



A DIVISION OF ANDREW KALOTAY ASSOCIATES, INC.

The Interest Rate Risk of Municipal Bonds: Challenges and Opportunities

November 18, 2013



Topics

Why taxes depress prices of discount munis

When rates rise, performance suffers unduly

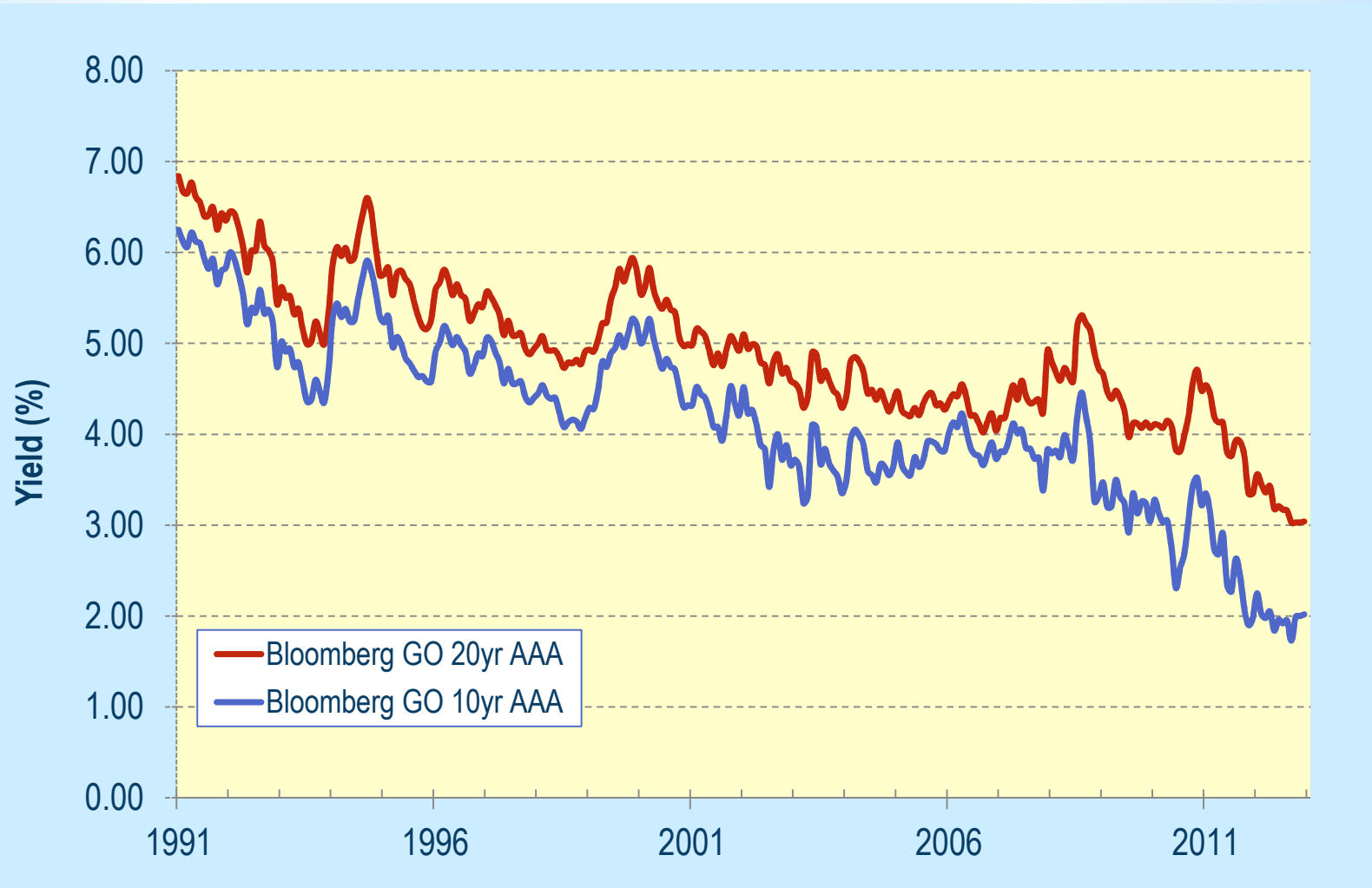
But 'hold value' can exceed market price

How strategic selling can enhance after-tax return

How to determine savings?

What is the right time to sell?

What Will Happen When Rates Rise?



When Rates Rise Prices Will Fall More Than Expected

Bond Buyer, March 18, 2013

Single-A Par Bonds	Rates Rise 100bps					
	Standard Approach		Kalotay Approach		Δ	
	Price	Yield	Price	Yield	Price	Yield (bps)
2-yr 0.90%	98.05	1.90	96.82	2.54	-1.23	64
5-yr 1.65%	95.35	2.65	92.84	3.21	-2.51	56
10-yr 3.00%	91.82	4.00	88.94	4.38	-2.88	38

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. 5

Discount Bonds Get Hit Harder

THE BOND BUYER

Monday, July 8, 2013

After Price Drop, Discount Bonds Cheap

Markets - Market News

by: Taylor Riggs and Oliver Renick

Lower coupon bonds were hit the hardest in the recent selloff as prices declined much faster than premium bonds ...

Though lower coupon bonds don't hold up as well in a rising interest rate environment, a slew of 2% and 3% coupon bonds dropped to the 70-80 price range, making them much more attractive to the retail investor than 4% and 5% coupons priced over 100.

"If you have a true buy-and-hold investor, these low-coupon bonds are likely to be entirely suitable," said Phil Fischer, head of municipal bonds research and global index systems at Bank of America Merrill Lynch. "These lower coupon bonds all need to be priced and sold on an after-tax yield calculation. People need to be very sensitive, especially on the retail side, to make sure

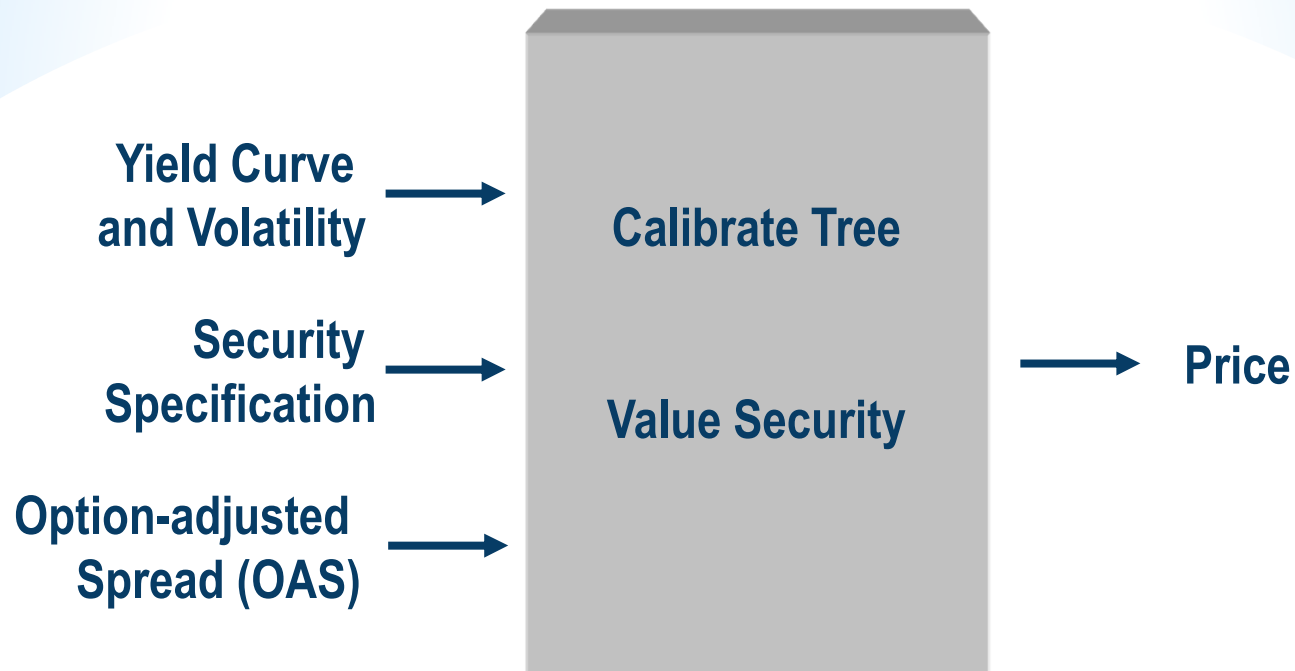
Tax Treatment of Tax-exempt Bonds Held to Maturity – Simple Version

Purchase Price	Treatment	Tax Rate*
At a premium	Premium amortized to zero	N/A
At a de minimis** discount	Taxed as capital gain	20%
At a non-de minimis discount	Taxed as ordinary income	40%

* Marginal tax rate implied by EMMA prices is 'very high'

** $0.25 \times$ the number of remaining years to maturity (e.g. 2.50 for a 10-year bond)

Robust OAS Technology Provides the Foundation for Rigorous Analysis



Handbook of Municipal Finance (2008)

OAS Framework Extended to Munis

Capital gains and losses are taxable

Investors assumed to be in the highest tax bracket

Key concepts: *after-tax fair price* and *after-tax OAS*

Fair price defined as value of after-tax cashflows, *including tax payable at maturity* (determined iteratively)

After-tax valuation tools are essential for managing interest rate risk and to maximize after-tax performance

*Examples below generated by MuniOAS™ and MuniSignal™
(patent pending)*

Assumptions for Following Exhibits

Tax Rates	
Income	40%
Short-term capital gains/losses	40%
Long-term capital gains/losses	20%

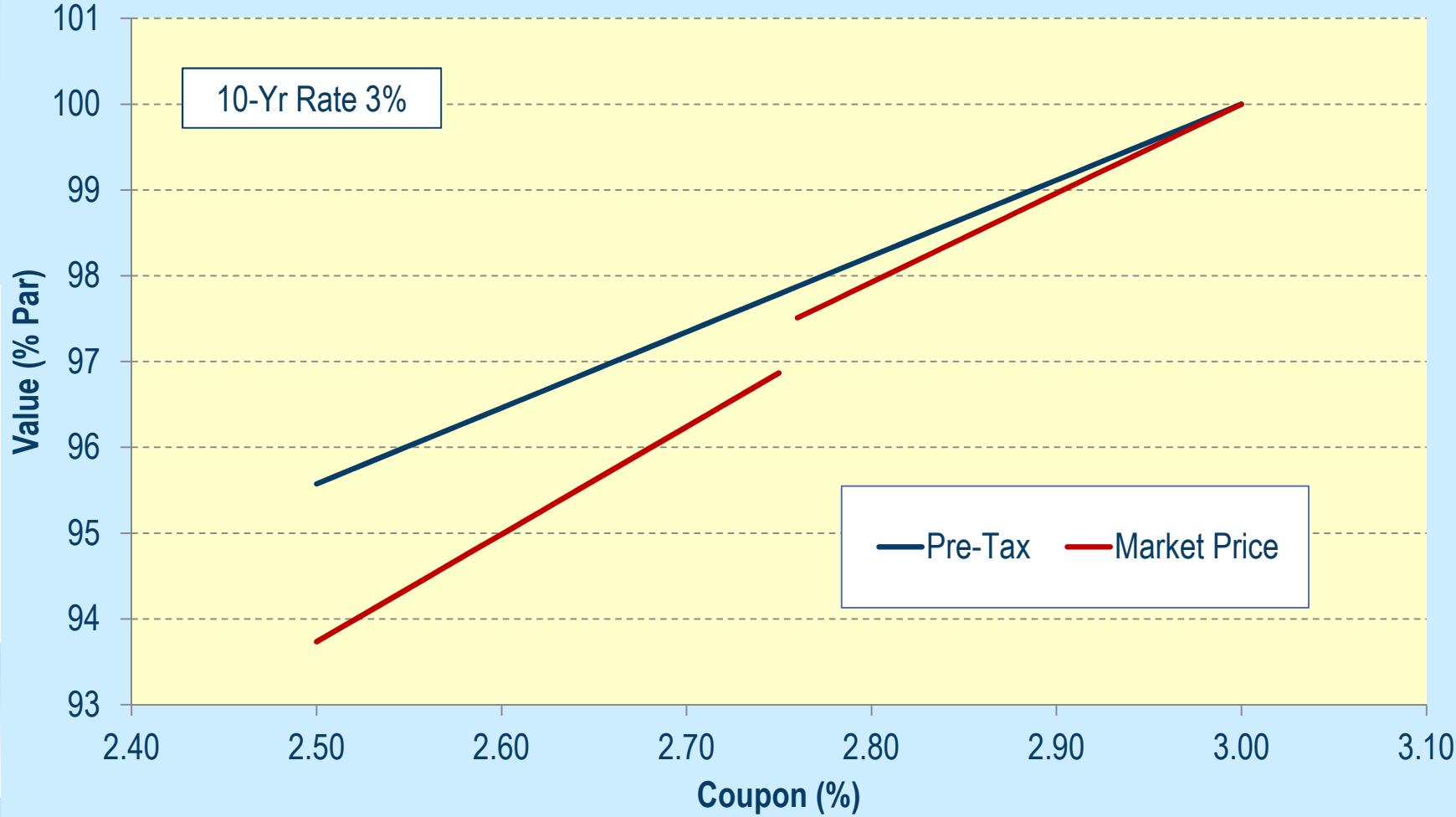
Issuer Par Optionless Yield Curve						
Mty (yrs)	1	2	5	10	20	30
Rate (%)	1.0	1.5	2.0	3.0	4.0	4.5

Interest Rate Volatility
20%

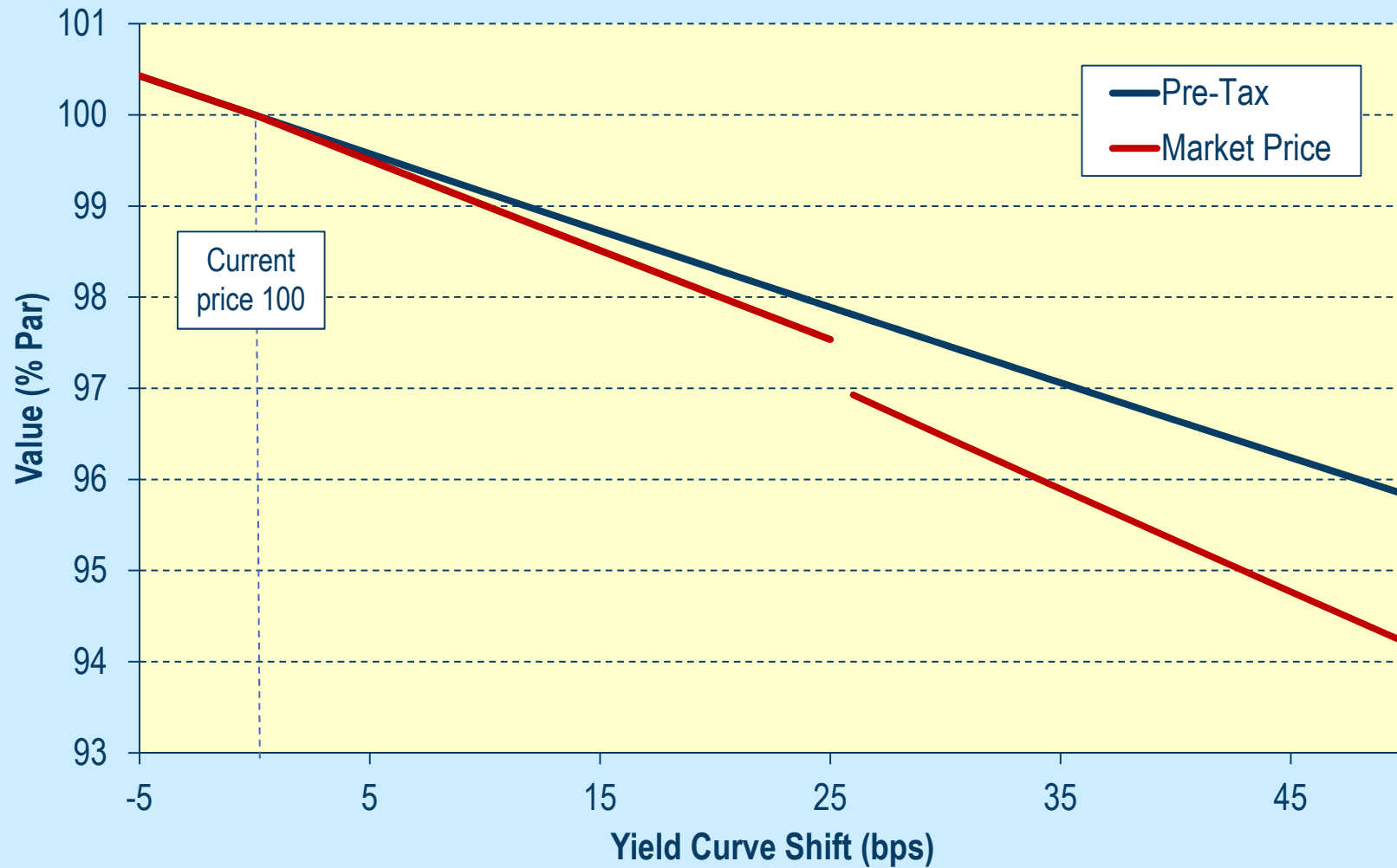
Transaction Cost
0.50% par

Taxes Depress Prices of Discounts

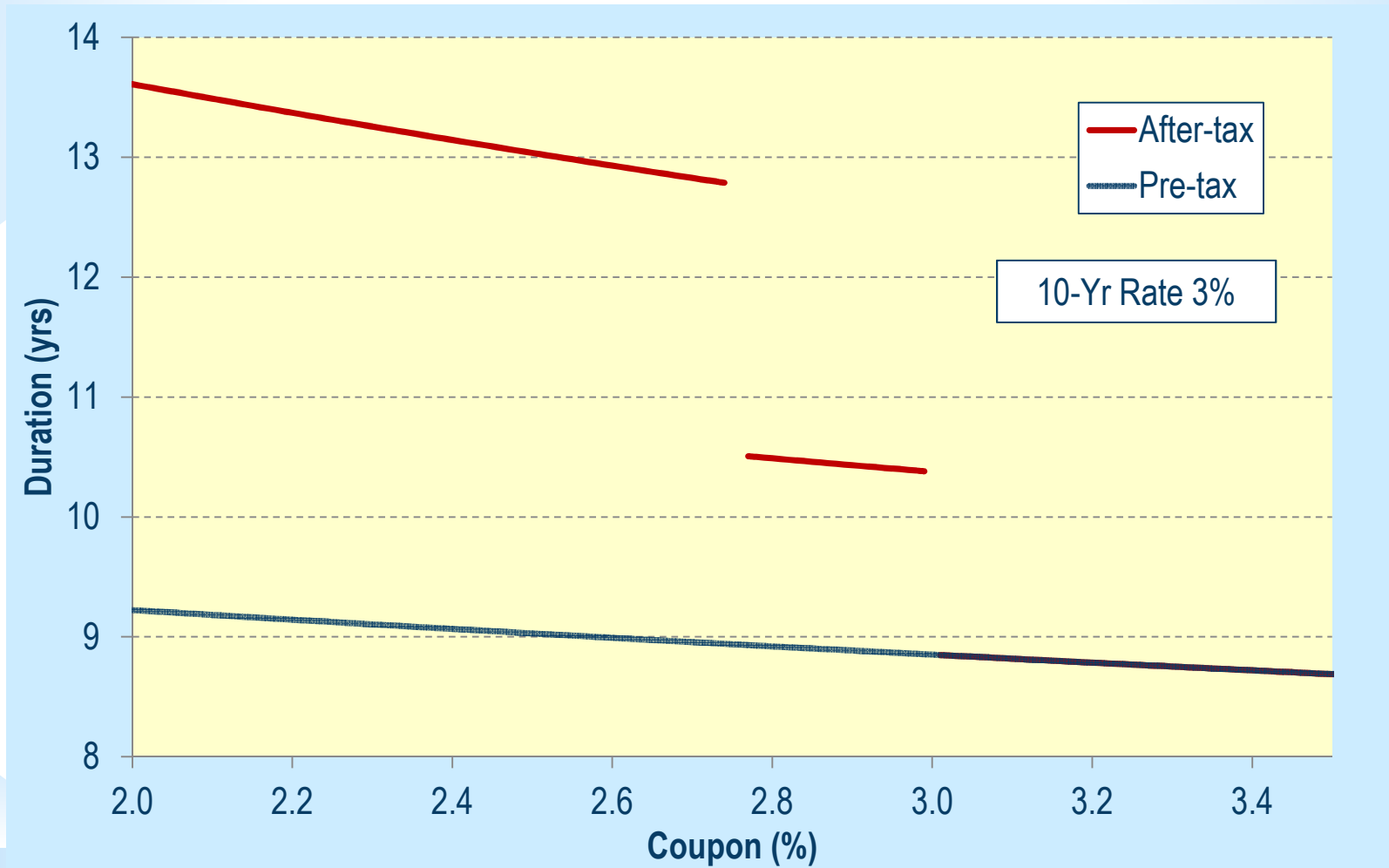
10-Year Bullets



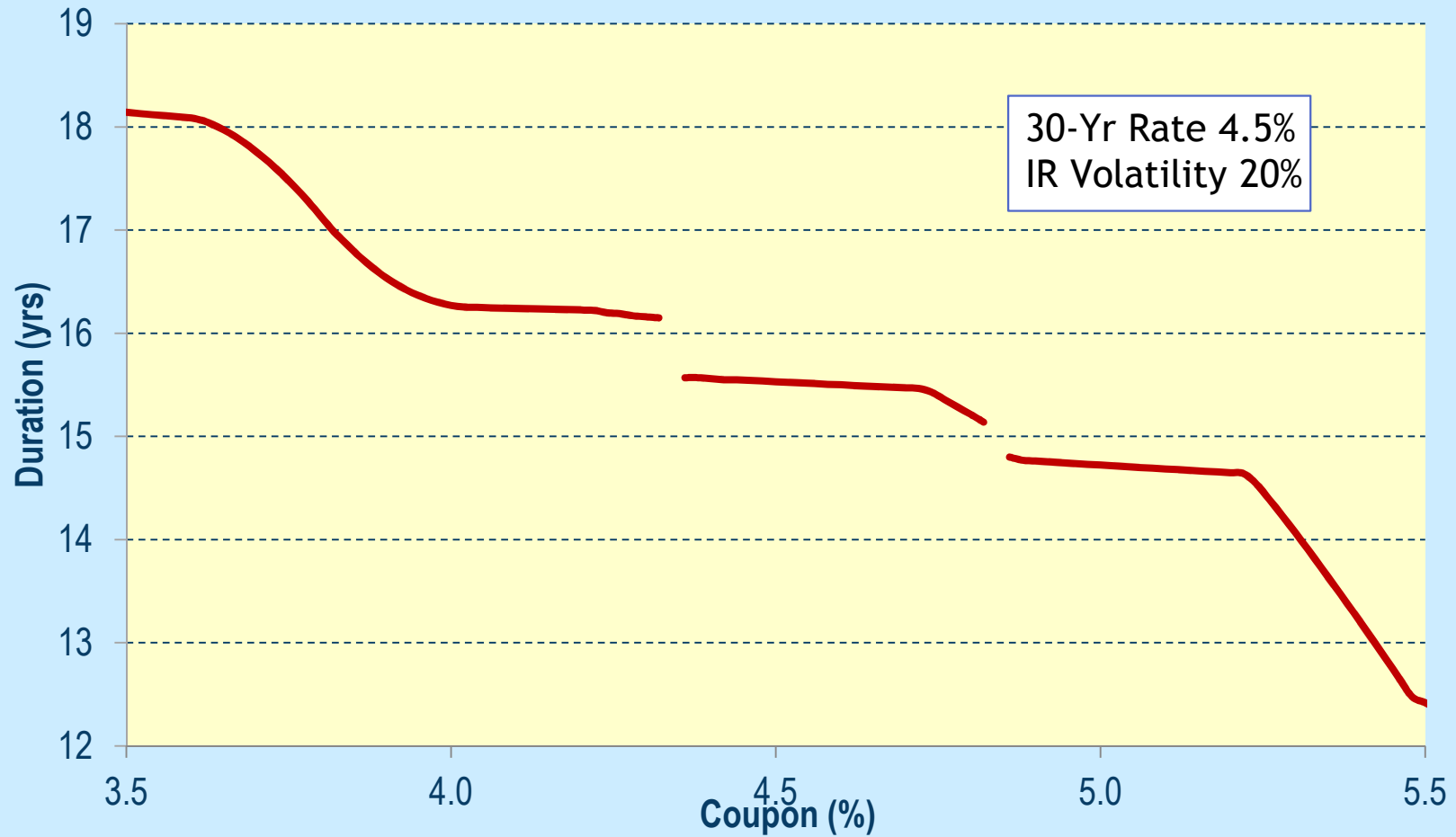
Interest Rate Sensitivity of 10-Year 3% Bond



Ignoring Taxes → Duration Underestimated 10-Year Bullets



After-Tax Duration of 30NC-10 Bonds



Option-Adjusted Spread Measures Credit Risk

Expressed relative to a risk-free benchmark curve

What is good benchmark curve for munis?

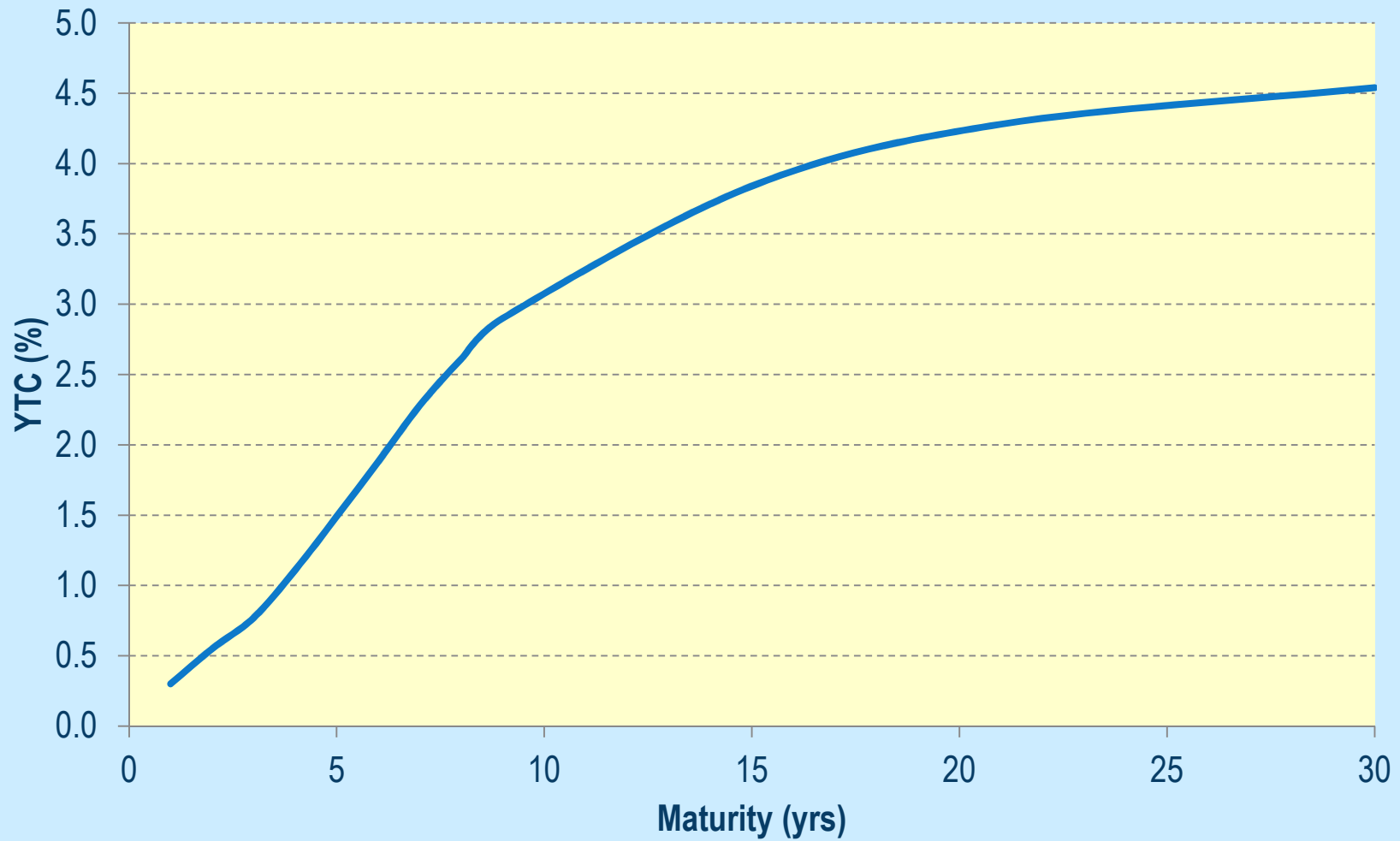
Identifies mispriced bonds

High OAS signals that bond is cheap

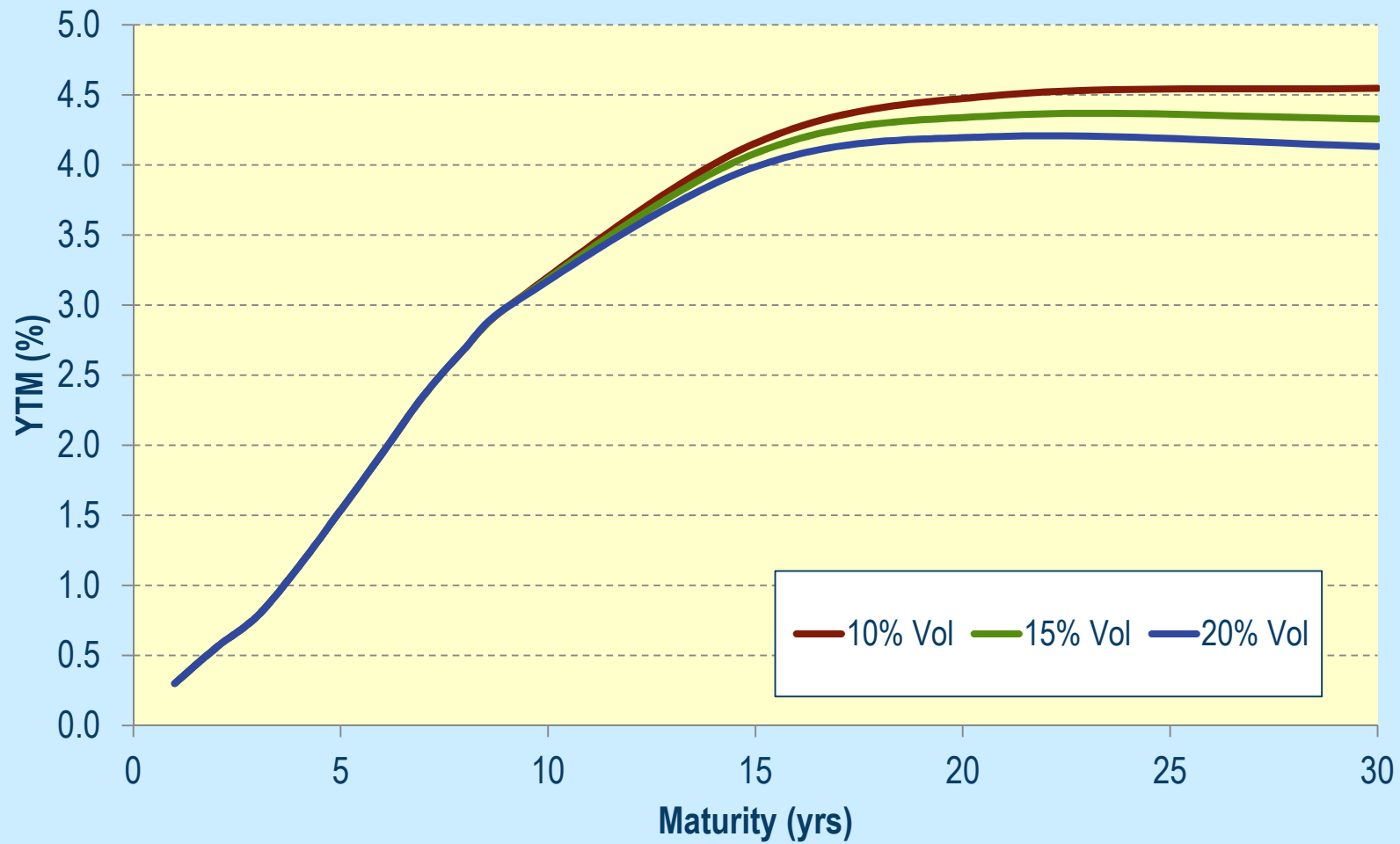
Used in quantifying interest rate risk

Calculate prices given yield curves, keeping OAS constant

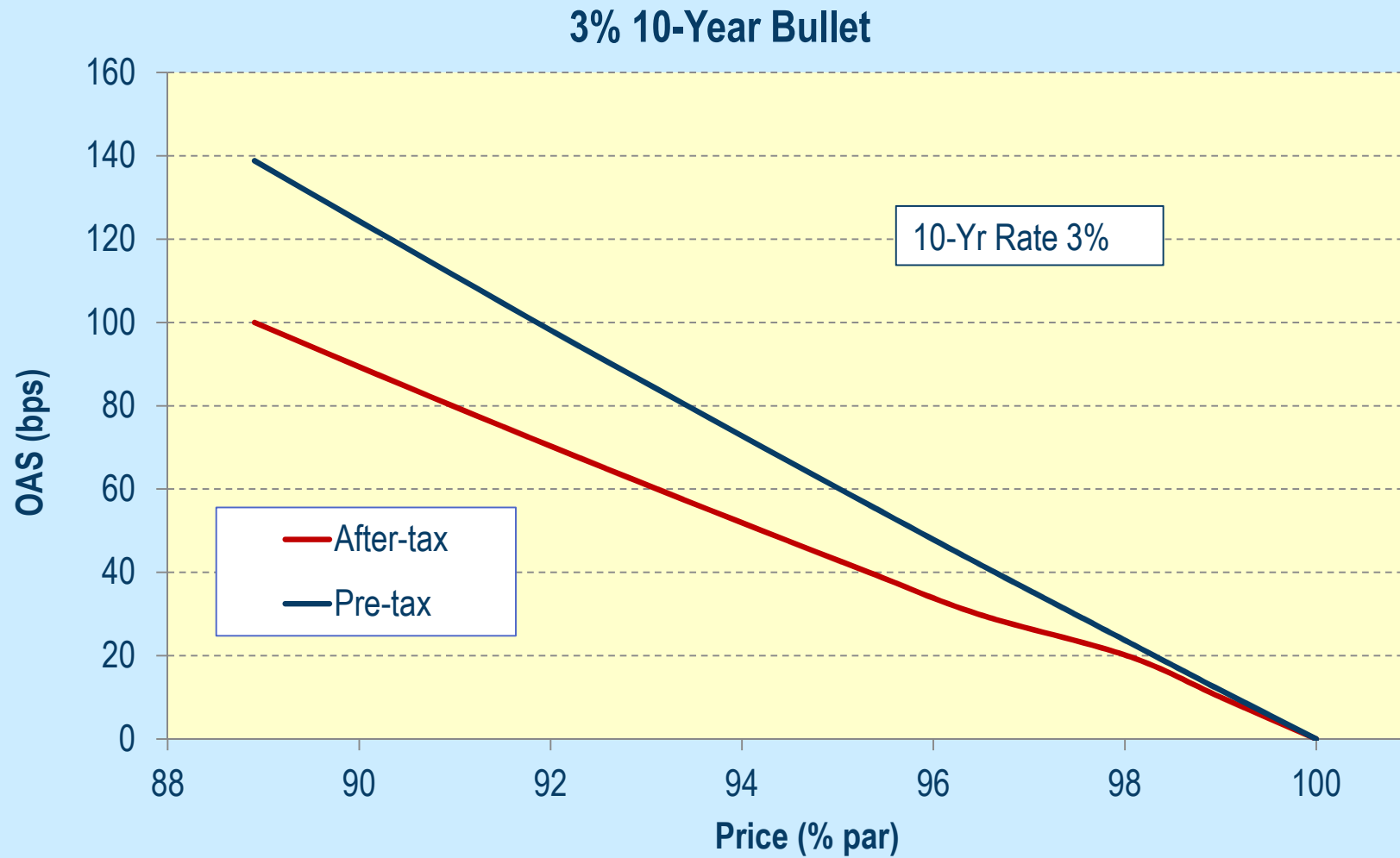
Recent AAA 5% NC-10 Curve



Optionless Par Curves Derived from 5% NC-10 Curve



Ignoring Taxes → OAS Overestimated



Tax Management Opportunities

Familiar transaction: selling losers*

Known as tax-loss harvesting

Short-term loss @ 40% can be very valuable

Selling winners (bonds whose value has surged) can also be beneficial at times

Read paper, if interested

**For bonds purchased at a premium, loss is based on accreted basis*

Sale Decision is a Two-Step Process

1. Is it profitable?

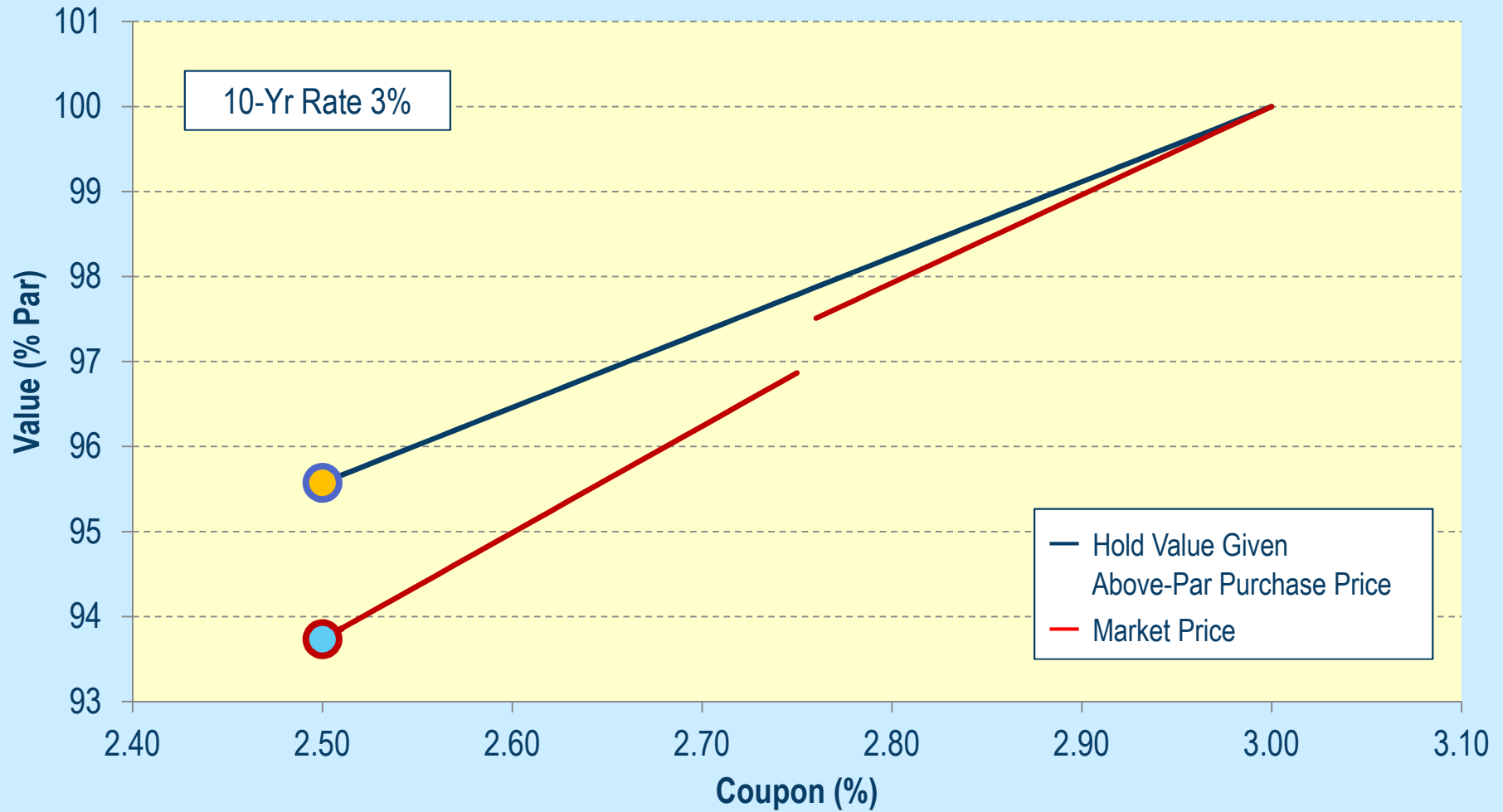
Compare after-tax proceeds from sale to 'hold value'

Hold value not directly observable

Depends on holder's basis

Obtained by OAS-based valuation

Market Price and 'Hold Value' Can Diverge 10-Year Bullets



Selling Losers

Bond Purchased at a Premium, Sold Below Par

2.50% Bond – 10 Years to Maturity	
Purchase Price (2 years ago)	111.85
Holder's Basis	110.00
Sale Price	93.23
Tax Savings	3.35
After-tax Proceeds from Sale	96.58
Hold Value	95.57
Net Value of Transaction	1.01

All values in percent of par

Sale Decision is a Two-Step Process

1. Is it profitable?

Compare after-tax proceeds from sale to 'hold value'

Hold value not directly observable

Depends on holder's basis

Obtained by OAS-based valuation

2. Do it now or wait?

Compare value of 'tax option' relative to savings, i.e. on the 'tax efficiency' of the sale

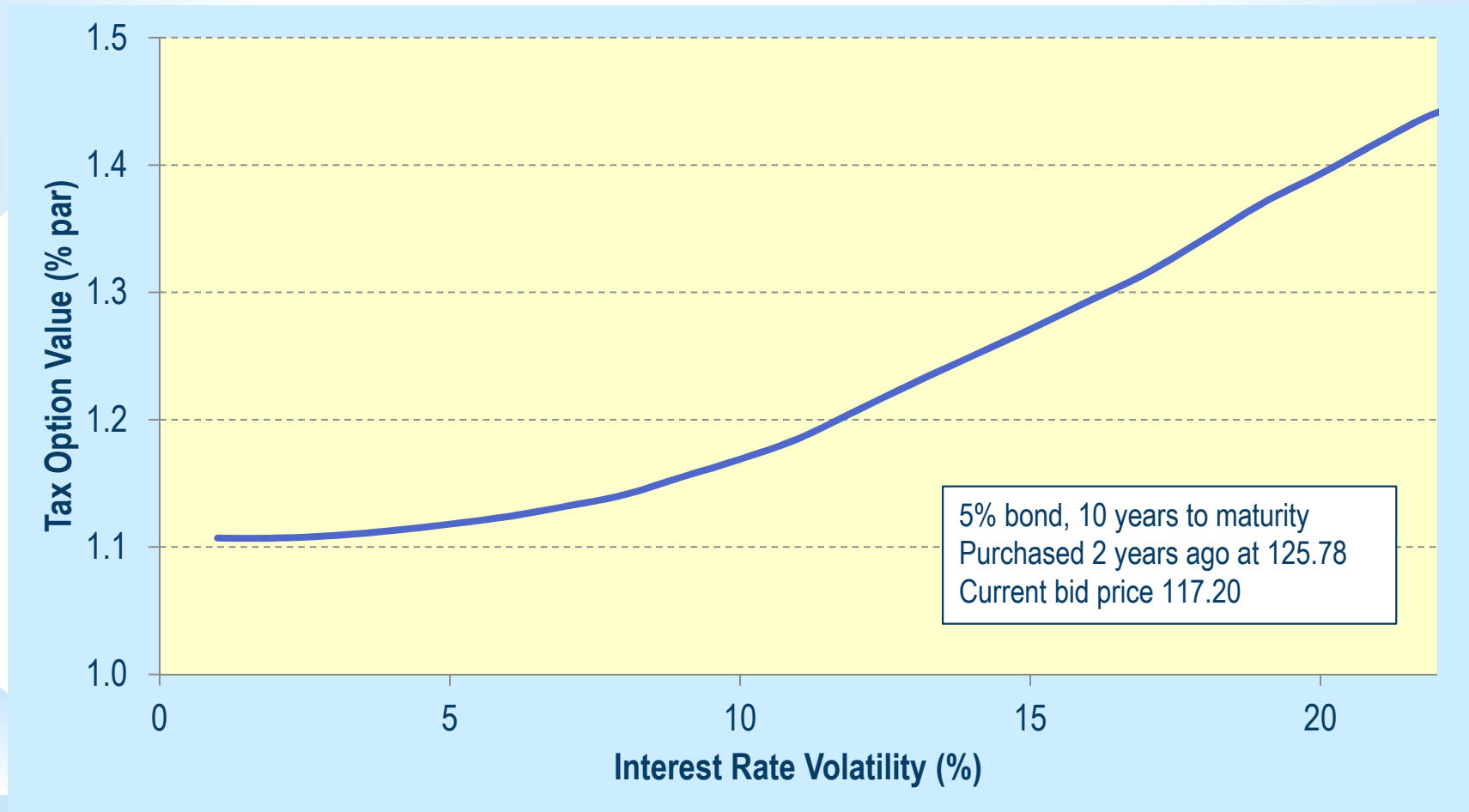
Value of tax option depends on transaction cost and interest rate volatility (even if bond is optionless)

Benefit from Selling Increases at Higher Rates

Bond Purchased at Premium, Sold Above Par



Interest Rate Volatility Increases Value of Tax Option Greater Potential for Tax-Loss Harvesting

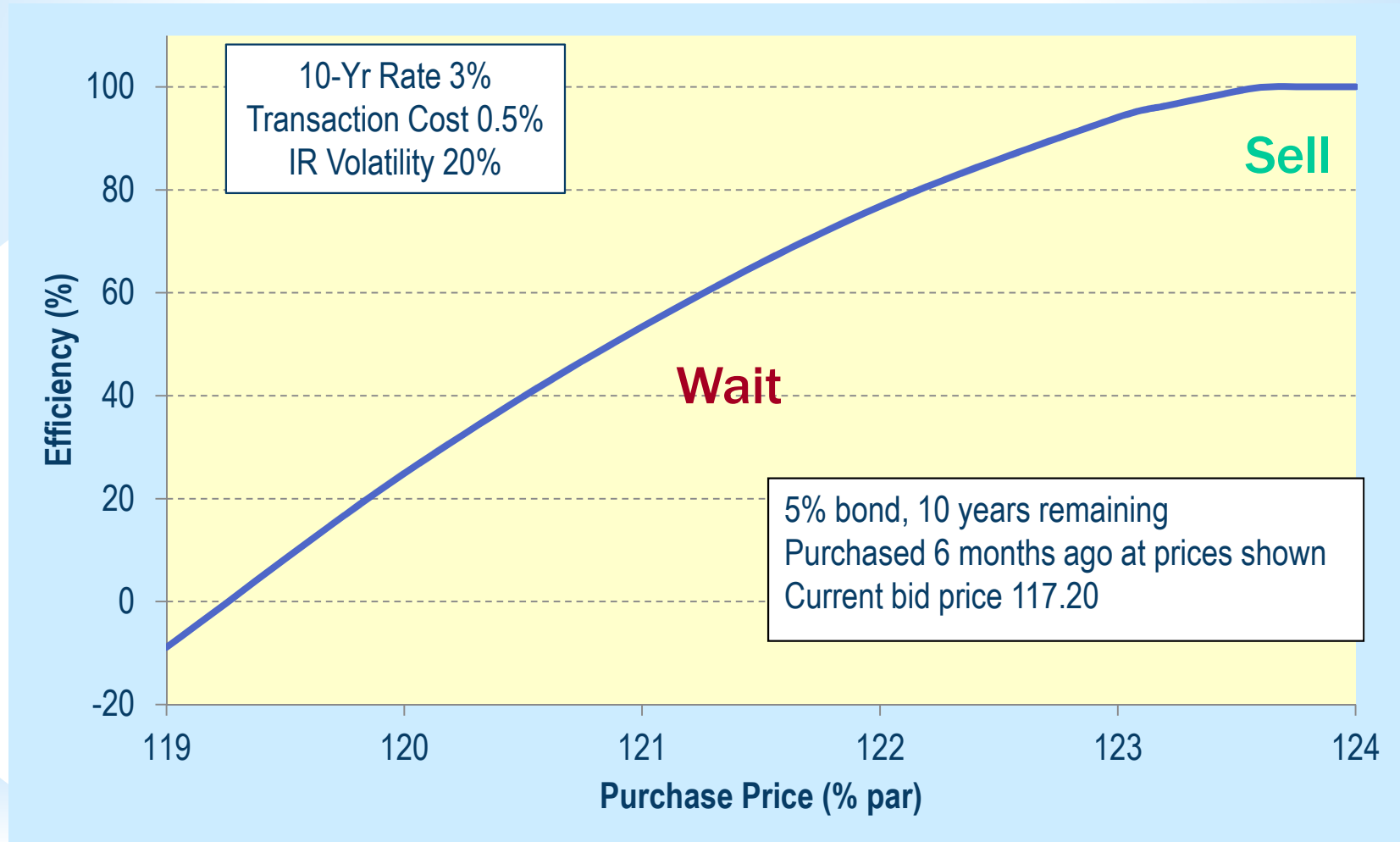


Tax Efficiency Signals When to Sell

Net value of sale should capture most of the tax option value
Decision depends on risk tolerance; recommended minimum 90%

$$\textit{Efficiency} = \frac{\textit{Aftertax Proceeds} - \textit{Hold Value}}{\textit{Tax Option Value}}$$

Short-Term Loss Aids Tax Efficiency



Unique Challenges of Managing Munis

Interest is tax-exempt

But gains and losses are subject to complex tax treatment that affects market price and *hold value*

Performance of funds is reported pre-tax

But investors are liable for taxes due to sales

Active managers should be able to outperform passive investors on an after-tax basis

But standard systems lack critical after-tax capabilities

References

"Taxes on Tax-Exempt Bonds," A. Ang, V. Bhansali, Y. Xing, *Journal of Finance*, Vol. 65, No. 2 (2010)

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"Optimum Tax Management of Municipal Bonds" (working paper)