

# ACI FINANCIAL MARKETS ASSOCIATION

## EXAMINATION FORMULAE

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## INTEREST RATE CONVERSIONS

### Converting between bond basis and money market basis (Act/360)

$$\text{rate}_{\text{bond basis}} = \text{rate}_{\text{money market basis}} \frac{365}{360}$$

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### Converting between annually and semi-annually compounding frequencies

$$\text{rate}_{\text{annually-compounded}} = 1 + \frac{\text{rate}_{\text{semi-annually compounded}}^2}{2} - 1$$

$$\text{rate}_{\text{semi-annually compounded}} = \left( \sqrt{1 + \text{rate}_{\text{annually compounded}}} - 1 \right) 2$$

*The formulae for converting between annually and semi-annually compounded rate apply only to rates quoted on a bond basis, not a money market basis.*

# MONEY MARKET

## Certificates of deposit

proceeds at maturity = face value ( 1 +  $\frac{\text{coupon} \times \text{term}}{\text{annual basis}}$  )

$$\frac{\text{proceeds at maturity}}{1 + \frac{\text{yield} \times \text{day count}}{\text{annual basis}}}$$





## FIXED INCOME

### Clean and dirty price of bond with annual coupons on coupon date

price =

$$100 \frac{\text{coupon}}{\text{yield}} \left[ 1 - \frac{1}{(1 + \text{yield})^{\text{remaining coupons}}} \right] + \frac{1}{(1 + \text{yield})^{\text{remaining coupons}}}$$

### Dirty price of bond with annual coupons

dirty price =

$$\frac{\text{first cashflow}}{(1 + \text{yield})^{\frac{\text{days to next coupon}}{\text{annual basis}}}} + \frac{\text{second cashflow}}{(1 + \text{yield})^{1 + \frac{\text{days to next coupon}}{\text{annual basis}}}} + \dots + \frac{\text{n}^{\text{th}} \text{ cashflow}}{(1 + \text{yield})^{(n-1) + \frac{\text{days to next coupon}}{\text{annual basis}}}}$$

### Duration at issue or on a coupon date

Macaulay Duration =

$$\frac{\begin{aligned} &(\text{present value of first coupon amount} \times \text{time to first coupon}) + \\ &(\text{present value of second coupon amount} \times \text{time to second coupon}) + \dots \\ &+(\text{present value of (last coupon amount} + \text{nominal amount)} \times \text{time to last coupon}) \end{aligned}}{\text{net present value of bond}}$$

$$\text{Modified Duration} = \frac{\text{Macaulay Duration}}{1 + \frac{\text{yield}}{\text{compounding frequency}}}$$



### Calculating zero-coupon yield from an annual yield-to-maturity (bootstrapping)

zero - coupon yield for n - year term

$$= \sqrt[n]{\frac{\text{final coupon amount} + \text{nominal amount}}{\text{implied present value of final coupon and nominal amount}}} - 1 \quad 100$$

The implied present value of the final coupon and nominal amount is calculated by subtracting from the net present value of the bond the sum of the present values of all coupons except the final one, where each present value is calculated using the appropriate zero-coupon yield.

**FOREIGN EXCHANGE**

## OPTIONS

Standard deviation