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Topics in Fixed Income



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Over the past few years I had communicated frequently with Joseph Galluzzi, former treasurer of Essex County, New Jersey. But we did not meet until his release from a federal penitentiary.

Mr. Galluzzi was convicted in 1998 (Securities and Exchange Commission 2002) of taking kickbacks from underwriters of a certain county bond deal and apparently faced two to three years of jail time. However, during the sentencing phase of the trial the prosecution introduced some Essex County documents showing that the transaction lost several million dollars. The judge viewed this as a substantial financial harm to the county and gave him seven and a half years.

I assisted with Mr. Galluzzi's case after the failure of his first appeal. Because I was familiar with the mechanics of the type of transaction involved, advance refunding, I was certain

that the calculations indicating a large loss were erroneous. There was no way to lose that much even if one tried (Finnerty 1988)!

The culprit was the discount rate. The transaction definitely did not lose money. One could argue that the maturity extension actually lowered the cost of the County's liabilities.

I hoped exposing the discounting error would reduce Mr. Galluzzi's sentence. But I had been brought in too late. Apparently in a federal case the only recourse after the first appeal is the Supreme Court, where only matters deemed of constitutional significance have a chance of being heard. While the wrong discount rate was of critical importance to the outcome of the Galluzzi case, it obviously lacked constitutional ramifications.

Mr. Galluzzi told me that prison officials had refused him treatment for a life-threatening

continued on page 2

condition until his congressman finally came to his aid. Here was a man who almost lost his life because of the wrong discount rate.

Advance Refunding

The Galluzzi case involved an Essex County bond deal that was part of an advance refunding – a routine transaction in the world of municipal finance. The county wanted to avert a potential liquidity crisis by extending the maturity of certain tax-exempt bonds that were scheduled to mature in the near term.

In a transaction of this type, new bonds are issued and their proceeds are used to defease, i.e., legally extinguish, the outstanding bonds. This is accomplished by structuring an escrow of Treasury bonds that match the remaining cash flows of the outstanding bonds. The return on the escrow cannot exceed the so-called True Interest Cost (TIC) of the new bonds. TIC is essentially the IRR of the new issue and is defined to many decimal places in the “no arbitrage” rule (Municipal Securities Rulemaking Board). For example, a municipality cannot issue tax-exempt bonds with a four percent TIC and invest the proceeds in Treasuries yielding five percent. Violation of the rule renders the bonds taxable and causes their market value to drop.

A Bird’s Eye View of Tax-Exempt Bonds

First issued in 1936, tax-exempt bonds are not subject to federal income tax and may also be exempt from state and local income taxes (they are, however, subject to capital gains tax). Today there are over 1.5 million issues outstanding, ranging in size from a few thousand dollars to hundreds of millions; the aggregate volume is in excess of \$2 trillion. Their preferential tax treatment accords them a higher price (lower yield) than taxable bonds of similar quality.

To qualify for tax-exemption, the proceeds must serve the public good. Many

What is Yield Burning?

Yield burning, once a source of massive profits for investment banks, used to occur in advance refunding transactions. These transactions involve structuring an escrow portfolio of Treasury bonds that defeases a municipality’s outstanding bond issue.

The “no arbitrage” rule limits the return on the escrow to the municipality’s borrowing cost, as defined by the True Interest Cost (TIC) of the refunding issue. The problem is what to do if the market rate of Treasuries exceeds this TIC.

To overcome this, the U.S. Treasury offers tailored book-entry investments called SLGs (State and Local Government Series, pronounced “slugs”), which have lower yields as desired. Thus issuers comply with the “no arbitrage” rule while the Treasury borrows at below-market rates. By mixing SLGs and regular Treasuries, the municipality can meet the TIC limit.

What made yield burning possible was that the escrow portfolio was constructed by an investment bank acting on the municipality’s behalf. The bank would sell Treasury bonds from its own inventory at inflated prices to the municipality, and then meet the TIC by specifying higher coupons for the SLGs. The result was a windfall profit for the investment bank at the expense of the U.S. Treasury. Yield burning is now illegal.

tax-exempt bonds are general obligations of municipalities backed by taxes. Others are backed by revenues from projects such as turnpikes and housing. Although commonly referred to as munis, tax-exempt bonds are sometimes indirectly issued by corporations.

Munis are structured differently from corporates. They come in a series, are typically callable after 10 years, at or near par, and have their own terminology; for example, a muni with a sinking fund is referred to as a term bond.

“It’s How You Do the Math”

Let’s turn now to the valuation of tax-exempt bonds from the perspective of the borrower. The critical input in valuing a bond is the discount rate which can be arbitrary and theoretically unsatisfactory.

A *New York Times* article by Al Baker, “It’s How You Do the Math, Analysts Say of Bond Issue” (July 23, 2005), reports on the then contemplated refinancing of \$2.9 billion of New York State transportation bonds with a longer issue (similar to the transaction in the Galluzzi case). Clearly the maturity extension would increase the amount of interest paid over the life of the debt. But for a meaningful analysis the debt should be measured in today’s dollars.

John Cape, the governor’s budget director, is correct in saying, “You cannot just make up your own rules about how to measure it.” Unfortunately, that is often what municipal officials do. Obviously, just adding up the cash flows without reference to the timing of the payments (as reportedly done by New York State Comptroller Alan Hevesi) is nonsensical.

The industry practice is to use the TIC of the new issue. Of course, the TIC is essential to check compliance with the “no arbitrage” rule. But why should it be used for valuation? The typical rationale is that “this is how we have always done it.” As an aside, TIC served as the basis for creative bankers to indulge in “yield burning”.

While discounting cash flows using the TIC is better than ignoring the time value of money, it is nonetheless an ad hoc method with major shortcomings. Its most obvious flaw is that it ignores the option value of the bonds being analyzed. Its disregard for the term structure of borrowing rates is also troublesome. What is the alternative?

Bond professionals lean towards the standard “option adjusted spread” technology, using the issuer’s tax-exempt yield curve and the appropriate interest rate volatility as inputs. But remarkably, what works for the investor fails for the borrower.

continued on page 3

So What is the Right Discount Rate?

Consider a municipality that contemplates funding a project with a combination of tax-exempt and taxable bonds. How should these bonds be valued as liabilities?

The market price of the tax-exempt bonds is meaningless in this context as municipalities do not pay taxes. A municipality would never invest in tax-exempt bonds.

The alternative to using the market price is to discount prospective cash flows. But what discount rate should be used? The critical insight is that from the perspective of the municipality the PV of a dollar payable in the future is the same whether the debt it services is tax-exempt or taxable.

As Bruce Tuckman and I show in "Subsidized Borrowing and the Discount Rate: The Case of Municipal Capital Budgeting and Financial Management," (Municipal Finance Journal 1999), the liabilities should be valued using a municipality's taxable yield curve. Because taxable yields are higher than tax-exempt yields, from the perspective of the municipality the PV of a tax-exempt bond is below its market price. The difference is the federal subsidy.

Let's revisit Mr. Galluzzi. I said earlier that I was convinced that the deal had not lost the amount of money indicated. Here is my rationale.

The value of an advance refunding transaction is the difference between the PV's of the outstanding and the refunding bonds. Suppose we use the TIC of the refunding bonds for

discounting. Then, by definition, the PV of the refunding issue equals the proceeds. The proceeds in turn equal the purchase price of the defeasance portfolio. But the value of the defeasance portfolio is roughly the same as the PV of the outstanding bonds (to maturity or first call, whichever is applicable). So if the TIC is used for discounting, the transaction breaks even.

However, if we use the taxable rate for discounting (the only correct method), then the PV of the longer-duration refunding bonds will be lower than the PV of the outstanding bonds. One could claim that extending the maturity of tax-exempt debt by advance refunding has a positive NPV. But this logic has a shortcoming; send me an e-mail if you see it.

Valuing the Call Option

The value of the option depends on both the tax-exempt and the taxable yield curves! The cash flows are determined by the tax-exempt rates and PV of these cash flows is quantified by the taxable rates. The imperfect correlation between rates is an additional source of analytical complexity.

There is widespread confusion about the valuation of tax-exempt debt from the borrower's perspective. The right approach is to use the borrower's taxable yield curve for discounting, regardless of the debt being serviced. Valuing options embedded in tax-exempt issues poses a significantly more complicated challenge for the financial engineer, as it entails both taxable and tax-exempt rates. In any event, make sure to use the right discount rate. It could save your life! ■

About the Author

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