MAKING THE RIGHT CALL

The tendency among municipal issuers to call their bonds early in the belief they are refunding on better terms often results in the loss of future value, to the detriment of the taxpayer.

By Andrew Kalotay and Leslie Abreo

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Municipal bonds make up a sizeable portion of the US fixed income market, with around 50,000 issuers accounting for close to $3 trillion of outstanding debt. Unlike the corporate bond market, where the call option is approaching extinction, most long duration tax-exempt municipal bonds are callable after 10 years. The call option allows issuers to take advantage of declining interest rates by issuing new bonds at lower yields and paying off the outstanding bonds at the call price.

Unfortunately, industry practice focuses on present value savings, while disregarding the forfeited option to refund in the future. Often, the result is premature refunding – a boon to most of the participants in the deal, such as underwriters, financial advisers, rating agencies, bond counsels, prospectus printers and the financial media where notices of transactions are placed – each of whom receive fees as a result of the transaction. The exception is the borrowing entity and, by extension, the taxpayer.

A factor that further tilts the field towards revenue generation for all the ancillary parties is the ability of the issuer to advance refund. Here again, the attention paid to option value is slight to non-existent. The issuer's reliance on the hitherto unregulated community of financial advisers, whose competence in such matters can at best be described as uneven, is of little help.

A common practice among municipal borrowers is to refund outstanding bonds in advance of their first call date if interest rates

are sufficiently low. In terms of how advance refunding works, the municipality issues new bonds and uses the proceeds to buy a portfolio of Treasury securities to match the remaining cashflows of the outstanding issue to the first call date. The 'pre-refunded' bonds are said to be defeased (made void) and are taken off the issuer's books. Investors view advance refunding favourably since the bonds, now backed by Treasuries, trade like triple-A rated securities, regardless of the credit quality of the issuer.

Advance refunding is prevalent only in the municipal market. Because yields of highly rated tax-exempt bonds are traditionally lower than Treasury yields (the current state of interest rate turmoil excepted), it is possible for an issuer to profitably advance refund bonds. In contrast, there is no incentive for corporate issuers, whose borrowing costs are higher than that of the Treasury, to buy a defeasance portfolio at low yields.

At the same time, municipal issuers are not allowed to earn more on the defeasance portfolio than their borrowing cost. The threshold is the so-called true interest cost (TIC) of the refunding issue. The TIC is simply the internal rate of return of the cashflows of the new debt given the proceeds received by the issuer. This constraint is referred to in industry shorthand as the "no arbitrage rule".

For convenience, practitioners have taken to using TIC to discount the cashflows in a refunding transaction, instead of using the theoretically correct spot rates derived from the appropriate yield curve. One consequence of this approach is that it is not amenable to proper valuation of embedded options.[1]

Although the TIC threshold puts a restriction on what the defeasance portfolio can earn, it is more generous than it seems. Most new issues consist of a series dominated by long maturities; thus the TIC is reflective of the issuer's longer-term borrowing rate. However, since the defeasance portfolio is meant to fund cashflows up until the call date of the outstanding bonds, the blended yield of the Treasuries purchased for the purpose is representative of much shorter rates. In other words, municipalities may be able to earn in the short term what is in effect their longer-term rate.

Nonetheless, the TIC is a constraint and constraints inspire gamesmanship. Going back a couple of decades, there was the phenomenon that came to be known as yield burning. Unscrupulous bankers would sell Treasuries at artificially low yields (and therefore high prices) so that municipalities could technically meet the no-arbitrage rule, while the bankers made a profit on the sale. Cases of yield burning were widely prosecuted in the 1990s and many banks were made to pay substantial fines. While the banks were taken to task in the past for their abuses in this context, municipalities are now also held to account if they allow yield burning to occur. Consequently, the practice of yield burning has vanished from municipal finance.

Meanwhile, in response to municipalities' needs in cases where Treasury yields are higher than the TIC, the US government has been issuing special State and Local Government Securities (SLGS; pronounced 'slugs') which have a blended yield matching the TIC. This way, municipalities do not stray from the no-arbitrage rule, while the government is able to borrow more cheaply than in the public markets.

1. New York State advance refunding minimum savings thresholds

		Years to call		
		0 to 2	3 to 7	8 to 10
Years from call to maturity	0 to 5	0.5%	1.0%	2.0%
	6 to 10	1.0%	2.5%	4.0%
	11 to 15	3.0%	4.0%	5.0%
	16 to 20	4.0%	5.0%	5.5%

Source: Bureau of Debt Management, New York State

Other, more subtle examples of gamesmanship around refunding still exist, however. For example, call prices, which traditionally declined from 102 to par over a two-year period, now start at par, thus increasing the likelihood of refunding. Another trend that increases the odds of refunding is the practice of issuing bonds with a coupon of 5% across the maturity spectrum for institutional deals. These bonds typically are sold at prices higher than par, the little-understood implication being that the call option is more likely to be exercised. This is less prevalent in bonds intended for the retail market, since retail investors are averse to buying bonds at a premium.

The 5% coupon is now so entrenched that the municipal market's key benchmark yield curve provider, MMD (Municipal Market Data), bases its daily release of new issue levels on yields-to-call of 5% bonds. The reporting of yields-to-call rather than yields-to-maturity reflects the high likelihood of bonds being called.

Against the backdrop of much churning from refundings, to the great benefit of all participants in the municipal market except the taxpayers, the government gradually tightened the rules, limiting the number of advance refunding cycles permitted. At present, advance refundings are restricted to a single cycle. So-called new money bonds are usually eligible, but refunding bonds (which may be callable) cannot also be advance refunded.

Present value savings targets

Many issuers attempt to be responsible by instituting advance refunding policies, so that these transactions do not occur willy-nilly. An example of this is the New York State's guidelines for advanced refunding, as shown in Table 1. According to the table, if a bond has four years left to the call date and 12 years from the call date to maturity, then a minimum of 4% present value savings is required before a refunding is considered. While not explicitly mentioned, the refunding bonds are assumed to be callable if longer than 10 years.

Although these are non-binding guidelines, many issuers adopt them as rules that do not require the use of judgement. Bankers, intimately familiar with issuers' guidelines, are at the ready whenever the savings are close to meeting the appropriate target. In fact, when the numbers are close, there are a few tricks that can help push the savings calculation over the threshold.

One way to 'increase' savings is to lower the TIC by eliminating the conventional NC-10 call option, which lowers the yield

[1] "A Model for Valuing Bonds with Embedded Options", Andrew Kalotay, George Williams, and Frank Fabozzi, *Financial Analysts Journal*, May/June 1993

of the refunding bonds. This is often done by issuing floating rate bonds and swapping them into fixed. Discounting the outstanding cashflows at the resulting lower TIC exaggerates the present value of the outstanding bonds' nominal cashflows. When discounting with the TIC, by definition the value of the replacement bonds is equal to the proceeds. Therefore, the savings, calculated by subtracting the value of the new issue from the value of the outstanding cashflows, can be nudged upwards.

Putting these quibbles aside, the glaring sin of omission in refundings is not looking at the option value given up, not to mention the new option acquired when refunding with callable bonds.

Optimum refunding

In the past, corporate treasurers would struggle to decide when to call a bond. Pulling the trigger and then watching rates decline further made one feel sheepish. On the other hand, not calling and watching rates climb caused regret for not capturing the savings. Since no one had yet come up with a crystal ball that predicts where rates are going, the best policy was to play the odds like a professional. From this thinking emerged the concept of refunding efficiency.[2] Simply put, the savings from calling are compared to the value of the option if not currently exercised. If the ratio is close to 100%, then the refunding is deemed efficient. Nowadays treasurers call when efficiency is high, and defer action if the savings do not capture enough of the option value. Refunding efficiency or optimal option exercise is now widely practised in the corporate and agency markets and can be applied to even household finance decisions, such as when to refinance a mortgage.[3]

$$\textit{Refunding Efficiency}_{\textit{conventional}} = \textit{PV Savings/Option Value}$$

In the agency market, as in the municipal market, the refunding bonds are also usually callable (analogous to refinancing mortgages that are themselves refinanceable).[4] Thus, it is necessary to account for not only the value of the option given up but also that of the new one received (the call option embedded in the refunding bonds). The generalised efficiency formula below addresses this neatly. It compares the savings from refunding to the net option value given up.[5] The formula works in general and it collapses to conventional refunding efficiency when the refunding bonds are optionless.

$$\textit{Refunding Efficiency}_{\textit{generalized}} = \textit{PV Savings}/\Delta\textit{Option Value}$$

The option to advance refund

The calculation of the option value in an advance refunding is complicated by the fact that the economics depend on the level of Treasury rates, among other factors. The lower the short Treasury yields, the higher the cost is of the defeasance portfolio. On the other hand, if Treasury rates are high, the so-called escrow yield (the yield of the defeasance portfolio of Treasuries) cannot exceed the TIC.

Existing literature deals with the case where there is no negative arbitrage,[6] but a comprehensive model is needed. Arguably, a stochastic process must be applied to three different curves: Treasuries and the issuer's tax-exempt and taxable curves.[7] The first affects the size of the defeasance portfolio, the second determines the TIC and the option value, while the third may be used to discount flows at the issuer's marginal cost of debt. The value of the conventional call option (ignoring the value of the option to advance refund) is a sensible lower bound for estimating the total value of the optionality in an advance refunding transaction.

Given the size of the municipal market and the magnitude of the waste from inefficient refunding, this area provides a rich vein of research for academic or quantitatively oriented practitioners.

Several market and regulatory forces are evolving to nudge municipal finance out of its backwater with regard to quantitative sophistication. The runaway success of Build America Bonds – taxable bonds introduced in early 2009 for which the federal government provides a direct subsidy of interest expense – is opening issuers' eyes to option pricing outside the tax-exempt world. In the tax-exempt market, where investors are accustomed to inefficient calls exercised by issuers, the coupon premium demanded for a long callable bond is accordingly modest, rarely more than 15 basis points over what they would accept for an optionless bond. In contrast, a similar structure in the taxable market currently commands a coupon premium of about 40 basis points, a source of initial shock to municipal issuers.

On the regulatory front, the recently signed Dodd-Frank financial reform bill stipulates that financial advisers will have to register and be certified by the Municipal Securities Rulemaking Board. It also imposes a "fiduciary duty" on financial advisers, requiring them to place their clients' interests above their own – a refreshing thought. At the same time, the MSRB is obliged to expand its board to include members from outside the traditional tax-exempt world, a development that is likely to expose the industry to proper valuation of option-based transactions.

The entrenched infrastructure of the municipal market is geared to ongoing churning of issuers' debt portfolios, through advance refunding in particular, in order to benefit all participants except the borrower and, by extension, the taxpayer. Reliance by municipalities on less than competent financial advisers results in inefficient refundings with substantial waste in terms of forfeited option value. Rigorous calculation of the value of the option, including the option to advance refund, may be a challenge, but from a practical perspective it is a good starting point for municipalities to make sure they at least capture the full value of the conventional call option in any refunding.

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[3] "A Financial Analysis of Consumer Mortgage Decisions", Andrew Kalotay and Qi Fu, *Research Institute for Housing America*, 2008
[4] "Debt Management: The Call Efficiency Measure and Optimal Debt Refunding", Presentation by William Whitehead, Federal Farm Credit Banks at the Association of Finance Professionals Annual Conference, October 2009. Discusses how the problem of inconsistent call decisions among member banks was solved by adopting an optimum calling standard
[5] "Refunding Efficiency: A Generalized Approach", Andrew Kalotay, Deane Yang and Frank Fabozzi, *Applied Financial Economics Letters*, 2007:3
[6] "The Timing of Advance Refunding of Tax-Exempt Bonds", Andrew Kalotay and William May, *Municipal Finance Journal*, Fall 1998
[7] "Subsidized Borrowing and the Discount Rate: The Case of Municipal Capital Budgeting and Financial Management", Andrew Kalotay and Bruce Tuckman, *Municipal Finance Journal*, Winter 1999