

Option-based Analysis of Refunding Transactions

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Andrew Kalotay

Kalotay Advisors

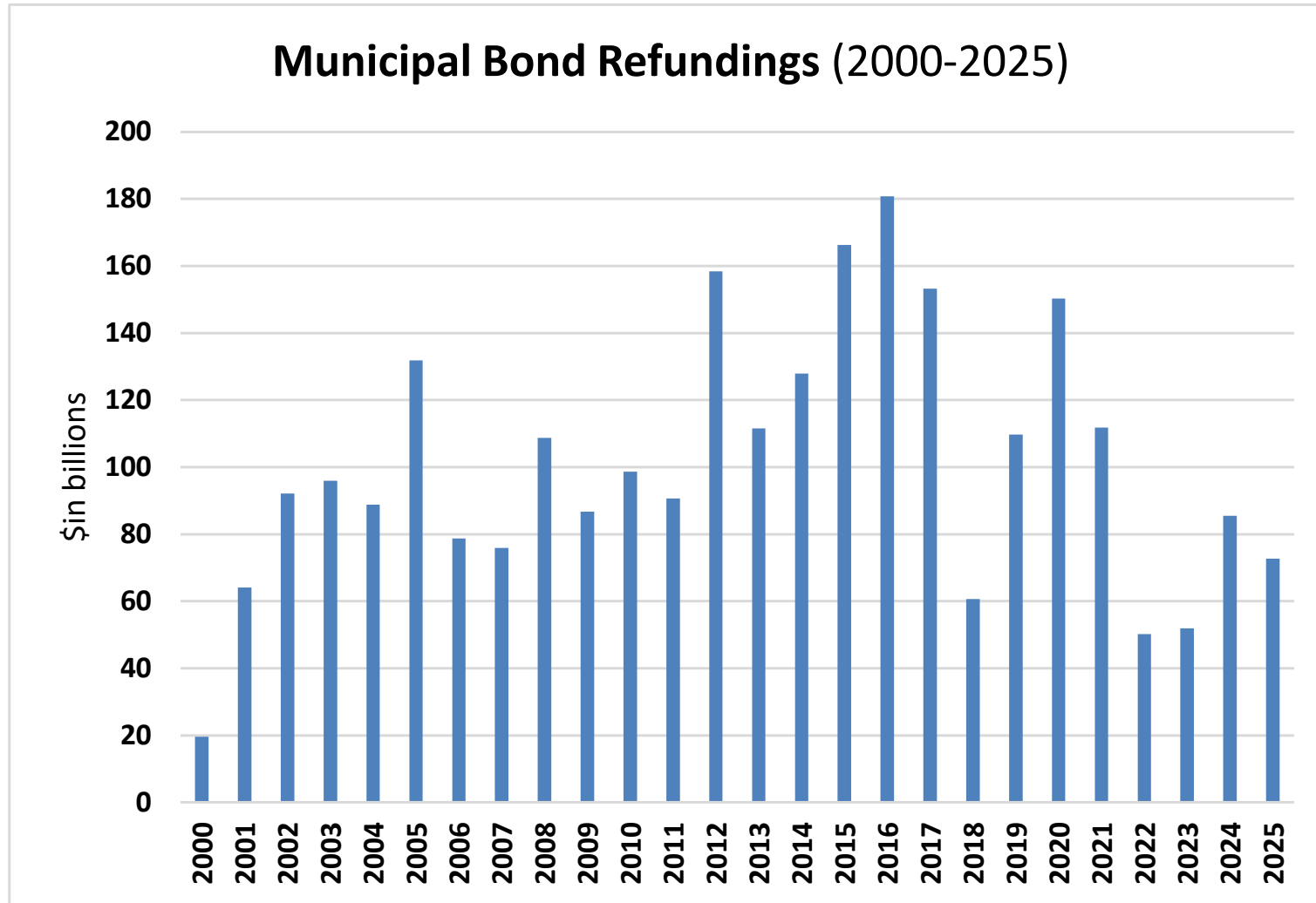
Martin Luby

University of Texas at Austin

Topic: Refunding 5% bonds prior to the call date

- Usual tax-exempt bond structure: 5% coupon, callable at 100 in Year 10
 - Refunded after 10 years (in the absence of extenuating circumstances)
 - Challenge: find one older than 10 years
- May be refunded prior to the call date:
 - Old-fashioned advance refunding with tax-exempt bonds (disallowed since 2018)
 - Advance refunding with taxable bonds
 - Tender/refunding (discussed today)
- Churning of 5% bonds benefits issuance infrastructure, detrimental to taxpayers

Annual Refunding Bond Activity



Source: Luby et al., 2026

Tender/refunding transaction

- Issuer repurchases not-yet-callable 5% bonds by a tender offer
 - Typical tender premium is 2 to 4 points over fair market value
- Purchase funded by issuing 5% bonds of like maturity
- Motivation: report debt service savings
 - Interest rate risk can be managed more effectively by other means

High-level look at the call option

- Enables the issuer to reduce debt service by calling and refunding
 - By tradition, if interest rates *decline*
- At issuance call risk reduces price of bond
 - By 11 points in the case of 20-year 5% bond in the featured transaction
- Refunding forfeits the call option
 - Value of call option depends on prevailing interest rates
- Are the savings adequate for the forfeited option value?

Refunding efficiency is the correct decision tool

- Tradeoffs: realized savings versus forfeited option value

$$\text{Refunding efficiency} = \text{Savings} / (\text{OV (Outstanding)} - \text{OV (Replacement)})$$

Invented in **1976** at Bell Labs

Extensively used in corporate tenders

- Applicable to both market transactions and to formal option exercises
 - Maximum efficiency of option exercise is 100%
 - Refund only if efficiency is close to 100%

Refunding efficiency in action: MWRA tender refunding of 5% bonds in 2023

- Outstanding bond: 2043 maturity, callable at 100 in 2028
- Tender price 109.86%
- Tender premium over fair value 3.50%
- Option value 16.16%
- Refunding bond: 2043 maturity, callable at 100 in 2033
- Market price 112.50%
- Option value 11.32%

Refunding efficiency=Savings/Forfeited option value=2.91/5.11=57%

* Size of refunding issue scaled down (market price exceeds tender price); Transaction costs disregarded

Overview of tender/refunding transactions

- Since 2019, on-going, activity is declining (<https://www.bondbuyer.com/news/tender-activity-slows-but-some-issuers-still-embrace-them>)
- Dozens of transactions, volume well above \$50B (<https://www.gfoa.org/bp-tender-refunding>)
- Typical refunding efficiency around 50% (based on transactions examined)
 - Efficiency of corporate tenders is much higher, because premium is tax deductible
- Low acceptance rate (30-40% of outstanding principal per *The Bond Buyer*)
- Participants appear to be unaware of the history
 - Wisconsin's fixed spread tender was the Bond Buyer's 'most innovative' transaction in 2025; fixed spread corporate tenders were utilized in **1984**.

Calculation of refunding efficiency is straightforward

- Commercially available interest rate models can value options and cashflows
 - Lognormal process is industry-standard
- Required input: optionless interest rates
 - Yields to call are not interest rates
- Callable 5% yield curve can be 'bootstrapped' into optionless rates
- Interest rate volatility must be reasonable

Sensible call features would reduce churning

- 5% bonds callable at 100 don't survive beyond the call date
 - **Transaction cost of refunding is considerable**
- Recommendation: 5% coupon, premium call prices that decline to 100
 - Refunding is cost-effective only if rates **decline**
 - Higher call prices increase market price, reduce size of issue
- Recommendation: floating rate 'ratchet' bonds
 - Coupon is reset only if rates decline
 - **Eliminates transaction cost** of refinancing
 - Coupon of 30-year \$575MM TVA PARRs declined from 6.75% to 2.10%

Summary: Municipal debt should be managed by qualified professionals

- Poorly implemented refundings prior to the call date are costly to taxpayers
 - Savings don't justify forfeited option value
 - Public is kept unaware of the waste
- Debt managers should be familiar with option-based bond analytics
 - Refunding efficiency is the right tool for decision-making
 - Information readily available, implementation uncomplicated
- Regulators and trade associations have dropped the ball
 - **GFOA 'Best Practice: Tender/Refunding of Municipal Bonds' does not mention option value**
 - 'Best Practice: Refunding Municipal Bonds' contains **35 'savings'** and **1 'option value'**
 - **MSRB certification** of municipal advisors **fails to include option valuation**