



A DIVISION OF ANDREW KALOTAY ASSOCIATES, INC.

Options When Managing Debt

Nashville
October 11, 2013



Independent FA's Are Under Pressure

Investment banks hold the aces:

Market knowledge

Well-trained analysts

Superior technology

Innovative and opportunistic

And highly qualified academics are getting involved:

Recent paper asserts that advance refunding can never be justified

***Cannot provide professional debt management advice
without understanding options***

Advance Refunding: A Misguided View from the Ivory Tower

“There is undoubtedly considerable waste from inefficient advance refundings, but let's not throw out opportunities to save taxpayers' money, when warranted, by giving credence to half-baked theories based on shoddy scholarship.”

The Bond Buyer, September 3, 2013

Topics

Overview of refunding options

- Call and advance refunding

Analytical considerations

- Discounting on an interest rate tree

Option-based refunding

- What is refunding efficiency?

Option-based new issue selection

- What is TICPlus?

Refunding Options in Munis

Allows issuer to take advantage of lower rates

Make-whole call doesn't get the job done

Refunding options:

Conventional call (usually NC-10 at 100)

Value depends on issuer's funding rate

Advance refunding to call date (if eligible)

Value depends on issuer's funding rate and on Treasuries,
which determine cost of escrow

Refunding may entail an exchange of options

If replacement bond is also callable

Analytical Considerations

Basic rule: Options and cashflows must be valued consistently

Cashflows: discount using spot rates based on issuer's funding curve

Adjust for options (MMD is a 5% NC-10 curve)

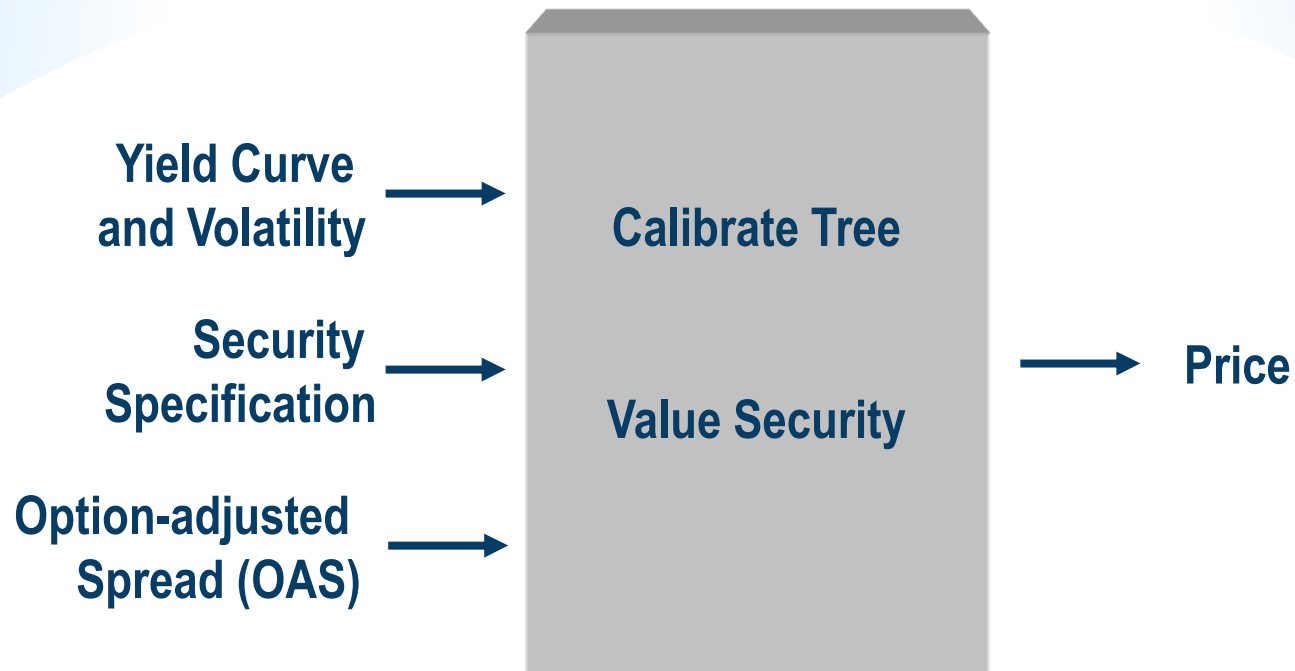
Don't use TIC for discounting

Options: use interest rate tree

Tree determined by issuer's funding curve and interest rate volatility

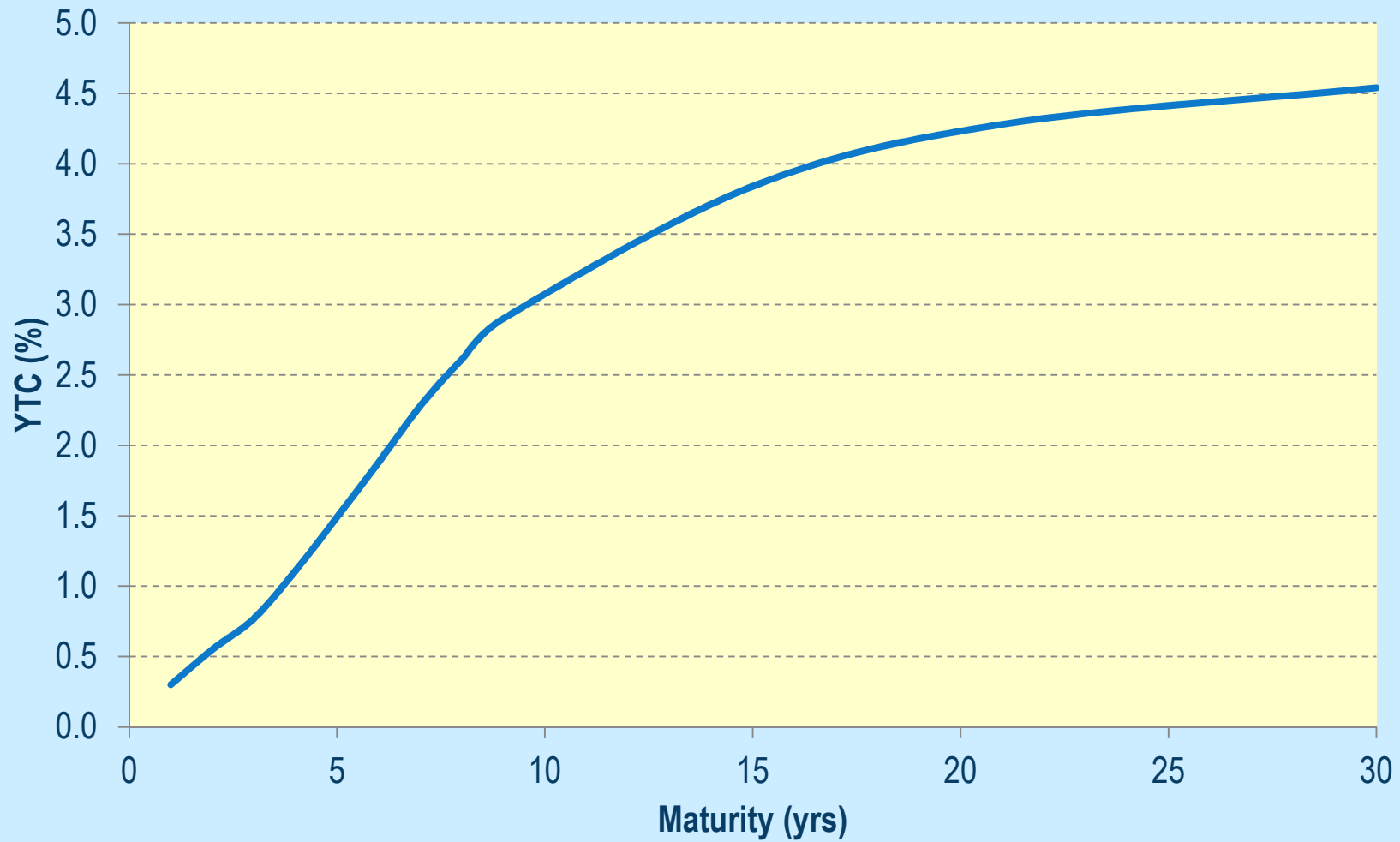
For advance refunding, also need Treasury tree

Robust OAS Technology Provides the Foundation for Debt Management

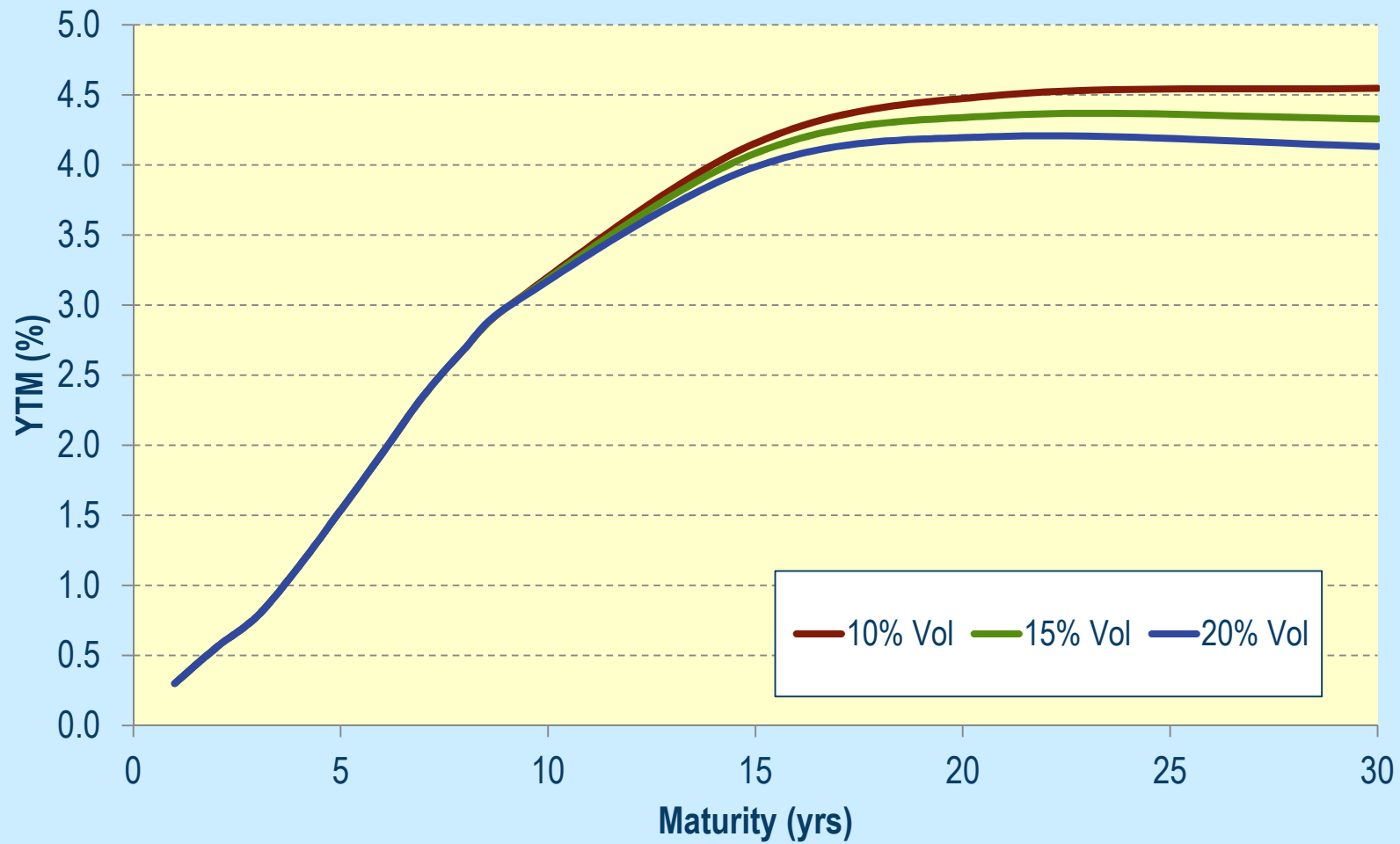


Handbook of Municipal Finance (2008)

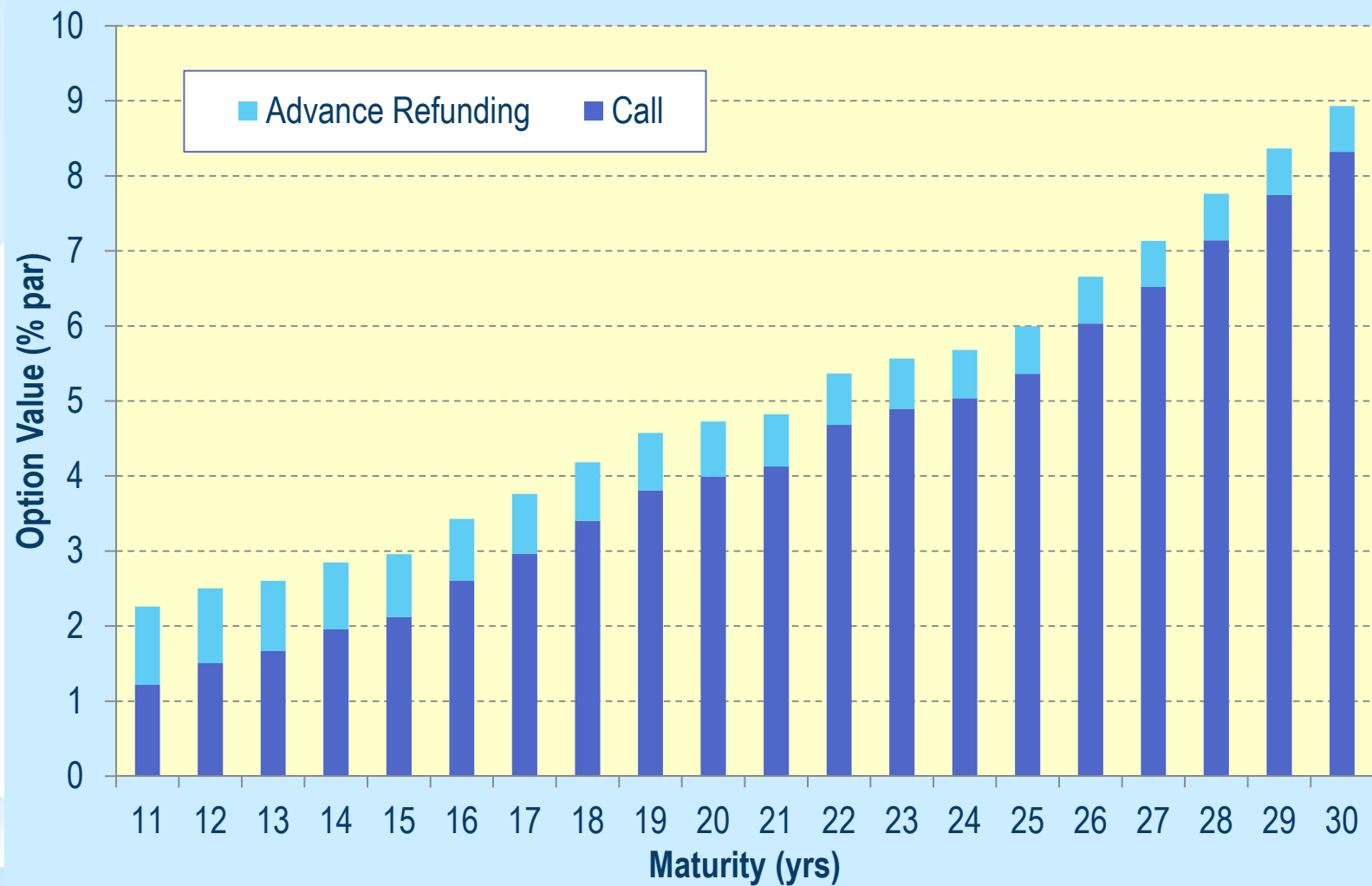
Recent AAA 5% NC-10 Curve



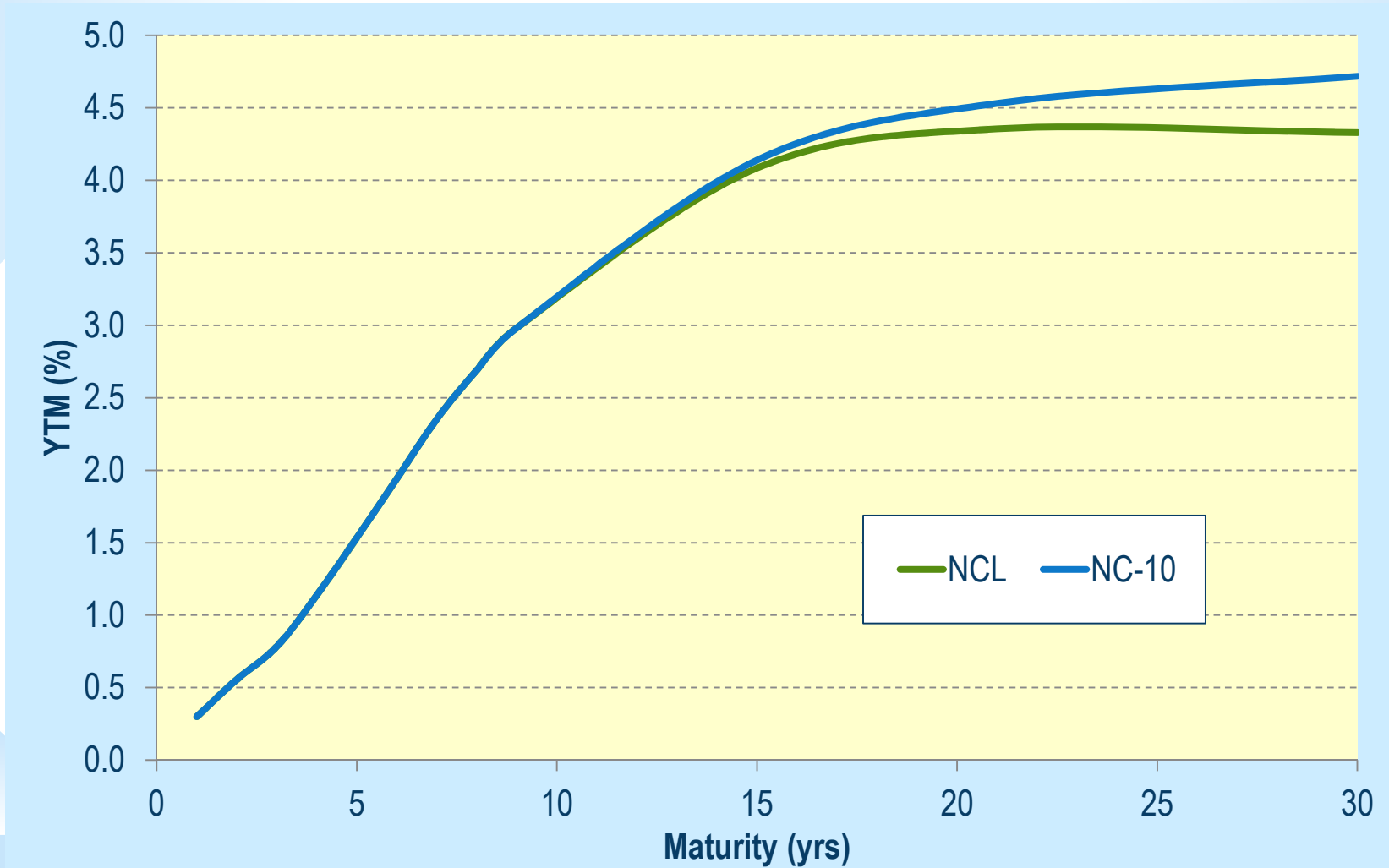
Optionless Par Curves Derived from 5% NC-10 Curve



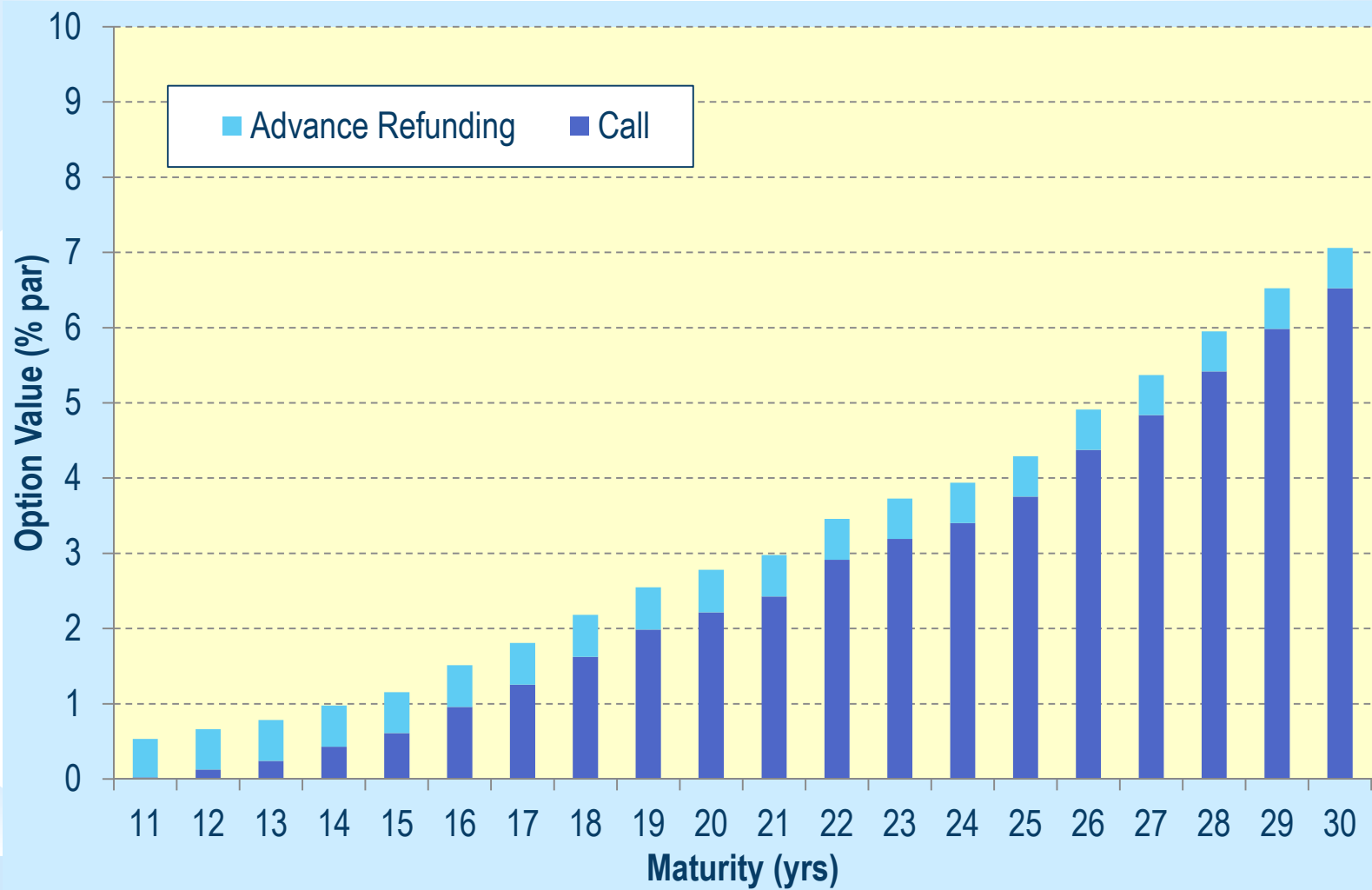
Value of Refunding Options 5% NC-10, 15% Vol



Derived Par Curves, 15% Vol



Value of Refunding Options Par NC-10, 15% Vol



Components of Advance Refunding Analysis

Present value of savings

Difference between PV's of outstanding and refunding issues

Net loss of option value

OV of refunded bond – OV of refunding bond

Decision yardstick: refunding efficiency

Discussed below

Generalized Refunding Efficiency

$$\text{Efficiency}_{gen} = \frac{PV \text{ Savings}}{\Delta \text{Option Value}}$$

Applicable to current and advance refunding

More on Refunding Efficiency

Cannot exceed 100%

Because savings cannot exceed option value

Refund when efficiency reaches 100%

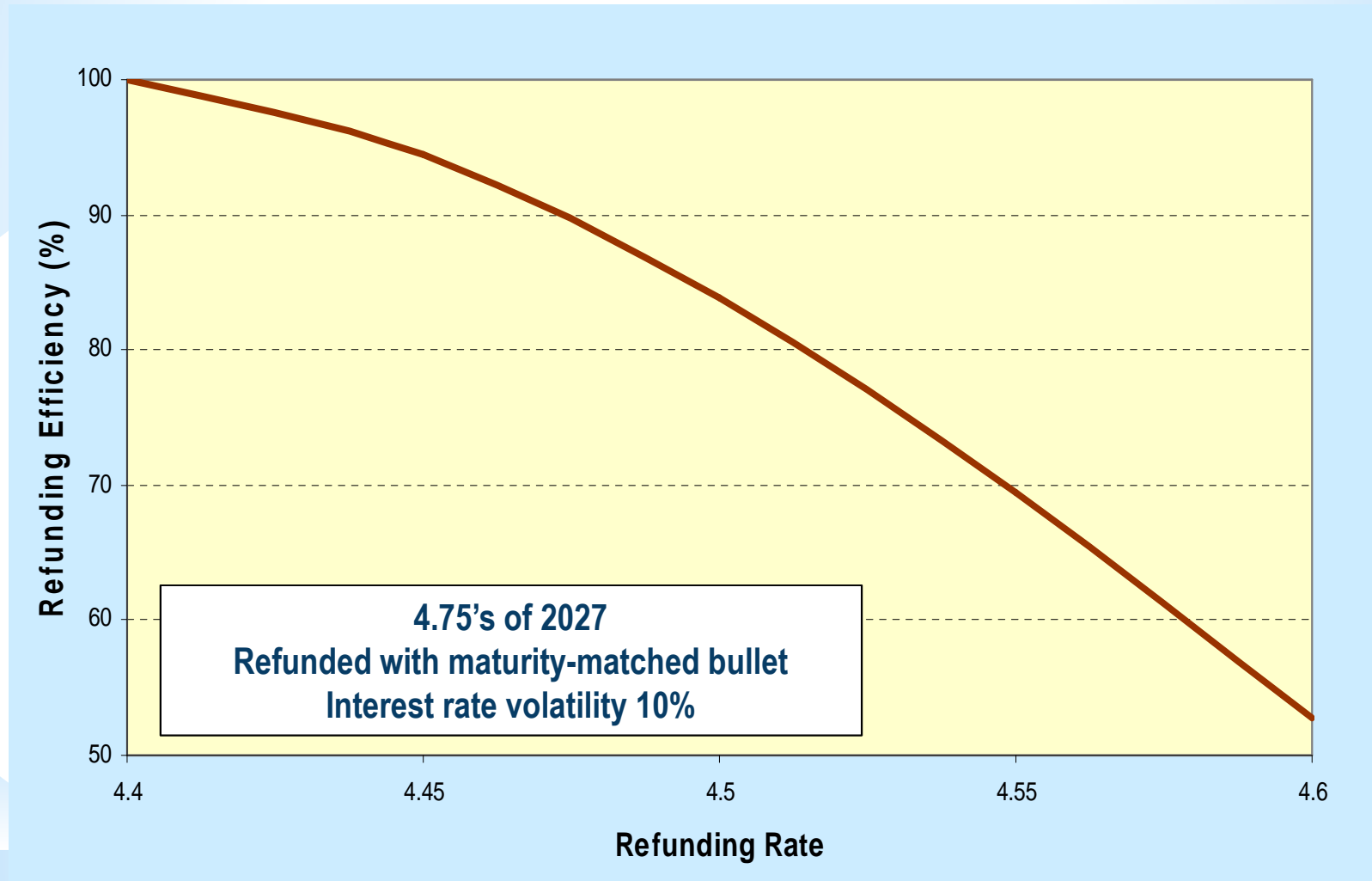
Slight inefficiency, say 95%, may be justifiable by risk-aversion

Widely used for callable agency bonds

The right tool for current and advance refunding

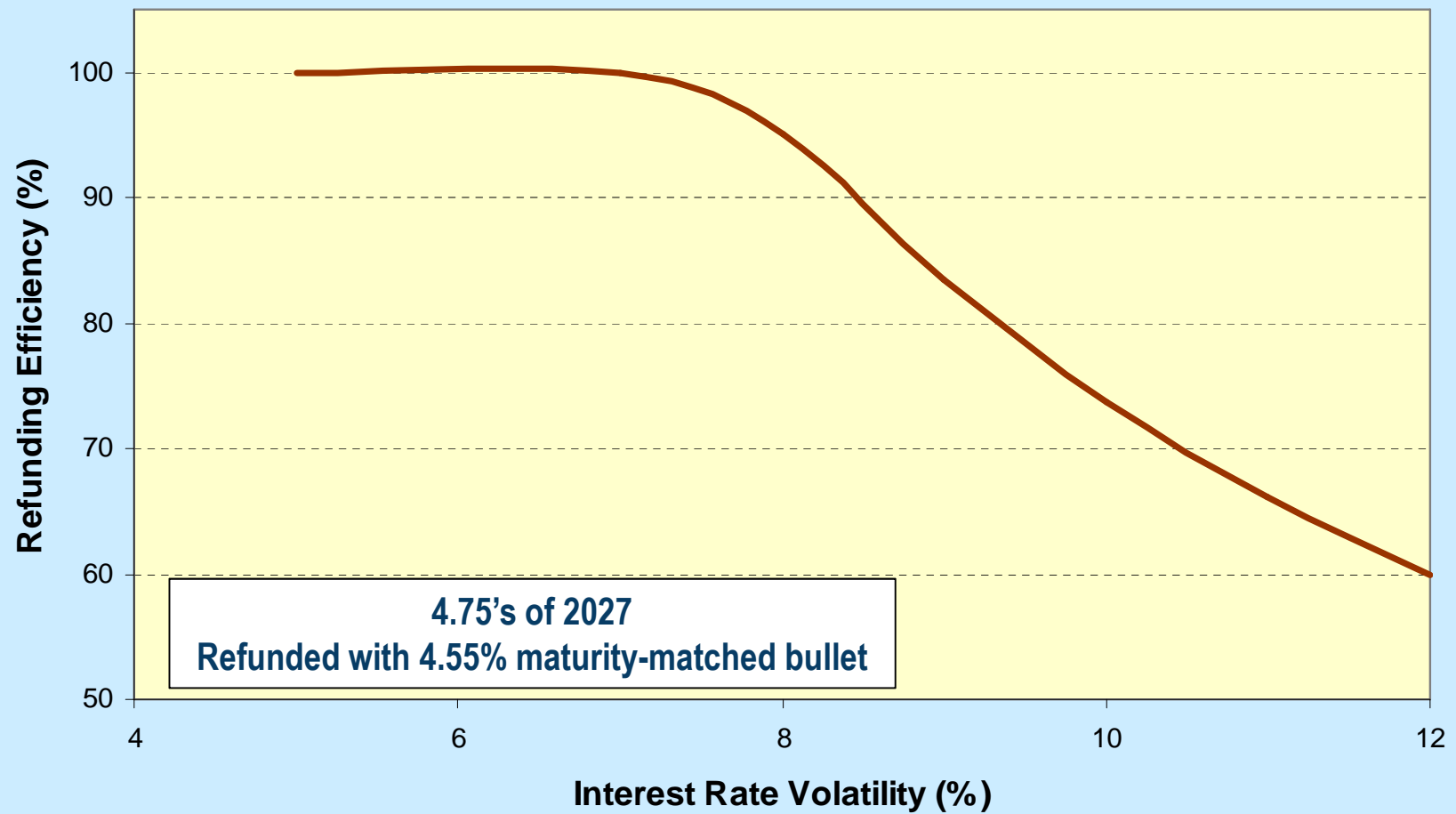
Know Your Refunding Rate!

Efficiency Declines As Refunding Rate Increases



Know Your Volatility!

Efficiency Declines As Volatility Increases



New Issue Selection Using IPREO's BidCOMP

Inputs:

Proceeds

Debt service

Option value (needs to be computed)

Selection criterion: lowest TICPlus

TICPlus is obtained by conventional TIC calculation based on
the sum of proceeds and option value

Valuation of option requires a benchmark yield curve and
an 'option-adjusted spread'

OAS is calculated from price to public

TIC vs. TICPlus – 30 NC-10, 15% Vol

| Coupon (%) | Price to Public (% Par) | Proceeds (% Par) | TIC (%) | Option Value (% Par) | TICPlus (%) |
|------------|-------------------------|------------------|--------------|----------------------|--------------|
| 5.00 | 103.653 | 103.153 | 4.801 | 7.708 | 4.348 |
| 4.72 | 100.000 | 99.500 | 4.749 | 6.524 | 4.357 |
| 4.00 | 90.167 | 89.667 | 4.642 | 4.045 | 4.378 |

TIC vs. TICPlus – Which is the Winning Bid?

\$50,000,000 City of Somewhere, OK, GO Bonds,
Series 2012 Sale Date 03/27/2012

| Bidder | TIC | TIC+ |
|----------------------|-----------|-----------------|
| Dealer Underwriter A | 3.005274% | 2.938356 |
| Dealer Underwriter B | 3.007975% | 2.937957 |
| Dealer Underwriter C | 3.019542% | |
| Dealer Underwriter D | 3.081149% | |
| Dealer Underwriter E | 3.134007% | |
| Dealer Underwriter F | 3.224898% | |

TIC vs. TICPlus – Full Deal Example

5:20:01 p.m. EST

Upcoming Calendar

Overview

Compare

Summary

Bid Results

Test

\$600,000,000 General Obligation Bonds, Cosolidated Loan of 2014, Series J

The following bids were submitted using *PARITY*[®] and displayed ranked by lowest TIC Plus. Click on the name of each bidder to see the respective bids.

| Bid Award* | Bidder Name | TIC Plus | TIC |
|--------------------------|--------------------------------------|----------|----------|
| <input type="checkbox"/> | Dealer Underwriter A | 4.244737 | 4.593767 |
| <input type="checkbox"/> | Dealer Underwriter B | 4.263863 | 4.576341 |

*Awarding the Bonds to a specific bidder will provide you with the Reoffering Prices and Yields.

TIC vs. TICPlus – Examining the Bids

Dealer Underwriter A - New York , NY's Bid



Test
\$600,000,000 General Obligation Bonds, Cosolidated Loan of
2014, Series J

For the aggregate principal amount of \$600,000,000.00, we will pay you \$630,244,350.00, plus accrued interest from the date of issue to the date of delivery. The Bonds are to bear interest at the following rate(s)

| Maturity Date | Amount \$ | Coupon % | Yield % | Dollar Price |
|----------------------------|-----------|----------|---------|--------------|
| 08/01/2023 | 20,000M | 5.0000 | 2.8400 | 115.331 |
| 08/01/2024 | 20,000M | 5.0000 | 3.0300 | 113.876 |
| 08/01/2025 | 20,000M | 5.0000 | 3.2300 | 112.367 |
| 08/01/2026 | 20,000M | 4.0000 | 3.5100 | 103.385 |
| 08/01/2032 | 40,000M | 5.0000 | 4.0600 | 106.354 |
| 08/01/2033 | 15,000M | 4.2500 | 4.3500 | 98.673 |
| 08/01/2034 | 50,000M | 5.0000 | 4.2200 | 105.239 |
| 08/01/2035 | 50,000M | 5.0000 | 4.2600 | 104.962 |
| 08/01/2036 | 50,000M | 5.0000 | 4.2900 | 104.755 |
| 08/01/2037 | 50,000M | 5.0000 | 4.3200 | 104.549 |
| 08/01/2038 | 50,000M | 5.0000 | 4.3500 | 104.343 |
| 08/01/2039 | 50,000M | 5.0000 | 4.3800 | 104.138 |
| 08/01/2040 | | | | |
| 08/01/2041 | | | | |
| 08/01/2042 | | | | |
| 08/01/2043 | 165,000M | 5.0000 | 4.4500 | 103.660 |

Total Interest Cost: \$680,405,208.33
 Premium: \$30,244,350.00
 Net Interest Cost: \$650,160,858.33
 TIC Plus: 4.244737
 TIC: 4.593767
 Time Last Bid Received On:08/01/2013 11:55:05 EDST

TIC vs. TICPlus – Examining the Bids

Dealer Underwriter B - New York , NY's Bid



Test
\$600,000,000 General Obligation Bonds, Cosolidated Loan of
2014, Series J

For the aggregate principal amount of \$600,000,000.00, we will pay you \$623,392,600.00, plus accrued interest from the date of issue to the date of delivery. The Bonds are to bear interest at the following rate(s):

| Maturity Date | Amount \$ | Coupon % | Yield % | Dollar Price |
|---------------|-----------|----------|---------|--------------|
| 08/01/2023 | 20,000M | 5.0000 | 2.8700 | 115.100 |
| 08/01/2024 | 20,000M | 5.0000 | 3.0500 | 113.724 |
| 08/01/2025 | 20,000M | 5.0000 | 3.2300 | 112.367 |
| 08/01/2026 | 20,000M | 5.0000 | 3.4100 | 111.030 |
| 08/01/2032 | 40,000M | 4.0000 | 4.3600 | 95.383 |
| 08/01/2033 | 15,000M | 4.2500 | 4.4200 | 97.758 |
| 08/01/2034 | 50,000M | 5.0000 | 4.2200 | 105.239 |
| 08/01/2035 | 50,000M | 5.0000 | 4.2600 | 104.962 |
| 08/01/2036 | 50,000M | 5.0000 | 4.2900 | 104.755 |
| 08/01/2037 | 50,000M | 5.0000 | 4.3200 | 104.549 |
| 08/01/2038 | 50,000M | 5.0000 | 4.3500 | 104.343 |
| 08/01/2039 | 50,000M | 5.0000 | 4.3800 | 104.138 |
| 08/01/2040 | 50,000M | 5.0000 | 4.4100 | 103.933 |
| 08/01/2041 | 50,000M | 5.0000 | 4.4300 | 103.797 |
| 08/01/2042 | 15,000M | 4.5000 | 4.7000 | 96.850 |
| 08/01/2043 | 50,000M | 4.5000 | 4.7000 | 96.800 |

Total Interest Cost: \$665,738,958.33
 Premium: \$23,392,600.00
 Net Interest Cost: \$642,346,358.33
 TIC Plus: 4.263863
 TIC: 4.576341
 Time Last Bid Received On:08/01/2013 11:05:13 EDST

*How to cope in a changing world:
Know your options, value them correctly*

Your Reward for Attending the 2013 NAIPFA Conference

Complimentary 3-month license to AKA's portfolio-based
Advance Refunding Calculator

Contact Radek Wyrwas (Radek@kalotay.com)

212-482-0900, press 4

Functionality of ARC:

Converts issuer's callable curve into optionless curve

Calculates PV savings, option value, and refunding efficiency
for specified replacement bond

Rank-orders candidates according to PV savings or refunding
efficiency

References

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