Kalotay Analytics

A DIVISION OF ANDREW KALOTAY ASSOCIATES, INC.

Problems with Benchmark Muni Yield Curves

Advanced Curve Building Frameworks: Best Practices

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The Tax-Exempt Bond Market

Large but illiquid ($3.7 trillion, 60,000 issuers)

Common institutional structure: 5% coupon, par call starting at the end Year 10

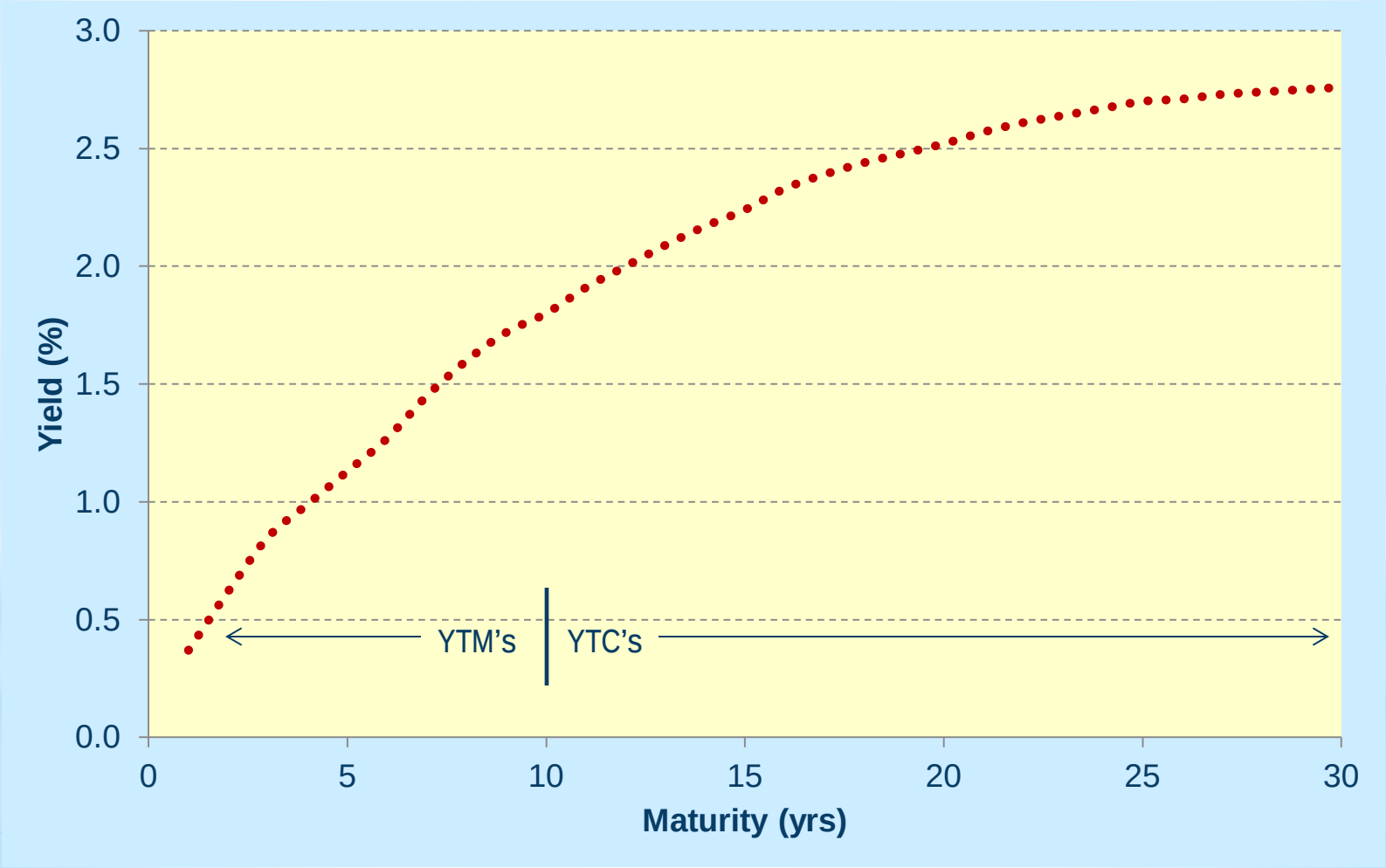
- Sold well above par; see ‘Allure’ article in References

Several vendors provide benchmark 5% NC-10 yield curves (Bloomberg, MMA, MMD, S&P)

- Yields are YTC’s
- Some also provide 5% NCL and par NC-10 curves*

**Different curves by same vendor often inconsistent with each other*

Recent MMA 5% NC-10 Curve



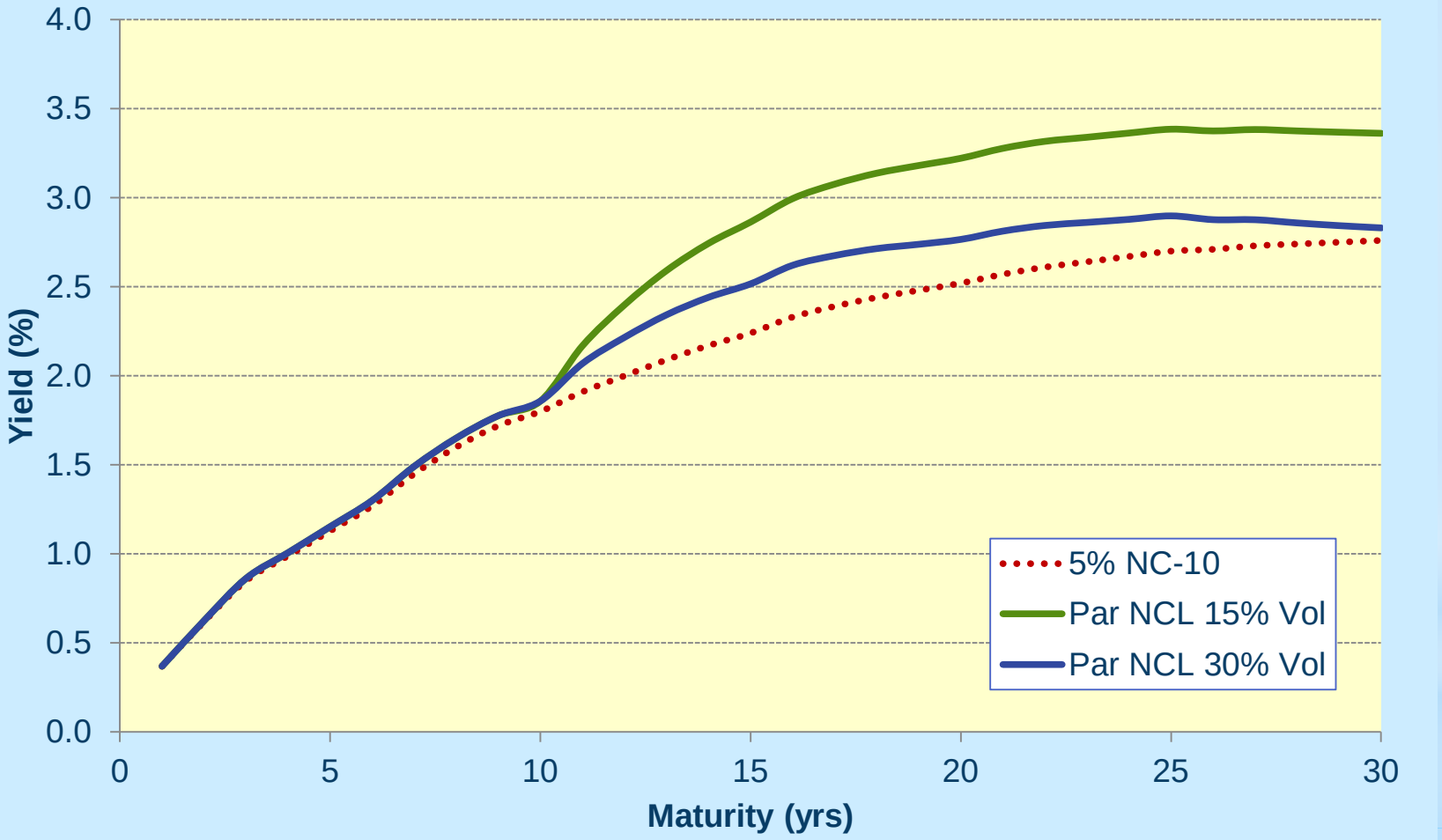
Optionless Discount Rates Needed for Risk Analysis

Have to be inferred from callable benchmark rates

Recommended approach: strip out call options

- Specify reasonable interest rate process and volatility
  - E.g. Black-Karasinki, 15% vol
- Bootstrap

Optionless Par Curves



Option Stripping Fails if Curve Not Arbitrage-Free

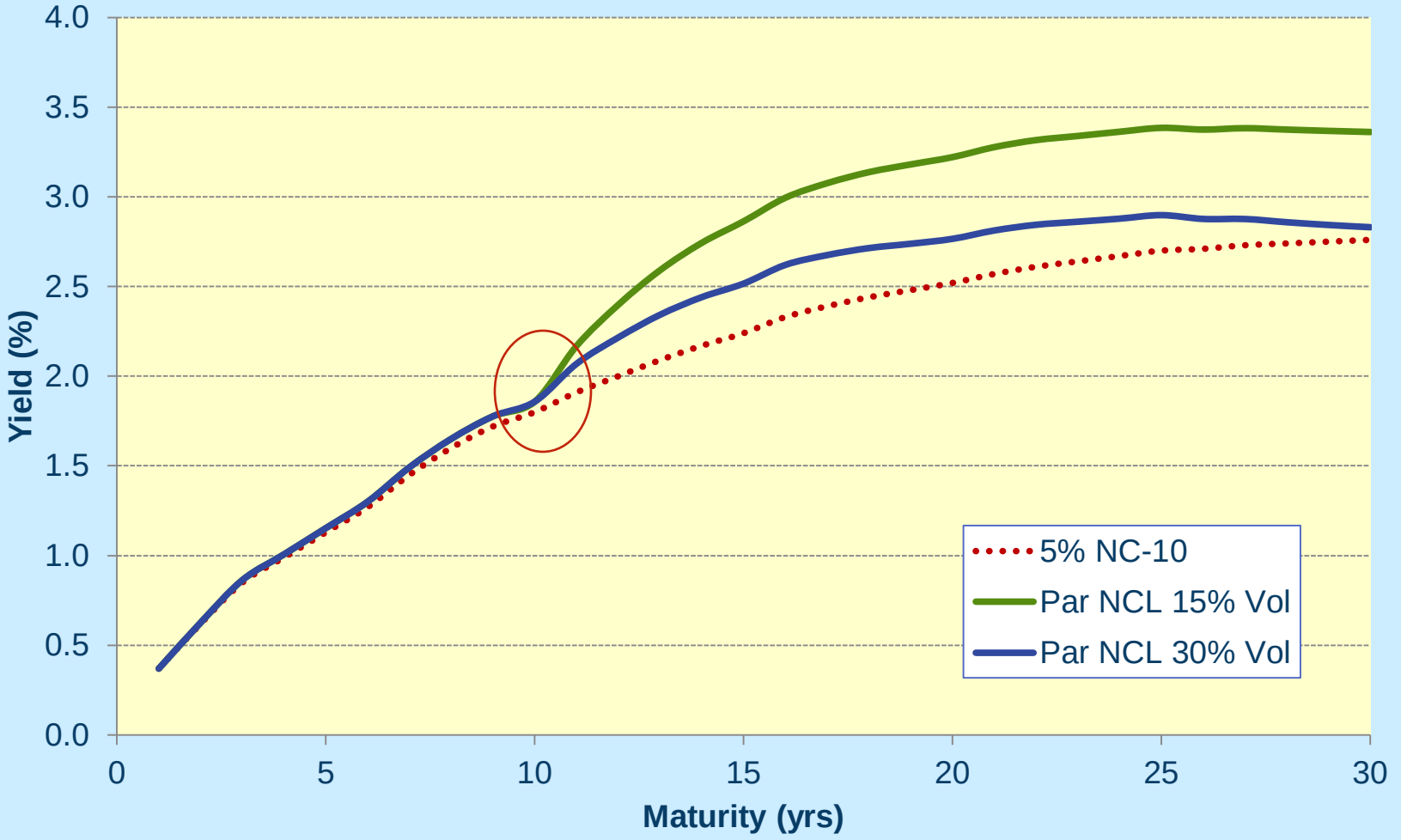
Homework: Prove that

Prices of 5% NC-10 bonds must decline with maturity

Yields of par NC-10 bonds must increase with maturity

See 'Bad curves' in References for proofs

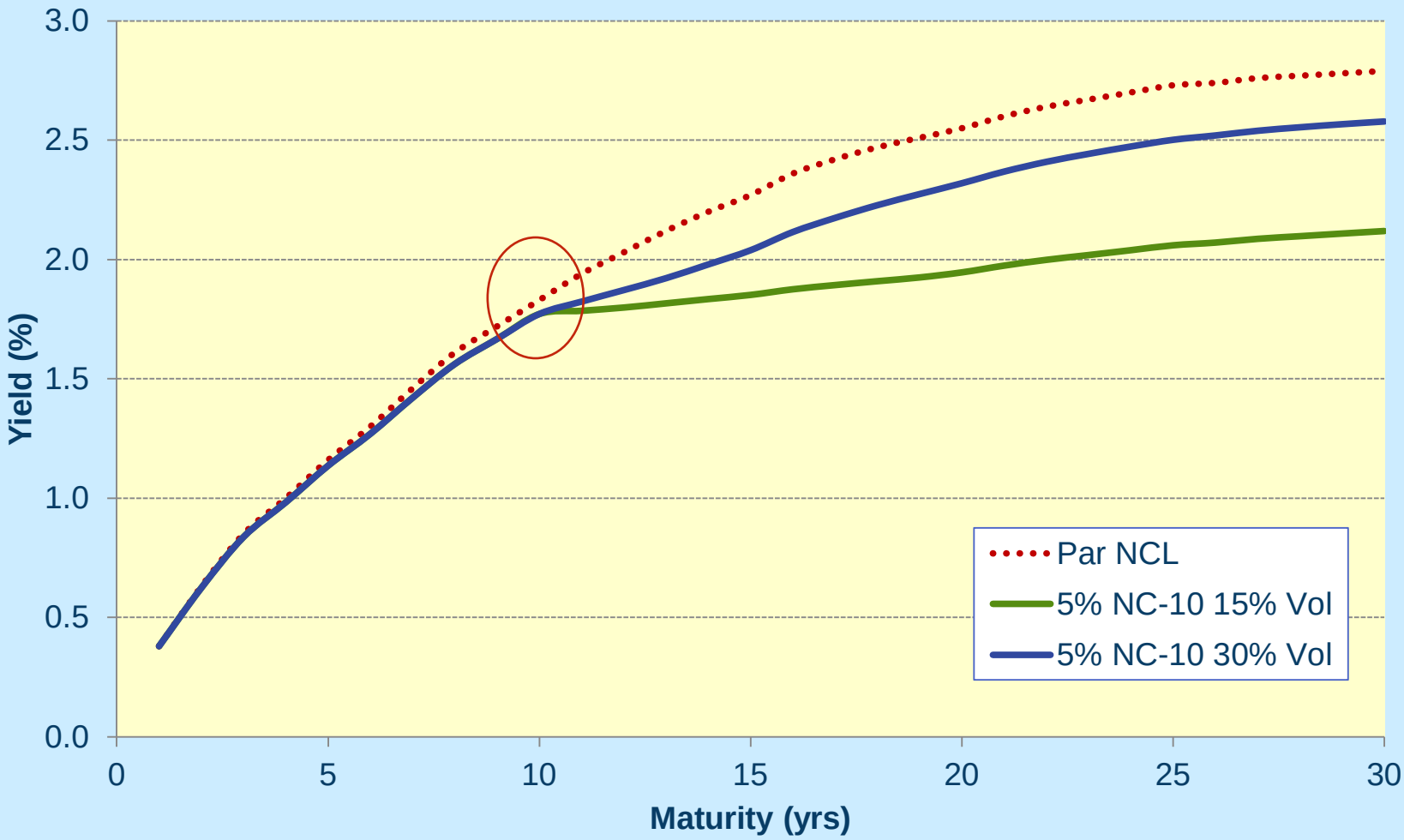
Optionless Curves from Smooth 5% NC-10 Curve



If Callable Curve Is Smooth, NCL Curve Is Not

- Bump between Year 10 (optionless) and Year 11 (callable)
  - Can be reconciled only by using a very high volatility
  - Similar problem occurs when going from smooth optionless curve to callable curve

5% NC-10 Curves from Smooth NCL Curve



A Career in Munis?

Municipal bonds are rich in optionality, but option-theoretic analytics are sorely missing

Financial engineers looking for a challenge can bring much-needed quantitative rigor to this area

References

What Makes the Municipal Yield Curve Rise? *The Journal of Fixed Income*, Winter 2008

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Risk(y) Measures, *Forthcoming*