

CIRE Fixed Income Yields

Bond pricing, duration, convexity, day-count, yield curves. Element 4 + the fixed-income outcomes in Element 7.

Pricing + yield

Bond price

$$P = \sum C/(1+y)^t + F/(1+y)^n$$

Discount each cash flow at YTM

Current yield

annual coupon / current price

Ignores capital gain/loss to maturity

YTM rule of thumb

$$(C + (F - P)/n) / ((F + P)/2)$$

Approximation; breaks down for long n

YTC (yield to call)

Same as YTM but using call date + call price

Use $YTW = \min(YTM, YTC)$ when callable

Duration + convexity

Modified duration

$$\Delta P/P \approx -\text{ModDur} \times \Delta y$$

First-order; misses convexity for big Δy

Macaulay duration

Weighted average time to cash flow

Used in immunization

Convexity adjustment

$$\Delta P/P \approx -\text{ModDur} \times \Delta y + 0.5 \times \text{Conv} \times (\Delta y)^2$$

Use for >50 bp shifts

Day-count + settlement

- T+1 settlement since May 27, 2024 for equities and most bonds
- Corporates use 30/360 day-count for accrued interest
- Government bonds use actual/actual day-count

Yield curve shapes

- Normal: long rates above short rates (typical)
- Flat: long rates $\approx$ short rates (transition signal)
- Inverted: short rates above long rates (recession indicator)
- Humped: medium-term rates highest

Spreads

- G-spread: yield over interpolated government curve
- Z-spread: spread over zero-coupon government curve
- OAS: option-adjusted spread, removes embedded option value

Duration worked example

A 10-year bond with modified duration 7.5 and yield 4.0%. If the yield rises 25 basis points to 4.25%, the approximate price change is $-7.5 \times 0.25\% = -1.875\%$. For a bond priced at \$1,000 this is a \$18.75 drop. Convexity adds a small positive correction on top.

Common YTM and duration mistakes

- Confusing modified duration with Macaulay duration. $\text{ModDur} = \text{Macaulay} / (1 + y/m)$. The CIRE asks both. Read the question.
- Using the YTM rule-of-thumb formula for very long maturities. The approximation breaks down past 15 years.
- Treating callable-bond yield as YTM. Callable bonds use yield-to-call when the call price is below the current market price.
- Forgetting that bond prices and yields move inversely. Rising yields means falling prices, always.
- Settlement: T+1 since May 27, 2024 for equities and most bonds. Pre-2024 references to T+2 are distractors on current exams.

Callable bond worked example

5-year corporate bond, \$1,000 face, 6% coupon, callable at \$1,020 after year 2. Current price: \$1,050. Yield to maturity: 4.8%. Yield to call: 4.3%. Investor's effective yield depends on whether the bond gets called.

- When market yields fall below the coupon, the issuer is likely to call. Pricing the bond at yield-to-call protects against this scenario.
- Yield-to-worst is the LOWER of YTM and YTC. For callable bonds trading above par, yield-to-worst is typically yield-to-call.
- On the exam: if a bond trades above its call price, default to YTC. If it trades below face value, default to YTM.

Credit ladder strategy

A credit ladder spreads bond maturities across 3-7 years to manage reinvestment risk. As each rung matures, proceeds buy a new long-end rung at current yields. Smooths interest-rate fluctuations over the cycle.

- Best for: income-oriented investors who do not want to time the yield curve.
- Worst for: investors with conviction on rate direction. A bullet portfolio (concentrated at one maturity) outperforms in strong directional moves.
- Exam trap: ladders reduce reinvestment risk on the income side but introduce reinvestment risk on the maturity side. Both exist, just at different points.

Yield curve shapes and what they signal

- Normal (upward-sloping): long yields > short yields. Expansion expected.
- Inverted: short yields > long yields. Historically a recession signal 6-18 months out.
- Flat: nearly identical yields across maturities. Transition phase, often before inversion.
- Steep: very wide gap between short and long. Strong growth + inflation expectations.

Read the live cheat sheet

Worked examples, callable bonds, credit ladder.

<https://registrantprep.ca/cheat-sheets/cire-fixed-income-yields>