Tax-loss Harvesting Municipal Bonds: A Primer
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Introduction

Tax-savvy investors need no introduction to tax-loss harvesting (TLH). The goal is to recognize losses for tax purposes on investments whose values declined. Currently short-term losses can be written off at 40%, long-term losses at 20%. Recognizing a loss requires an off-setting capital gain beyond $3,000.

TLH of equity has been extensive covered in both the academic literature and in the trade press, and it is widely promoted. In contrast, the TLH of municipal bonds has received relatively little attention. Considering that munis are virtually always held in taxable accounts, such lack of attention is somewhat surprising. Possible practical reasons are the illiquidity and the high transaction cost of munis; fortunately there are initiatives to mitigate these. On the theoretical front, the analysis of the TLH of munis is complex. For example, selling a muni at a loss can save tax and at the same time lose value.

The focus of this article will be on the unique aspects of the TLH of tax-exempt municipal bonds. Familiar considerations common to the TLH of every security, such as wash-sale rules, will not be discussed; these are thoroughly covered in the TLH literature pertaining to equity.

Tax treatment of municipal bonds

We will only consider bonds issued at or above par. The tax treatment of original issue discount munis (OIDs) is too intricate for introductory purposes.

The tax basis of an optionless muni purchased at a premium gradually declines to par, based on its purchase yield to maturity. If the bond is callable at par, the tax basis declines to par by the call date, according to its yield to call. The salient point is that if a muni is purchased at a premium, the loss cannot be deducted for tax purposes at maturity or at call.

Let's turn to the tax treatment of the gain from purchasing a muni at a discount. If the discount is 'de minimis' (i.e. small), the gain is taxed at the long-term capital gains rate (at 20%), otherwise it is taxed as ordinary income (at 40%). The de minimis threshold is 0.25 times the number of years remaining to maturity; if there are 10 years remaining to maturity, the de minimis threshold is 97.50. Examples of the tax treatment follow.

Sale of a muni purchased at a premium

A 5% muni was purchased 8 years prior to maturity for 114.13, at a 3.00% yield to maturity. Three years later, 5 years prior to maturity, the bond is sold for 106.00. Based on the 3.00% purchase yield, the tax basis of the bond declined from 114.13 to 109.22. Accordingly, the investor can recognize a long-term capital loss 3.22 (109.22-106.00). At a 20% long-term capital gains rate the transaction results in 0.64 tax saving, and generates after-tax proceeds of 106.64.

Hold to maturity a muni purchased at a discount

A 2% muni was purchased 8 years prior to maturity for 96.00. The de minimis threshold for a bond with 8 years remaining to maturity is 98.00 (100 – 0.25x8). Therefore the 4 point gain from purchase at 96.00 will be taxed at maturity as ordinary income, at 40%. The corresponding tax payment will be 1.60, resulting in after-tax proceeds of 98.4.

The eventual tax at maturity depresses the current prices of discount munis; the relevance of this to TLH will be discussed below.

Valuation of the TLH transaction

The gain or loss resulting from the sale of a security at a price P from an after-tax account is taxable. The tax depends on the current tax basis B and the applicable tax rate t. The after-tax proceeds S(A/T) from sale at price P is

$$S(A/T) = P - t(P-B)$$

If the price is lower than the tax basis, the transaction reduces taxes — this is precisely the motivation for TLH. However, tax savings alone does not guarantee that the transaction is beneficial. What matters is the relationship between the after-tax proceeds and the 'hold value' H. As its name indicates, the hold value is the worth of the security if it is held, rather than sold. The net value V of a TLH transaction is

$$V = S(A/T) - H$$

Example: TLH analysis of premium muni

Let's first look at a muni originally purchased at a premium, and sold at a loss, but above par. For example, we previously considered the sale of a 5% muni whose tax basis is 109.22 at a 106 price. As we saw, the after-tax proceeds from sale would amount to 106.64. The question is how 106.64 compares to the hold value.

The investor's hold value is the present value of the future cashflows, at the fair discount rate. Because the price of this bond is above par, it is not affected by taxes. Therefore the mid-

market price is a good estimate of the hold value. If the mid-market price is 106.25, the net benefit of the sale is 0.39 (106.64-106.25).

Let's keep in mind that the benefit is reduced by the transaction cost of the sale, and it will be further reduced by the transaction cost of reinvesting, as discussed below.

Example: TLH analysis of discount muni

Could a tax-beneficial sale lose value if the bond is immediately repurchased at the sale price? It depends on the hold value. Let's assume that the tax rate remains the same, and the investment horizon exceeds the bond's maturity, so there will be no need to sell. As we will see, even under these pragmatic assumptions the hold value may exceed the after-tax proceeds.

The bond in this example is taken from a recent report by the Municipal Securities Rulemaking Board (MSRB, 2022). An investor purchased a 20-year 2% bond at par 4 years ago. Interest rates have increased, and the price of the bond declined to 90.40 (2.72% yield to maturity). Because the purchase price was 100.00, sale would result in a long-term loss of 9.60 points, and tax savings of 1.92 points at a 20% long-term capital gains rate. Therefore the after-tax proceeds would amount to 92.32 (90.40+1.92). Would it be beneficial for the investor to sell?

Let's examine the 90.40 market price from the perspective of a current buyer. Because the bond has 16 years remaining to maturity, its de minimis threshold is 96.00 (100-0.25x16). Therefore the current buyer would be taxed at maturity on the 9.60 points gain as ordinary income, at a 40% rate, resulting in 3.84 tax, and after-tax proceeds of 96.16. The after-tax yield to maturity corresponding to the 90.40 purchase price is 2.54%; which we assume to be the fair 16-year yield.

Now consider the hold value from the perspective of an investor who purchased this bond some time ago for 100. The hold value is the present value of the prospective cashflows. The cashflows are known, but what discount rate to use? As discussed above, the appropriate discount rate should be estimated from the mid-market price of the bond. For the example, let's assume that the transaction cost is 0, and 90.40 is the mid-market price. As we have seen, the after-tax yield corresponding to the 90.40 price is 2.54%. Given the 2.54% discount rate and the investor's cashflows (2% coupon, terminal value 100 instead of 96.16) the hold value turns out to be 92.96. This exceeds the 92.32 after-tax proceeds by 0.66 points. As we see, although the sale would save tax, the transaction would be uneconomical (Kalotay, Bond Buyer, 2018).

An alternative way of obtaining the hold value is to increase the 90.40 market price by the present value of the 3.84 tax, which would be paid by the new buyer at maturity. At the 2.54%

discount rate, the present value of the tax is 2.56, resulting in hold value 2.56+90.40=92.96, as before.

The calculation of the hold value is straight forward. The key point is to adjust the market price by the present value of the corresponding tax, using the correct discount rate. Simply put, the seller of a discount bond pays for the future tax of new buyer.

What makes munis different?

Tax-neutral valuation
Since the mid-1980 the commonly used method to analyze investment-grade taxable bonds has been the option-adjusted spread (OAS) approach (Kalotay et al, 1993). Standard OAS lacks a tax-parameter, which is essential to quantify the de minimis treatment affects the prices of discount munis. In order overcome this problem, the standard OAS method was extended to the so-called tax-neutral OAS (Kalotay, JOIM, 2014, and Kalotay, "Interest rate risk management of municipal bonds, 2021). Incorporation of taxes requires analytical subtleties, such as de minimis smoothing – the price behavior as it approaches the de minimis threshold.

A required input to any OAS analysis is a yield curve which represents the yields to maturity of optionless bonds selling at par. Obtaining a par optionless yield curve for munis is surprisingly challenging, as discussed below.

Muni yield curves are 'callable'
Muni prices are conventionally expressed in terms of yield to worst (YTW), which is the lower of the yield to call and yield to maturity. The standard municipal yield curve is based on the YTWs of AAA 5% bonds callable at par in Year 10. Because such bonds trade well over par, the YTWs are determined by yields to maturity.

For proper OAS-based analysis, the callable muni yields have to be converted into optionless par yields, as mentioned above. This can be accomplished by systematically 'stripping out' the call options. The process requires the specification of interest rate volatility, which has to be estimated from the prices of the appropriate callable bonds (Kalotay, 2017).

Municipal bond analysts must keep in mind that the standard municipal yield curve is *not* based on the yields of optionless bonds. This important feature of is a source of confusion, even for presumed experts; consider the following example. In the '*TLH analysis of a discount muni*' section above we considered a 16-year bond, and indicated that the source of was an MSRB document pertaining to the de minimis rule (MSRB, 2022). According to the MSRB document,

'the investor bought the bonds at 2.72% (yield to maturity) when benchmark AAA rates in 16 years were about 1.80%, a significant pickup in yield,' indicating that the discount muni was a bargain. The MSRB document mistakenly compares the yield to maturity of a 16-year optionless bond to the yield to call of a 5% bond whose nominal maturity happens to be 16 years. This comparison is erroneous: the yield of the callable bond primarily depends on the 10-year rate, rather than the 16-year rate. For the proper comparison, the prevailing callable yield curve should have been converted into an optionless par curve, in order to determine the appropriate 16-year rate.

Investment strategy

TLH-friendly municipal bonds
An investment held in a taxable portfolio may provide a beneficial TLH opportunity. Formally, TLH is an option, and the actual sale is an option exercise. Note that whenever a security is purchased for a taxable portfolio, the TLH option is obtained automatically, and without any additional cost. At the time of purchase the option has only time value, it has no intrinsic value. It acquires intrinsic value when the price declines below the tax basis. The value of the TLH option can be determined by modelling the evolution of the price of the security over time (Kalotay, JOIM 2016, and Kalotay, FAJ, 2016).

We previously analyzed the economics of selling a bond whose market price is below its tax basis, so that selling it would generate tax savings, i.e. we determined the intrinsic value of the TLH option. We now explore the time value of the option, and identify muni investments which are most suitable for TLH (Kalotay, Journal of Portfolio Management, 2022, and Kalotay, Journal of Portfolio Management, 2018).

When it comes to TLH, not all munis are created equal. Near-par munis are unsuitable for TLH, because of their 'negative convexity' (Kalotay and Davidson, 2021). Optionless taxable bonds are usually positively convex: their prices increase more when interest rates decline than they fall when rates increase by the same. Such is not the case with near-par munis, due to the detrimental de minimis tax treatment amount (Kalotay, Bond Buyer, 2022). If rates increase, the market price of a near-par muni declines more than its hold value, effectively eliminating a cost-effective sale. Although sale would save tax, holding is preferable to selling.

The suitable investments for TLH are bonds with high coupons, i.e. those selling at substantial premiums over par. If rates increase, their prices decline in a predictable 'positively convex' manner, and they can be sold well before their prices decline too close to par. Although retail

investors are usually reluctant to pay a substantial premium over par, they should recognize that the above-market coupon provides sufficient compensation for the premium.

Reinvestment of proceeds

As discussed above, certain bond structures are preferable to others for TLH. Bonds selling at a high premium are desirable. Non-OID bonds selling at a discount are also acceptable, although these tend to be in short supply. Intermediate-term bonds selling near par are not suitable. These considerations are relevant to the reinvestment of the proceeds from a TLH transaction. In order to maintain the desired characteristics of the portfolio, the proceeds need to be reinvested in a bond with similar credit risk and interest rate risk (duration). If our bond was sold at a price slightly above par, reinvesting in a virtually identical bond would not be conducive to TLH. The recommended strategy is to invest in a bond with similar credit and duration, but substantially different market price. This can be accomplished by considering bonds with coupons and maturities different from those of the bond which has been sold.

Short-term losses, namely those within a year of purchase, are deductible at a higher rate than long-term losses. From a TLH perspective, a short-term loss is a valuable option, and this option loses its value once a security has been held for over a year. Reinvestment of the proceeds from a TLH transaction automatically restarts the short-term clock. Selling a security year at a slight gain which has been held for over a year and immediately repurchasing it is an intriguing but risky strategy – there is a trade-off between the tax on the gain and the transaction cost on the one hand, and the increase of the TLH option on the other. The strategy of restarting the short-term clock has been promoted for equities, but the muni market may not yet be ready for it.

Performance measurement

The objective of TLH is to improve after-tax performance. Determining the savings in dollar terms is straight forward, but how to convert savings into a measure of excess return? Tax-savvy portfolio managers want to quantify and disclose their excess returns over the relevant 'benchmark' strategy. Unfortunately, the CFAI's GIPS method of measuring after-tax performance has an obvious shortcomings; a possible solution is provided by the 'tax-smart' approach (Kalotay, Journal of Performance Measurement, 2022), (Kalotay, Journal of Portfolio Management, 2021). As indicated by its name, the proposed return is calculated from tax-smart values — the tax-smart value is the greater of the liquidation value and the hold value. The tax-smart return recognizes superior performance delivered by tax-savvy managers, and pinpoints opportunities such as tax loss harvesting which can improve after-tax performance.

Efficient tax-loss harvesting of municipal bonds

As discussed above, owners of municipal bonds have a valuable TLH option. When exercised correctly, this option can significantly improve after-tax portfolio performance. Selling premium-coupon bonds with unrealized losses deserves serious consideration, provided that the tax benefit exceeds the transaction cost. Market risk is minimized if the proceeds are immediately reinvested in a like bond.

Currently the high transaction cost and the lack of liquidity are major obstacles to the TLH of munis. In the equity market, the transaction cost of a reasonable-size transaction is almost insignificant. In contrast, according to the MSRB (Wu), the transaction cost of a comparable muni deal is in the 1/2 to 3/4 point range. Thus the cost of a round trip of sale and reinvestment is at least 1 point. Let's put this into the TLH perspective: if the applicable tax rate is 20%, in order to recover the transaction cost the loss must exceed 5 points!

Market risk is another consideration. Ideally, a TLH transaction should be virtually riskless: sell a bond at a loss, simultaneously purchases a like bond, and lock in the tax savings. In practice, the investor must look for a suitable bond to reinvest, and this requires time. If the market improves, the price increase could easily overcome the benefit of harvesting the loss. The value of the loss doesn't change, but the replacement investment will earn less than the bond sold, and therefore the performance of the portfolio will suffer.

In order that TLH be efficient, transaction cost must be kept low and market risk must be constantly monitored and minimized. This is a tall order for small investors. A possible answer is riskless trades between owners of similar municipal bonds; investor A sells their bond to investor B and reinvests in a similar bond bought from investor B. Since no dealer is asked to position the bonds, the transaction costs should be small. And, since the trades are executed simultaneously, the investors' market risk is eliminated. To this end, a low-cost system that enabled risk-free swaps of municipal bonds among investors could sharply increase the value of TLH, and improve the liquidity of the municipal market.

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