



A DIVISION OF ANDREW KALOTAY ASSOCIATES, INC.

Uses and Misuses of OAS: Risk Analysis and Callable Benchmark Curves

Bloomberg Municipal Bond Forum *Measuring Optionality*

New York, NY
April 28, 2016

OAS Is Indispensable for Risk Analysis

Standard muni structure is 5% NC-10

Currently trade to the call, well over par (YTW=YTC)

'Coupon levitation' appeals to both issuers and investors

What happens to prices when rates rise?

Bump YTC or YTM? Neither is satisfactory!

Extension risk is not the only concern; *tax effect* on discounts depresses prices further

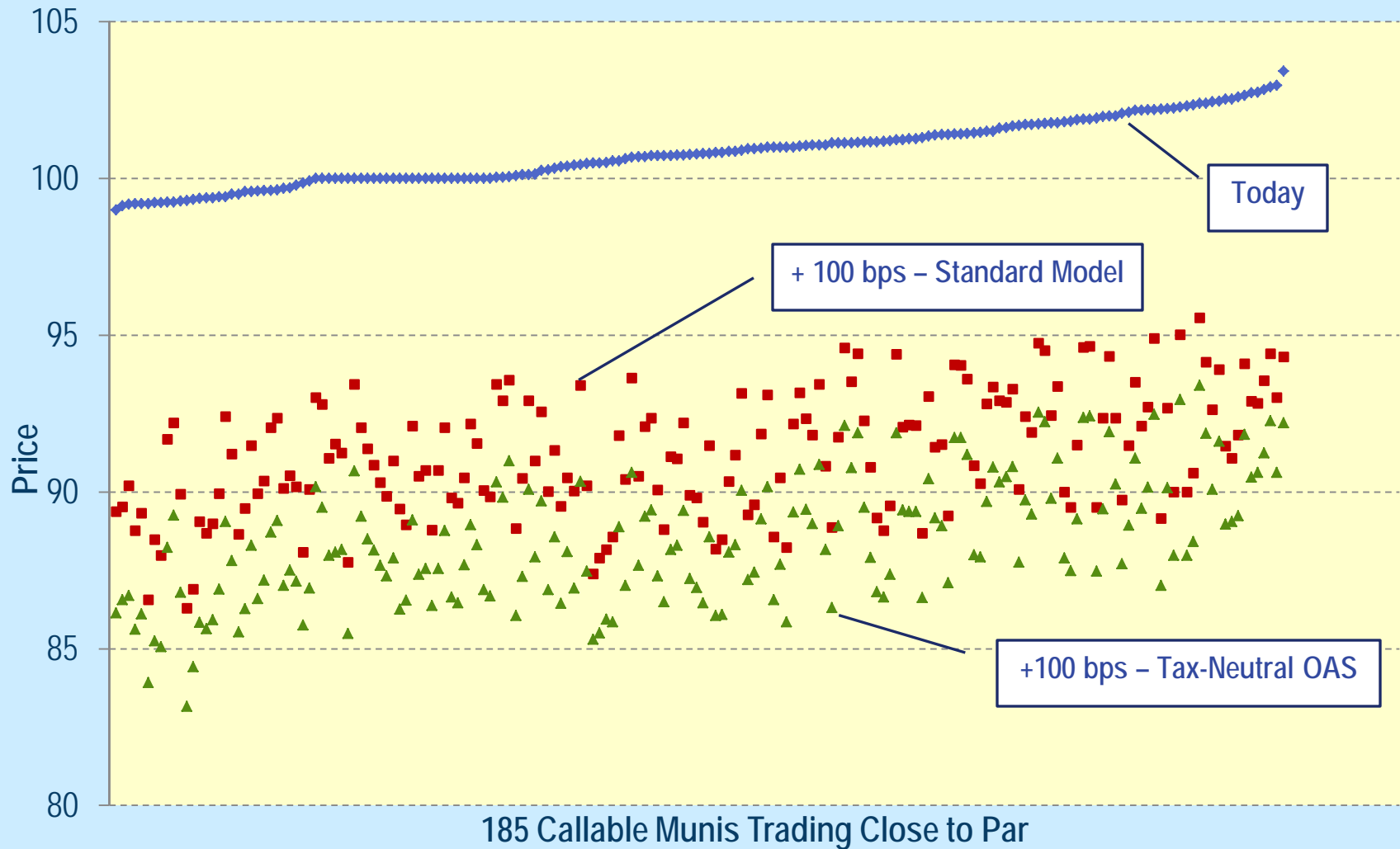
Credit spreads must be adjusted accordingly

OAS gets it right (but it must be *tax-neutral*)

Any other approach fails miserably

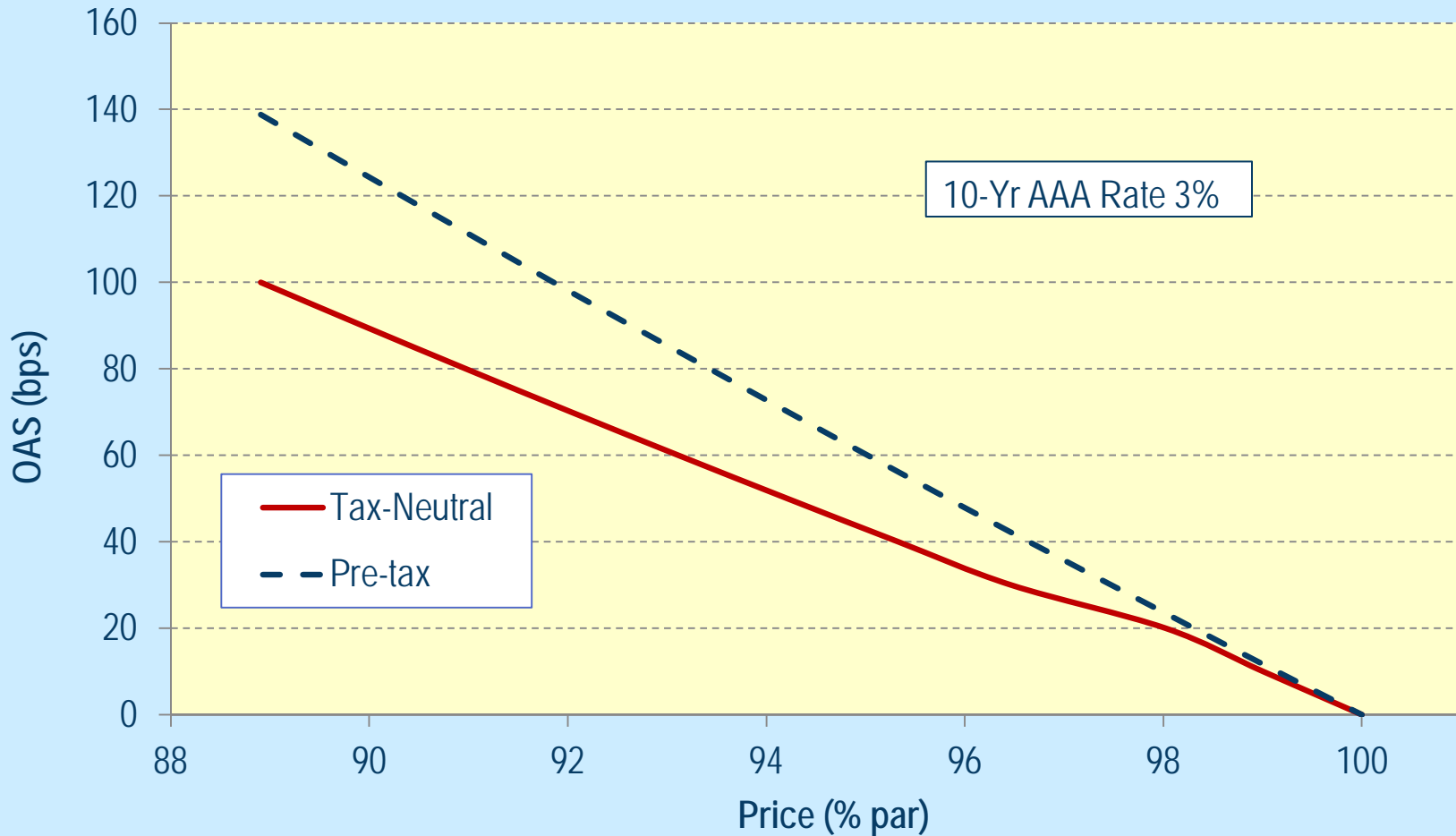
Taxes Depress Prices of Discounts

What Happens to Muni Prices When Rates Rise 100 bps?



Ignoring Taxes → Discounts Cheap

3% 10-Year Bullet



Callable Benchmark Curves Are Defective and Misused

OAS exposes inherent defects

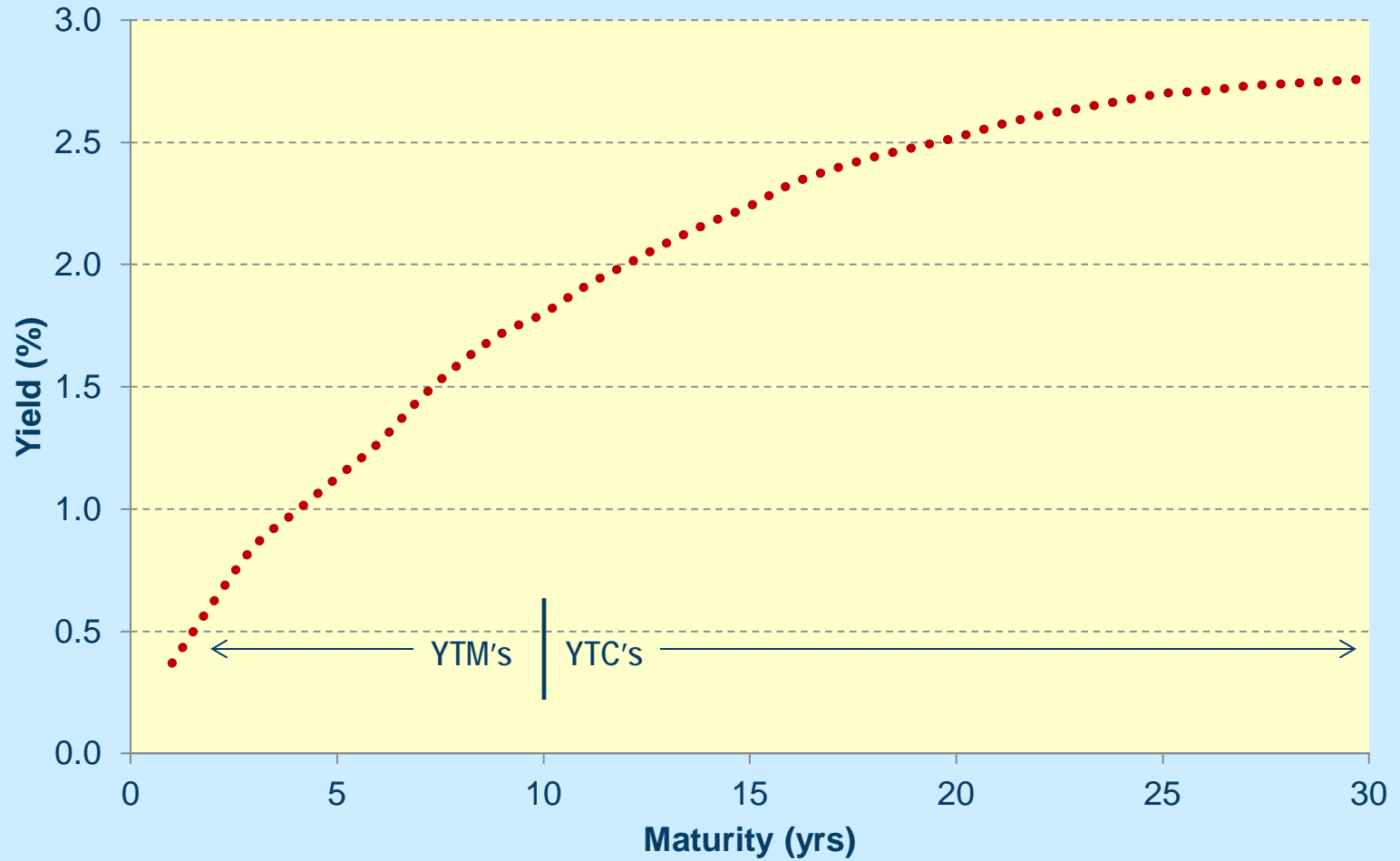
Implied optionless rates are unrealistic

Cannot be used for OAS analysis in their raw form

Optionless input curve needed (derived from callable benchmark)

Devastating examples follow

Recent 5% NC-10 Curve



Common Defects of Callable Benchmark Curves

Not arbitrage-free

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

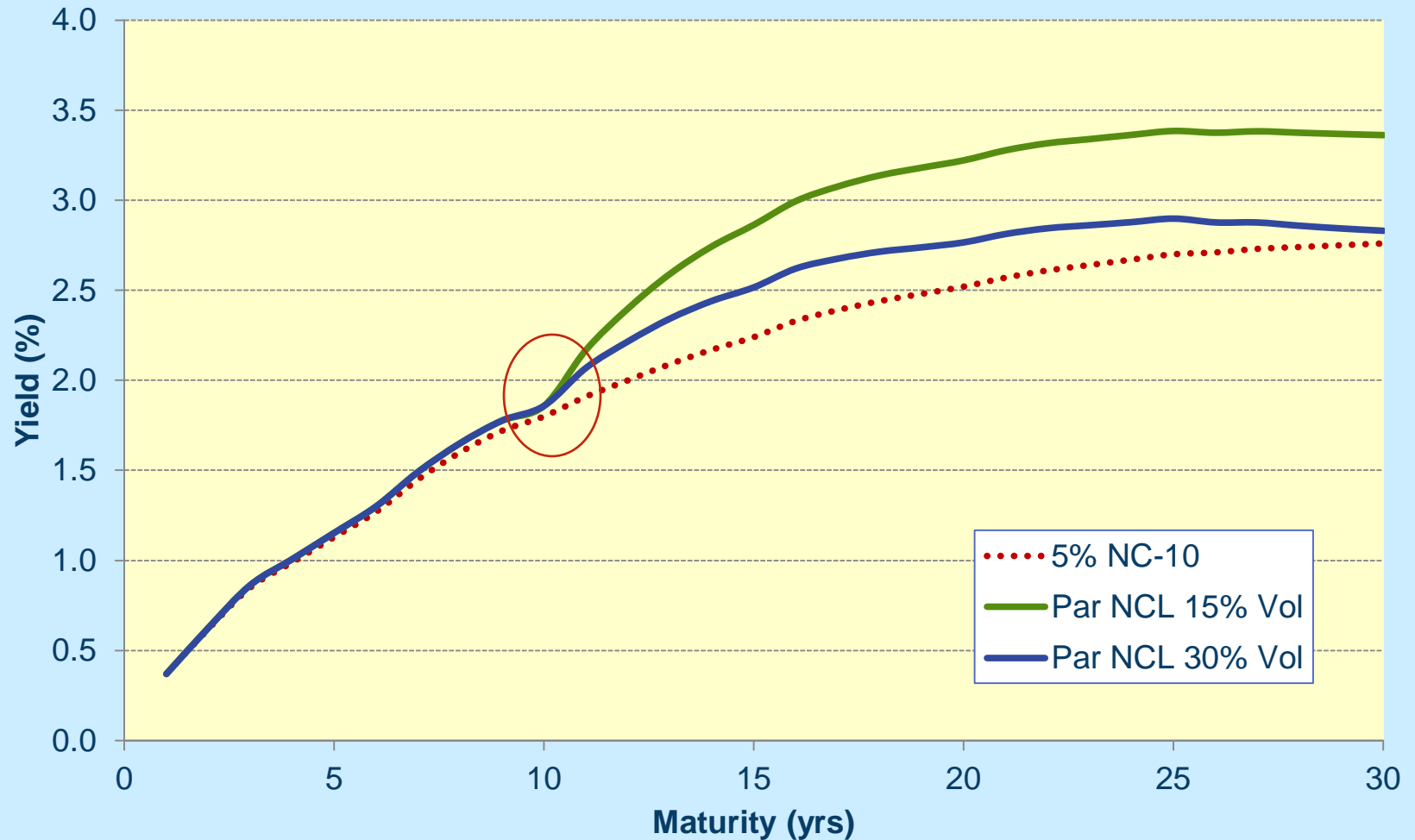
Yields of par NC-10 bonds must increase with maturity*

Smooth callable curve implies kink in optionless curve
between years 10 and 11

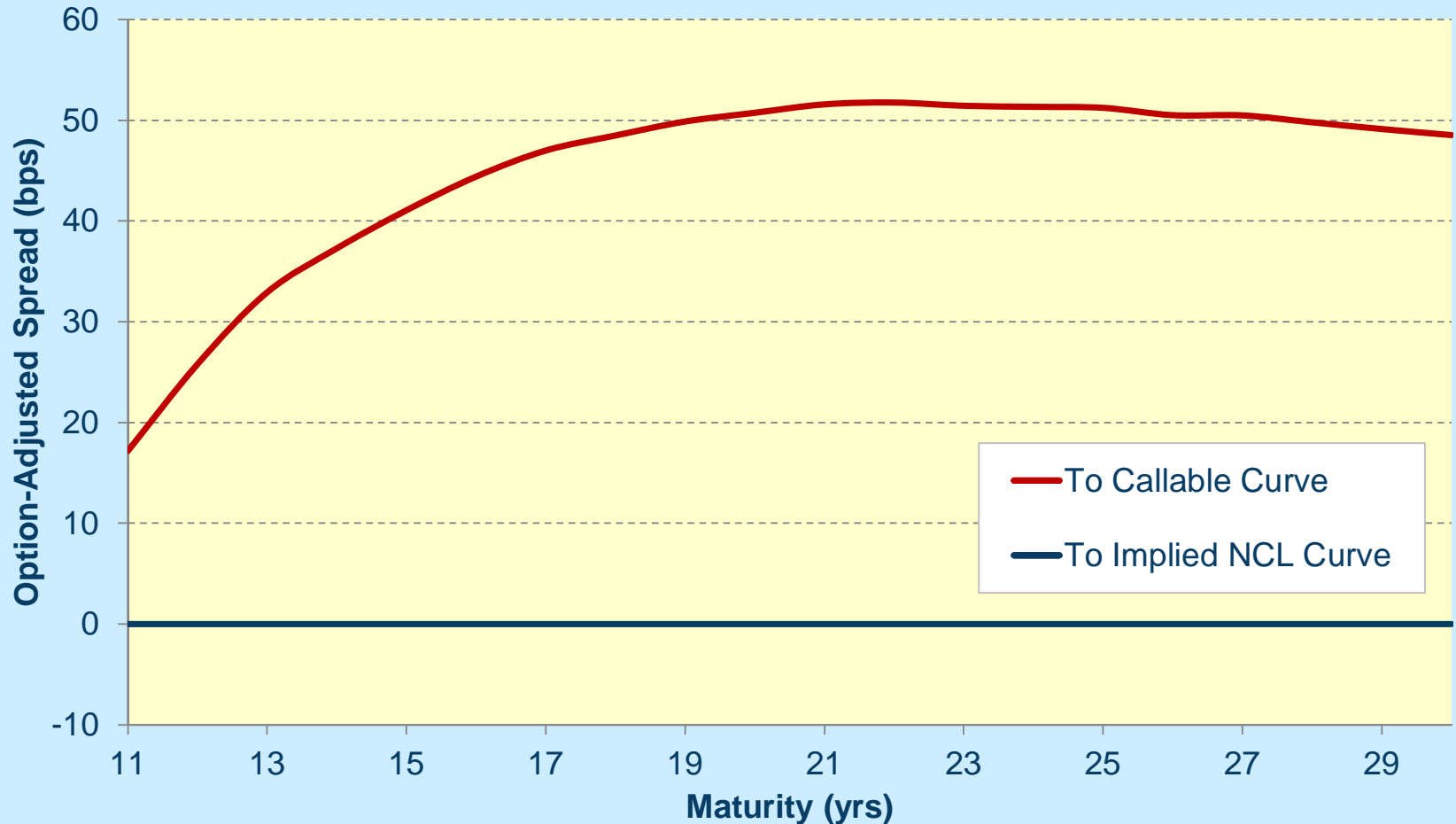
And vice versa

** Challenge for quants: prove assertions*

Smooth Callable Curve Implies Kink in NCL Curve



How Can Benchmark Bonds Trade at a Spread To the Curve They Define?



Fear and Loathing of OAS in Muni-Land Unjustified

OAS works perfectly *if properly used*

And it is ridiculously fast

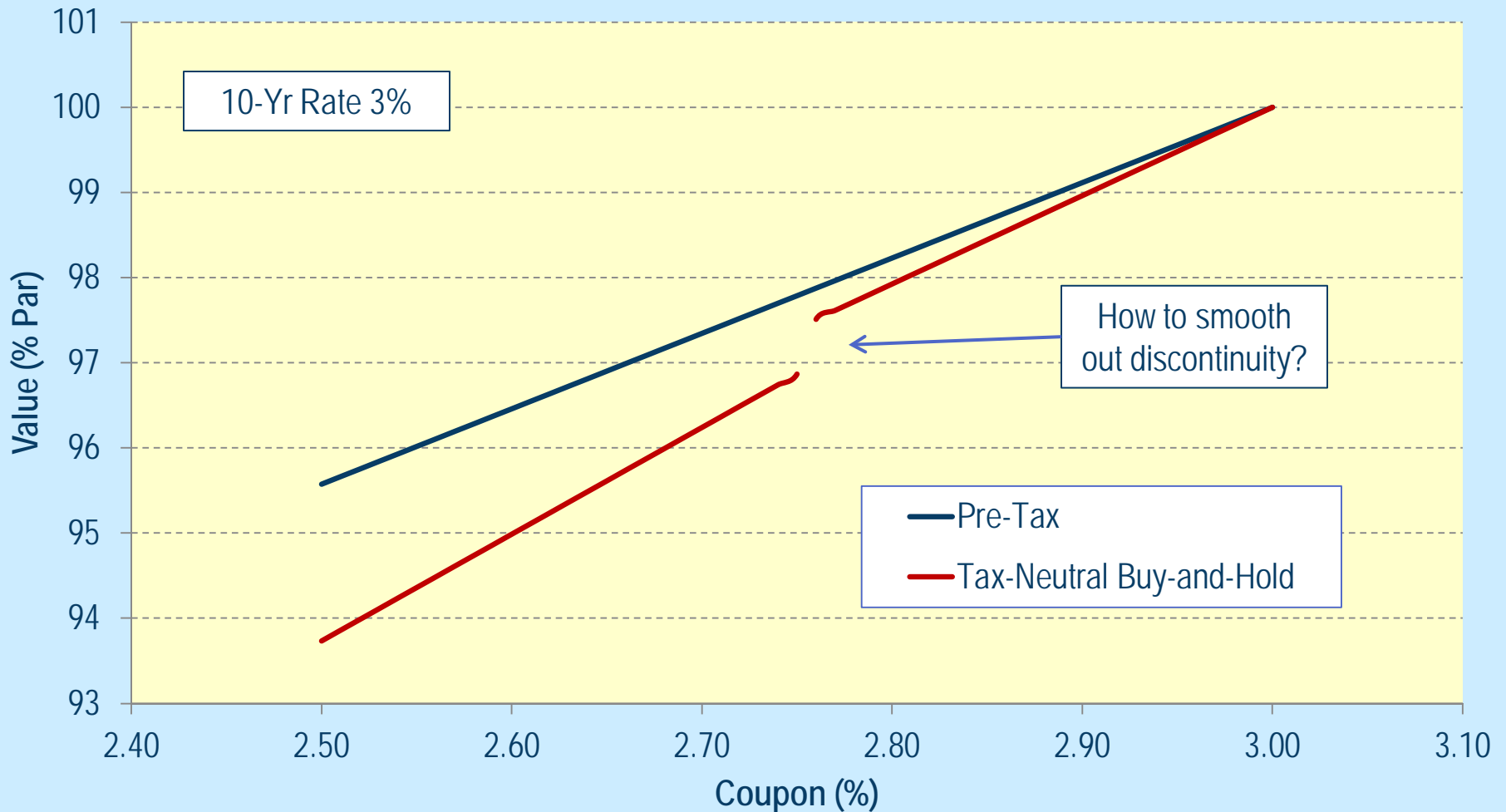
YTW is fine for price quotes, but unsuitable as an analytical tool

The muni industry will be a better place when OAS analysis becomes the norm

Yield curve providers, portfolio managers, financial advisors take note!

Taxes Depress Prices of Discounts

10-Year NCL Bond



Investors Punish Low Coupon Bonds

THE BOND BUYER

Wednesday, July 3, 2013

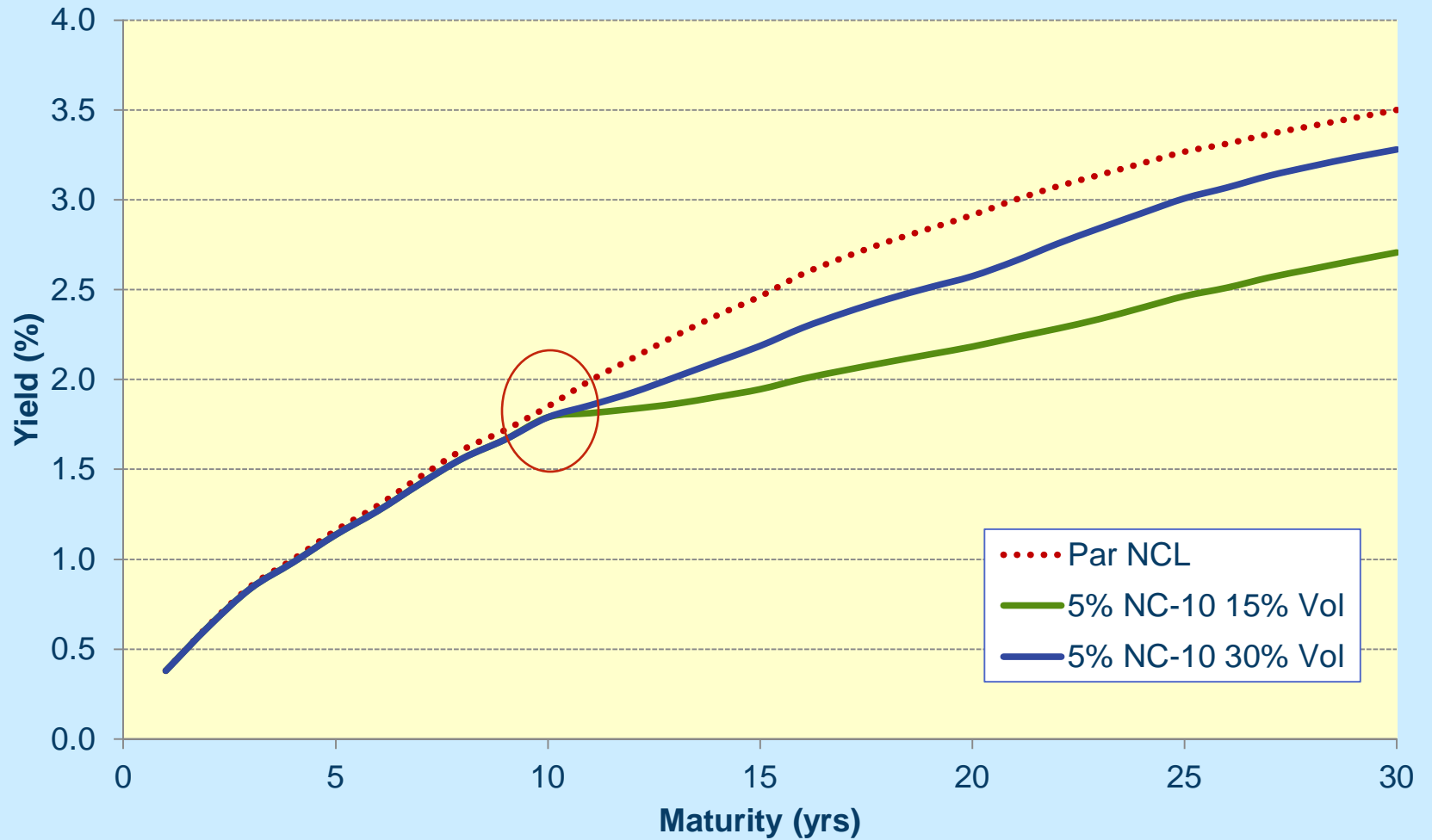
In Selloff, Higher Coupons Outperformed

Markets - Buy Side
by: James Ramage

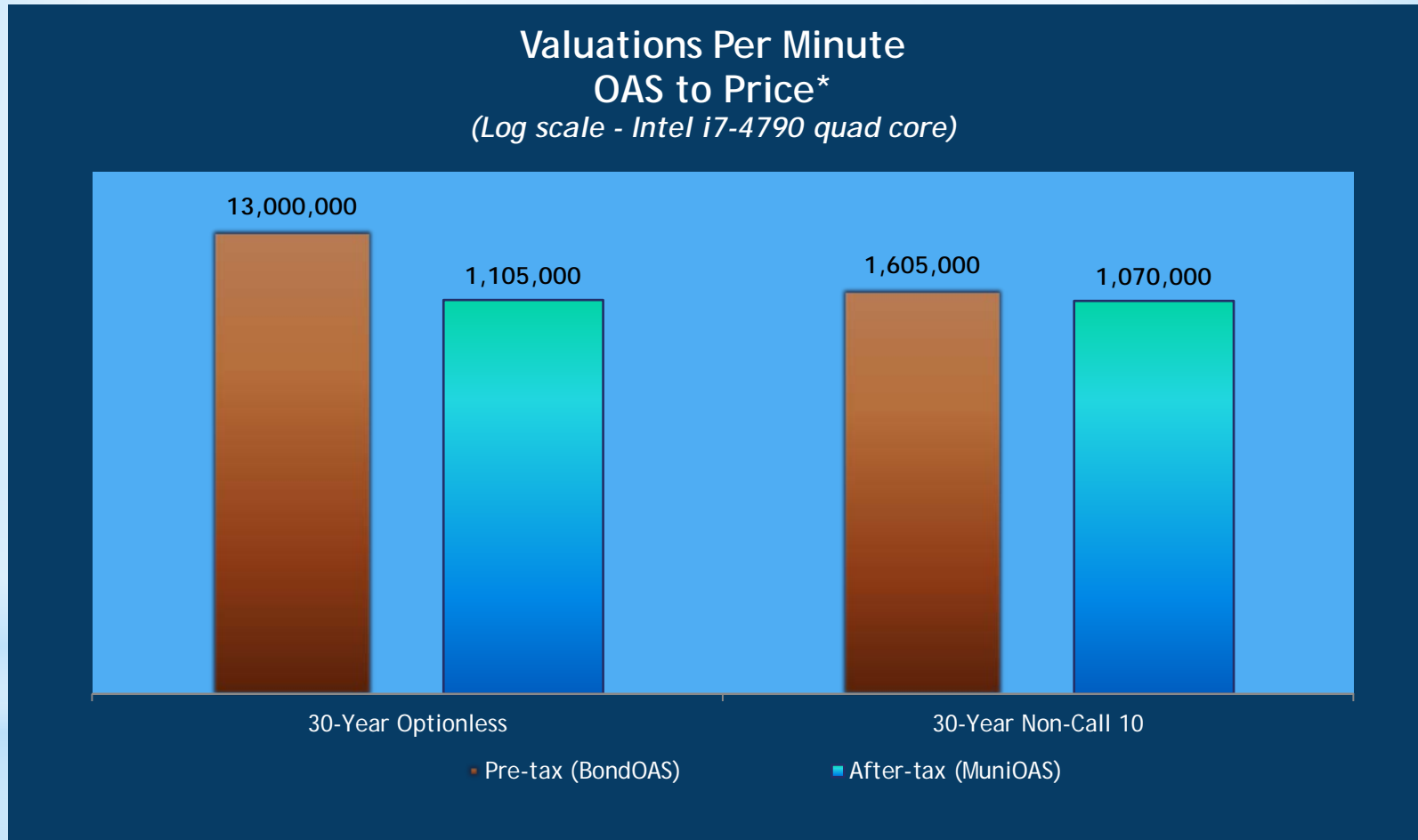
... buyers demanded an additional 40 basis points for 4% coupon bonds, industry analysts estimated, ... [and] ... they demanded an additional 80 basis points for 3% coupons [relative to 5% bonds].

Accordingly, while 5% coupons could be sold at these levels, buyers demanded an additional 40 basis points for 4% coupon bonds, industry analysts estimated. Following up, they demanded an additional 80 basis points for 3% coupons. 12

And Vice Versa



Kalotay Analytics Speed Benchmarks



Application: Real-time bond ETF pricing and index tracking

References

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

The Interest Rate Sensitivity of Tax-Exempt Bonds under Tax-neutral Valuation, *Journal Of Investment Management*, Vol. 12, No. 1, (2014),

The Allure of 5% Bonds: Coupon Levitation Creates Magical Savings, *The Bond Buyer*, January 27, 2012

Pricing 5% Bonds with Shorter Calls, *The Bond Buyer*, April 21, 2014

Spread(ing) Confusion, *The Bond Buyer*, November 23, 2015

Beware of Bad Benchmark Curves, *The Bond Buyer*, January 6, 2016

Defective Curves, Faulty Analysis, *The Bond Buyer*, April 21, 2016