



## Bond Analysis in Tax Denial

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*Taxes add a critical missing dimension to the world of bonds. Unfortunately, fixed income textbooks seldom mention taxes.*

Asymmetrical issuer-investor tax treatment is a prevalent yet underappreciated phenomenon of the bond market. Corporate issuers are taxable, but their bonds are usually held in non-taxable pension funds and IRA accounts. While municipalities do not pay taxes, their bonds are held in accounts that do.

Tax asymmetry drives many transactions that seem nonsensical at first blush, and it also explains price anomalies. Unfortunately, fixed income textbooks seldom mention taxes. Incorporating taxes should provide a rich vein for academic research, but purists prefer not to upset their neat, albeit incomplete, view of the world.

The literature on the advance refunding of discounted corporate bonds provides an amusing example of tax denial. The tax treatment is straightforward: Interest payments are deductible, and the gain resulting from repurchase is taxed as ordinary income. If the corporation's tax rate is 40%, the after-tax cost of repurchasing a bond at 60 is 76. The difference between market price and after-tax cost of purchase is artfully ignored in the literature.

Back in 1975, Ang (Ang, James, "The Two Faces of Bond Refunding," *Journal of Finance*, June 1975, 30(3), pp. 869-874) attempted to explain the economics of refundings, but *without referring to taxes* — the source of the purported benefit turned out to be a mathematical error. In a follow-up article, Mayor and McCoin (Mayor, Thomas and McCoin, Kenneth, "Bond Refunding: One or Two Faces?" *Journal of Finance*, March 1978, 33(1), pp. 349-353) corrected this error and claimed, *without ever referring to taxes*, that the transaction can never be beneficial. The then editor, an obvious tax-denier (who now goes by the moniker "The Mortgage Professor"), rejected my comment (Kalotay, Andrew, "On the Advanced Refunding of Discounted Debt," *Financial Management*, Summer 1978, 7(2), pp. 14-18) which shows that the *benefit is entirely tax-driven*, and demonstrates that the Mayor and McCoin paper is simply the zero-tax case of a general model that incorporates taxes.

Another instructive mistake is to assume that tax treatment is symmetrical. Livingston (Livingston, Miles, "A Note on the Issuance of Long-Term Pure Discount Bonds," *Journal of Finance*, March 1979, 34(1), pp. 241-246) correctly shows that original issue discount bonds would provide a tax benefit to the corporation, and that investors holding such bonds in taxable accounts would experience an off-setting disadvantage. Starting from the false premise that bonds are held only in taxable accounts, he concludes that OIDs would never be issued. It was a bold but badly mistaken prediction: Within two years OIDs were issued in the billions (Kalotay, Andrew, "An Analysis of Original Issue Discount Bonds," *Financial Management*, Autumn 1984, 13(3), pp. 29-38).

Let's turn from corporates to munis. Here interest is tax-exempt, but gain resulting from secondary market purchase at a large (non-de minimis) discount is taxed as ordinary income. For example, someone in a 40% tax bracket will have an 8 point tax liability at maturity on a bond purchased for 80. Sophisticated investors are well aware that the eventual tax liability depresses the price of a discount muni. But correctly incorporating this tax into pricing and risk analysis is easier said than done.

Suppose that in the absence of taxes, a muni should be priced at 90, and that the present value of the 4-point tax at maturity is 3 points. Naively concluding that this muni should be priced at 87 would be a mistake, because now the resulting gain would be 13 points, rather than 10. Due to this feedback, the price of a discount muni declines further in response to rising interest rates than can be explained by a simplistic tax adjustment. The correct valuation method is described in "Interest Rate Sensitivity of Tax-Exempt Bonds Under Tax-Neutral Valuation," *Journal of Investment Management*, First Quarter 2014, 12(1), pp. 62-68 (Kalotay); it extends the standard 'OAS' framework to munis by explicitly incorporating their admittedly complex tax treatment.

In the case of munis, the tax-deniers are the standard analytical systems. As can be seen in the graph below, the correct duration of a discount muni can be significantly longer than reported by pre-tax analytics. For example, assuming the 10-year rate is 3%, the duration of a 2.75% 10-year bond is roughly 13 years, much longer than the 9 years indicated by standard analytics. In other words, a 1% increase of interest rates would result in a 13% decline in market value. Risk managers, take note!

Figure 1: Ignoring Taxes Results in Underestimating Duration of Tax-Exempt Bonds



As discussed above, due to taxes, the duration of a discount muni can substantially exceed its maturity. The same remarkable phenomenon can be observed with the duration of an original issue discount bond from a taxable issuer's perspective.

Clearly taxes add a critical missing dimension to the world of bonds. Ignoring taxes is akin to watching a 3D movie without 3D glasses.