot, Par, and Forward Curves

Pricing with spot rates	$P = \frac{PMT}{(1 + S_1)} + \frac{PMT}{(1 + S_2)^2} + \cdots + \frac{PMT + FV}{(1 + S_N)^N}$
Par rates	$100 = \frac{c}{1 + S_1} + \frac{c}{(1 + S_2)^2} + \cdots + \frac{c + 100}{(1 + S_N)^N} \Rightarrow c = \frac{100\left[1 - \frac{1}{(1+S_N)^N}\right]}{\sum_{t=1}^{N} \frac{1}{(1+S_t)^t}}$
Forward rates and notation	$(1 + S_3)^3 = (1 + S_1)(1 + {}_{1y1y})(1 + {}_{2y1y}) = (1 + S_2)^2(1 + {}_{2y1y})$ $S_N = \left[(1 + S_1)(1 + {}_{1y1y}) \cdots (1 + {}_{(N-1)y1y})\right]^{1/N} - 1$ ${}_{A}y{}_{B}y = \left[\frac{(1 + S_{A+B})^{A+B}}{(1 + S_A)^A}\right]^{1/B} - 1$
Valuing a bond with forward rates	$P = \frac{PMT}{1 + S_1} + \frac{PMT}{(1 + S_1)(1 + {}_{1y1y})} + \frac{PMT + FV}{(1 + S_1)(1 + {}_{1y1y})(1 + {}_{2y1y})}$

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60 Interest Rate Risk and Return

Horizon yield	$$\text{Horizon yield} = \left(\frac{\text{sale price (or principal)} + \text{coupons} + \text{reinvestment income}}{\text{purchase price}}\right)^{1/H} - 1$$
Holding period return, Macaulay duration and the investment horizon	$$\text{Duration gap} = \text{Macaulay duration} - \text{investment horizon}$$
Calculating and interpreting Macaulay duration	$$\text{MacDur} = \sum_{t=1}^{N} t \times w_t$$ $$w_t = \frac{CF_t/(1+r)^t}{\text{full price}}$$ $$\sum_t w_t = 1$$

61 Yield-Based Bond Duration Measures and Properties

Modified duration	$$\text{ModDur} = \frac{\text{MacDur}}{1+r} \quad (\text{annual-pay: } r = \text{YTM})$$ $$\text{ModDur} = \frac{\text{MacDur}}{1+\text{YTM}/2} \quad (\text{semiannual-pay, YTM on a semiannual bond basis, du}$$ $$\%\Delta P \approx -\text{ModDur} \times \Delta\text{YTM}$$
Approximate modified duration	$$\text{ApproxModDur} = \frac{V_- - V_+}{2 \times V_0 \times \Delta\text{YTM}}$$
Money duration and PVBP	$$\text{Money duration} = \text{ModDur} \times \text{full price of the position}$$ $$\text{Money duration per 100 of par} = \text{ModDur} \times \text{full price per 100}$$ $$\Delta V \approx -\text{Money duration} \times \Delta\text{YTM}$$ $$\text{PVBP} = \frac{V_- - V_+}{2}$$ $$\text{PVBP} \approx \text{Money duration} \times 0.0001$$

62 Yield-Based Bond Convexity and Portfolio Properties

Convexity from the cash flows	$$\text{convexity}_t = \frac{t(t+1)}{(1+r)^2}$$
Approximate convexity	$$\text{approximate convexity} = \frac{V_- + V_+ - 2V_0}{(\Delta YTM)^2 V_0}$$
Price change using duration and convexity	$$\%\Delta PV^{Full} \approx -\text{AnnModDur} \times \Delta YTM + \tfrac{1}{2} \times \text{AnnConvexity} \times (\Delta YTM)^2$$

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Money convexity	$\text{MoneyCon} = \text{AnnConvexity} \times PV^{Full}$ of the position $\Delta PV^{Full} \approx -(\text{MoneyDur} \times \Delta YTM) + \frac{1}{2} \times \text{MoneyCon} \times (\Delta YTM)^2$

63 Curve-Based and Empirical Fixed-Income Risk Measures

Why effective duration and effective convexity for bonds with embedded options	$\text{effective duration (EffDur)} = \dfrac{V_- - V_+}{2V_0\,\Delta\text{Curve}}$ $\text{effective convexity (EffCon)} = \dfrac{V_- + V_+ - 2V_0}{(\Delta\text{Curve})^2\,V_0}$
Percentage price change for a change in the benchmark yield	$\%\Delta PV^{Full} \approx -\text{EffDur} \times \Delta\text{Curve} + \frac{1}{2} \times \text{EffCon} \times (\Delta\text{Curve})^2$
Key rate duration and shaping risk	$\%\Delta V \approx -\sum_k \text{KeyRateDur}_k \times \Delta r_k$

64 Credit Risk

Measuring credit risk	$\text{expected loss} = \text{probability of default} \times \text{loss given default}$ $\text{LGD (in money)} = \text{expected exposure} \times (1 - \text{recovery rate})$ $\text{LGD\% (rate)} = \text{loss severity} = 1 - \text{recovery rate}$ $\text{credit spread} \approx \text{PD} \times \text{LGD\%} = \text{PD} \times (1 - \text{recovery rate})$
Market factors: liquidity	$\%\Delta P_{\text{full}} \approx -\text{ModDur} \times \Delta\text{Spread} + \frac{1}{2}\,\text{Convexity} \times (\Delta\text{Spread})^2$

69 Mortgage-Backed Security (MBS) Instrument and Market Features

Mortgage pass-throughs and CMOs	$\text{WAC} = \sum_i w_i \times \text{mortgage rate}_i$ $\text{WAM} = \sum_i w_i \times \text{remaining term}_i$ $\text{pass-through rate} = \text{WAC} - \text{fees}$
Commercial mortgage-backed securities	$\text{DSCR} = \dfrac{\text{net operating income}}{\text{debt service}}$ $\text{LTV} = \dfrac{\text{loan amount}}{\text{appraised value}}$

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