Tax-Efficient Investing

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Abstract and Keywords

Tax-efficient asset management confronts investors with a traditional asset allocation problem—how much of each asset to hold—and also an asset location problem. The traditional asset allocation problem concerns how much you should put into bonds. But taking account of taxes means having to figure out how much of your bonds you put in tax-deferred accounts versus taxable ones. Taxes also affect asset prices, a fact that can be exploited by a savvy tax-exempt investor.

Keywords: location, tax exemption, tax arbitrage, muni default risk, muni illiquidity, MOB trade, tax-efficient allocation, tax-timing option, trusts, after-tax returns, tax risk premium

Chapter Summary

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versus taxable ones. Taxes also affect asset prices, a fact that can be exploited by a savvy tax-exempt investor.

1. Pre-Tax and After-Tax Returns
Duncan was as confused as ever after talking to his financial planner, who doubled as his accountant. His thriving business was generating cash, but success brought a new set of problems: taxes, which Duncan acknowledged was a good problem to have.

Duncan pondered a list of investments provided by his financial planner in the form of the following table:

<table>
<thead>
<tr>
<th>Pre-Tax Expected Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Equity Fund</td>
</tr>
<tr>
<td>10.00%</td>
</tr>
<tr>
<td>Tactical Trading Hedge Fund</td>
</tr>
<tr>
<td>12.00%</td>
</tr>
<tr>
<td>Corporate Bond</td>
</tr>
<tr>
<td>7.00%</td>
</tr>
<tr>
<td>Municipal Bond</td>
</tr>
<tr>
<td>5.00%</td>
</tr>
</tbody>
</table>

His accountant emphasized that these were not the relevant numbers Duncan should be considering (not least because they did not consider the underlying factor risks; see chapter 7). “There’s an old saying in this business,” he told Duncan. “It’s not what you make. It’s what you keep that counts.” In 2013, Duncan was subject to a marginal 39.6% Federal income tax. He paid a 23.8% tax rate on long-term capital gains (20% capital gains rate plus a Medicare surtax of 3.8%). So the take-home returns on these investments at the margin were forecast to be: 1

<table>
<thead>
<tr>
<th>Tax Treatment</th>
<th>Post-Tax Expected Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private Equity Fund</td>
<td></td>
</tr>
<tr>
<td>Long-Term Capital Gains Tax 23.8%</td>
<td>7.62%</td>
</tr>
<tr>
<td>Tactical Trading Hedge Fund</td>
<td></td>
</tr>
<tr>
<td>Short-Term Capital Gains Tax 39.6%</td>
<td>7.25%</td>
</tr>
<tr>
<td>Corporate Bond</td>
<td></td>
</tr>
<tr>
<td>Income Tax 39.6%</td>
<td>4.23%</td>
</tr>
<tr>
<td>Municipal Bond</td>
<td></td>
</tr>
<tr>
<td>Tax-Exempt 0%</td>
<td>5.00%</td>
</tr>
</tbody>
</table>
Taxes had a major effect! The tactical trading hedge fund looked marvelous at first, with a pre-tax expected return of 12%. But it generated a lot of short-term capital gains, which are taxed as regular income; on an after-tax basis, the private equity fund and tactical trading fund had similar returns. The municipal bond looked terrible from a pre-tax perspective, offering only a 5% yield. But it beat the corporate bond after tax because municipal bonds are tax exempt.

Now suppose Duncan has a choice of holding these assets in his retirement accounts, which defer taxes, as well as in his personal accounts, which are subject to the usual income and capital gains levies. If the assets were in a retirement account, Duncan could rightly focus only on pre-tax returns. The tactical trading hedge fund would dominate, and he would prefer corporate bonds over municipal bonds. But if Duncan could only put his money in a taxable account, the private equity fund looks more attractive and municipal bonds dominate corporate bonds. (Again, all of this discussion ignores risk.) Duncan, however, can allocate to either his retirement account or his taxable account, or both. He thus faced both an asset allocation decision (how much of each type of asset to hold) as well as an asset location decision (in which account—taxable or tax deferred—to hold these assets).

Taxes are a first-order issue in asset management. There are a lucky few for whom taxes do not matter or are a second-order consideration. Pension funds, for example, are tax-exempt. Tax considerations are usually secondary for sovereign wealth funds, which typically pay some taxes, but not much, depending on the nature of bilateral taxation agreements. But for other investors, taxes are front and center.
2. After-Tax Returns

I start by showing the effect of taxes on savings vehicles with different tax treatments. I adapt the treatment in chapter 3 of Scholes et al. (2005), a marvelous book on *Taxes and Business Strategy* for the MBA classroom. Myron Scholes, the Nobel Prize winner and primary author of the book, asserted not very convincingly, “I said I was not an expert with regard to taxes,” under cross-examination by the Justice Department in 2003 over an abusive tax shelter associated with his hedge fund, Long-Term Capital Management (LTCM). Scholes and other LTCM partners paid $40 million in fines and penalties associated with the transaction. LTCM blew up in 1998 and was bailed out by a consortium of banks coordinated by the Federal Reserve Bank of New York. Scholes’s second hedge fund after LTCM, Platinum Grove Asset Management, was forced to halt investor withdrawals (it invoked *gates*, see chapter 17) after losing close to 40% of its value in 2008 during the financial crisis.

In our examples below, we assume an income tax rate of 39.6%, a capital gains rate of 23.8%, and that each asset earns a constant annual return of 12%. We start with $1,000 invested in each asset in year zero. Consider the following investments:

**Bond Fund:** where all distributions are taxed as ordinary income and there are no capital gains or losses. After $n$ years, $1,000 initially invested in the bond fund cumulates to

\[(12.1)\]

\[1,000 \times (1 + 0.12(1 - 0.396))^n,\]

where every year the investor can only keep 60.4c of each dollar earned by the fund. This is the lowest after-tax accumulation of all the strategies we consider.

**Non-Deductible IRA:** where contributions are not tax deductible (that is, contributions are made with after-tax dollars) but earnings are not taxed until retirement, at which point they are taxed as income. In this case, the non-deductible IRA cumulates to

\[(12.2)\]

\[1,000 \times (1 + 012)^n - 0.396[1,000 \times (1 + 012)^n - 1,000].\]
Compared to the bond fund, the non-deductible IRA accumulates at the pre-tax return of 12% rather than the after-tax return of $(1 - 0.396) \times 0.12 = 7.2\%$. At withdrawal, the earnings are taxed as ordinary income. The current limit for non-deductible IRA contributions is $5,000 for those age forty-nine or younger and $6,000 for those fifty and older.

**Equity Fund:** pays capital gains annually. In this case, the earnings are taxed each year at the 15% capital gains rate:

(12.3) \[ 1,000 \times (1 + 0.12)^t \]

This category of funds includes assets whose prices are marked up to market value at year end, even when no sale has occurred.

**Non-Dividend Paying Stock:** There is a reason why Warren Buffet has never allowed Berkshire Hathaway to pay a dividend. This investment is similar to the non-deductible IRA, except the earnings are taxed as a capital gain rather than as income:

(12.4) \[ \frac{1,000 \times (1 + 0.12)^t - 0.23(1,000 \times (1 + 0.12)^t - 1,000)}{1,000 \times (1 + 0.12)^t} \]

**Tax Exempt or Tax Deferred:** After $n$ years, a tax-exempt investment simply cumulates to

(12.5) \[ 1,000 \times (1 + 0.12)^t \]

The formula is exactly the same for a municipal bond (although in practice a municipal bond’s average return would be much lower; see Section 3) as for a tax-deductible retirement account. Every dollar contributed to the latter is equivalent to $(1 - 0.396) = 0.60$ after tax. But, at withdrawal, the pension is taxed as regular income at the full 39.6% rate. Thus we have

(12.6) \[ 1,000 \times \frac{1}{(1 - 0.396)}(1 + 0.12)^t(1 - 0.396) = 1,000 \times (1 + 0.12)^t \]

as the return on a pension investment, which is exactly the same as equation (12.4). This category also includes 529 college savings plans.

We know immediately that the bond fund is always the worst and that the tax-exempt or tax-deferred fund is always the best (remember, everything in this simple example earns 12% with
certainty). This implies that people should not be holding bonds in taxable accounts, unless they are very risk averse and their entire portfolio, both taxable and tax-deferred, is dominated by bonds. What about the other investments?

**p.390** The after-tax accumulations of the various investments are:
### Tax-Efficient Investing

<table>
<thead>
<tr>
<th>Year</th>
<th>Bond Fund</th>
<th>Non-Deductible IRA</th>
<th>Equity Fund</th>
<th>Non-Dividend Paying Stock</th>
<th>Tax Exempt</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1000.00</td>
<td>1000.00</td>
<td>1000.00</td>
<td>1000.00</td>
<td>1000.00</td>
</tr>
<tr>
<td>10</td>
<td>2013.22</td>
<td>2271.93</td>
<td>2398.83</td>
<td>2604.66</td>
<td>3105.85</td>
</tr>
<tr>
<td>20</td>
<td>4053.07</td>
<td>6222.36</td>
<td>5754.36</td>
<td>7588.48</td>
<td>9646.29</td>
</tr>
<tr>
<td>30</td>
<td>8159.74</td>
<td>18491.79</td>
<td>13803.71</td>
<td>23067.46</td>
<td>29959.92</td>
</tr>
</tbody>
</table>
The non-dividend paying stock dominates the bond fund, the non-deductible IRA, and the equity fund. It is second only to the tax exempt strategy. It works so well because of the lower capital gains rate. From this perspective Warren Buffet is right not to pay dividends. But so many companies do! Why? The standard explanations are dividend clientele and signaling hypotheses, since paying dividends by itself loses money for shareholders. There may also be benefits to paying out cash rather than managers wasting it on white elephant projects in the firm.

It is interesting that the non-deductible IRA and the equity fund switch positions between years 20 and 30. For short horizons, the equity fund dominates. For example, at the 10-year horizon, the equity fund cumulates to $2,399 versus $2,272 in the non-deductible IRA. So if you’re saving for a short time period, forget the Roth IRA; just put your money directly into a mutual fund. But at longer horizons, the non-deductible IRA comes out ahead. At 30 years, the non-deductible IRA cumulated amount is $18,492, which trounces the $13,804 in the equity fund. (If you’re twenty-five years old and reading this book, sock the maximum permissible into your non-deductible IRA every year.) The intuition for this is that the non-deductible IRA has earnings that compound at the higher pre-tax rate of 12% (see equation (12.2)), whereas the mutual fund compounds at the after-tax rate of 9.1% (see equation (12.3)). This is offset in the short run by the higher income tax rate for non-deductible IRAs and the lower capital gains rate for mutual fund investments. But over time, the “interest on the interest” dominates in the non-deductible IRA. Such is the beauty of compounding.

Clearly, taxes matter. This simple example shows that:

1. The most important lesson is to save in a way that is sheltered from taxes. Everything else is secondary.  
2. After maxing out your tax-exempt account, optimal allocation decisions can be quite complicated. They can depend on time horizon and tax rates. Different investment vehicles will have different tax implications. The tax treatment interacts with the returns the assets generate to make the joint optimal allocation and location decision complex.
3. Individuals need to focus on after-tax returns, not pre-tax returns. Unfortunately, most of the financial industry only reports pre-tax returns.

The first lesson is crucial. You can save directly in a tax-deferred pension. Or you can find an asset that pays you a tax-exempt return. One extremely important asset class that does this is municipal bonds, which allow money to accumulate tax-free in a taxable account.

3. Municipal Bonds

3.1. Characteristics of the Muni Market

Municipal bonds, or munis, are bonds issued by states, municipalities, 501(c)(3) nonprofit corporations (named for the section of the Internal Revenue Code granting them a tax exemption), and other tax-exempt entities. This market is large: at the end of 2011 there were $3.7 trillion in muni securities outstanding, about a third the size of the U.S. Treasury market. The coupons and original issue discount (OID) on regular munis are exempt from Federal income tax. In addition, individuals are exempt from state income tax on muni coupons and OID on bonds issued by tax-exempt authorities in the investor’s home state. But some munis are subject to federal income tax and the alternative minimum tax, so individuals have to be careful.\(^6\)

The tax-exempt muni market is unique to the United States. In other countries, investors holding state bonds pay national income taxes. Munis are exempt from federal taxes here due to the separation of the federal and state governments in the constitution (federalism). In *Pollack v. Farmers’ Loan and Trust* (1895), the Supreme Court interpreted the constitution as not allowing the Federal government to tax the states. Put simply, one government could not tax another. But in 1988 the Supreme Court overturned the constitutional basis for the tax exemption in *South Carolina v. Baker*, so the muni exemption is now the purview of Congress. Periodically there are calls to rescind it, but it will take an extremely brave Congress to do so.\(^7\)

\(^{(p.392)}\) At issue, OID and interest coupons are equivalent. The issuer can trade off paying a higher coupon with a steeper discount. Thus if the interest is tax exempt, the OID must also be tax-exempt. Issuers take advantage of this equivalence of
OID and interest: in muni-land, only about 10% of straight bonds are par bonds, whereas the great majority of corporate bonds are issued at par.\(^8\)

Individuals are the main holders of municipal bonds. Figure 12.1 plots the holdings of municipal bonds using data from the flow of funds from 1952 to 2012. Household holdings include both direct holdings and indirect holdings through mutual funds, exchange-traded funds (ETFs), and closed-end funds (see chapter 16). Households hold close to 80% of munis and have done so since the early 1990s. Of this 80%, about half is directly held and 30% is held indirectly. Banks used to own up to 50% of munis in the 1970s, but since most of their tax breaks for holding munis were eliminated, bank holdings of munis have been below 10%.\(^9\)

Individuals benefit from holding munis because they pay no income tax on muni interest or OID. Consequently, an individual holding a muni bond is willing (p. 393) to tolerate a lower yield, and muni yields are, on average, lower than the yields of federally taxable bonds such as Treasuries and corporate bonds. Tax benefits are the distinguishing characteristic of munis, and naturally these benefits are built into their high prices (or low yields).

Ang, Bhansali, and Xing (2012) decompose municipal yield spreads into credit, liquidity, and tax components:

\[
\text{Muni-Tsy} = \text{CreditRisk} + \text{LiquidityRisk} + \text{TaxBenefit}
\]

\[
(12.7)
\]

\[
\begin{align*}
&\text{CreditRisk} &\text{LiquidityRisk} &\text{TaxBenefit} \\
&-0.52\% &0.01\% &-2.95\%
\end{align*}
\]
As you can see, muni yields take a big hit (-2.05%) as a result of their tax benefit; in effect, muni bond issuers are able to transfer some of their borrowing costs to Uncle Sam, who makes up the difference in the form of a tax giveback. Credit risk is negligible (0.01%). Illiquidity risk is high (1.12%).

Equation (12.7) emphasizes what munis bring to the table versus Treasuries. Overall muni interest rates are influenced by the same factors driving interest rates in general—which we discussed in chapter 9. The fundamental, market-wide forces of economic growth, inflation, monetary policy, and associated risk premiums matter here as well.

But there are other factors affecting munis, so let’s examine each in turn.
3.2. Illiquidity

The muni market is disgustingly inefficient.

Information in the municipal market is dreadful. Contrast an investor obtaining financial reports on a listed company. She can do it for free with a mouse click, in a standardized format going back years, and compare this data with that of other companies. It is hard, and for the most part impossible, to do the same for the town where she lives, or for the school district which educates her children. Or for her county or state. Various organizations, including government and industry groups, have expended great efforts to make information more accessible to muni investors, but information quality, accessibility, and dissemination generally remain poor.¹⁰

From a political standpoint, this is appalling. Taxpayers, after all, have a right to know. Is my school district borrowing money at a rate competitive with the school district across the river? If I can see a leverage ratio for the companies I invest in, why can’t I quickly see the leverage ratio for my town?

Poor information also impairs liquidity, and liquidity in muni markets is abysmal. Transaction costs are high, price adjustment is slow, and different buyers pay different prices for the same bond. The bonds themselves are overly complex, and this further reduces liquidity. The way muni bonds are issued in series is ironically designed to minimize liquidity: it takes a large issue and then chops it up into several small issues (thirteen, on average, but with 5% of series issues containing more than twenty-five separate securities). Each small issue has a different maturity, different coupon, and perhaps even different embedded derivatives. There are literally a million or so different bonds in the muni market. Over 60% of them contain hard-to-value embedded derivatives. Contrast this with the large, deep U.S. Treasury market. U.S. Treasuries, unlike munis, are simple and easy to value, and there are relatively few issues with large sizes.

As a result of all this, individual investors often get fleeced when buying munis. Investors need to pay attention to recent comparable bond prices, released through the Municipal Securities Rule Marking Board, but the vast array of bond types and features makes these securities hard to compare; in addition to different maturities, coupons, and discounts/
premiums, munis can be sinkable, callable, putable, refunded, conduit, bundled with other contingent claims, subject to alternative minimum tax, taxable, bank-qualified, and so on.

Round-trip transaction costs for individuals average 2% to 3% but can easily reach 5%. This is more than double what institutions pay, roughly twice as much as what it costs to trade a corporate bond, and many times what it costs to trade a stock. Green, Hollifield, and Schürhoff (2007) show that dealer markups over the reoffering price can be high as 5%—roughly a year’s return on a typical muni bond. (The reoffering price is often represented to issuers as the price at which the bonds are sold to the public.) Biais and Green (2005) show that, remarkably, it is twice as expensive to trade munis today as it was in the 1920s, when muni bonds were actively traded on the New York Stock Exchange. Given the huge advances in technology, what other securities cost more to trade today than they did 100 years ago?

Figure 12.2 shows just how illiquid muni markets are. Dividing up all municipal bond transactions into ten buckets by the number of trades per year, excluding the bonds that never trade and taking bonds transactions which occur ninety days after issue, the 10% most illiquid bonds trade once every five to six years. The typical municipal bond trades once or twice per year. Even the most liquid bonds trade once every two days, on average. Muni bonds are extremely illiquid.

It’s tragic that these bonds, which appeal mainly to individual investors, are so hideously inefficient and unfriendly. Reforming this market would immensely benefit the common man as well as save billions in taxpayer dollars by lowering issuer costs. But muni reform is hard: the Securities and Exchange Commission (SEC) does not regulate this
market and cannot impose mandatory disclosure requirements or minimal accounting standards, as it can with regular securities. In fact, the main framework for the regulation of capital markets in the U.S. (the 1933 Securities Act and the 1934 Exchange Act) specifically exempts all municipal securities from their provisions except for the antifraud statutes. The SEC does what it can, but it is greatly hamstrung.11 In the words of SEC Commissioner Elisse Walter, muni investors have often been treated as “second class citizens.”12 The muni market has poor information and terrible liquidity partly because the muni market is segmented by states. Congress cannot simply mandate better disclosure, set up a muni market regulator, or dictate what types of bonds states can issue—these are state matters, and the U.S. constitution, along with a vast body of court rulings, limit what the federal government can do.

Richard Green and I, through The Hamilton Project, Brookings Institution, have proposed that municipalities could eliminate a great many inefficiencies by acting collectively.13 Municipalities could band together and thereby obtain better access to better financial advice, have more resources, and help each other in a way that they cannot do on their own. The potential benefits are enormous. From equation (12.7), if munis had the same liquidity as Treasuries, then municipalities would be borrowing at rates 1% lower than currently. This is a saving to taxpayers of more than $30 billion per year.

3.3 Term Spread

The decomposition reported in equation (12.7) was across the yield curve. The tax effect, however, varies with maturity. In particular, the muni curve has always been steeper than the Treasury curve, but the steepness has varied over time. This is one of the outstanding stylized facts in the muni literature and is called the muni puzzle.

We might expect muni yields, \( y_{\text{muni}} \), to be related to Treasury yields, \( y_{\text{Treasury}} \), by \( y_{\text{muni}} = (1 - \tau) y_{\text{Treasury}} \), where \( \tau \) is a relevant tax rate.14 An individual can earn 4%, say in Treasuries, but the after-tax yield she receives is \((1 - 0.396)\times 0.04 = 2.4\% \). Thus, we might expect a muni bond to deliver the same 2.4% yield to make the taxable Treasury and the tax-exempt muni investments equivalent after-tax. This relation holds at short maturities less
than one year, but it fails at long maturities. Long-term muni yields are much higher than this simple tax relation predicts.\textsuperscript{15} There is a further stylized fact beyond the muni puzzle: muni yield curves have never sloped downward, while Treasuries regularly have (see chapter 9).

Various explanations have been proposed for the muni puzzle, with my some-time co-author Richard Green’s (1993) among the most compelling. Green is able to construct a risk-free portfolio of taxable Treasuries so that income is transformed and treated as capital gains. Essentially, Green shows how to construct taxable bond portfolios to lessen the effect of taxes, making the muni puzzle less pronounced than it should be relative to a naïve analysis. Green modestly refers to his model as “a simple analysis” (which he puts in the title), but it requires some sophistication to follow.

Investors trade on the muni puzzle and it is called the MOB trade, for municipals over Treasury bonds. There are many ways to implement this strategy; a basic one is simply to buy long-term munis and sell short-term munis, hence you are exposed to the muni term spread. You fund this by taking offsetting positions in the Treasury term structure: selling long-term Treasury bonds and buying short-term Treasury notes. Then you leverage this, a lot.

Panel A of Figure 12.3 plots the twenty-year minus one-year term spread in munis (AAA) and the after-tax Treasury term spread from January 1990 to June 2011 and shows the spread for munis has been higher than the spread for Treasuries. But it has varied over time and dramatically narrowed during 2008. Panel B plots the difference between the two series.

There have been pronounced increases in the muni slope relative to the after-tax Treasury slope before, as in 1992 and 1994, but nothing in the post-1990 sample is as dramatic as 2008. If the (p.397) picture reminds you of volatility risk, you are spot on. As volatility spiked, the MOB trade suffered, along with other carry trade and risky asset strategies (see chapter 7). Many muni bond funds, some of which were very highly levered, took severe losses in 2007 and 2008 on the MOB trade.
3.4. Credit Risk

On December 19, 2010, Meredith Whitney, a noted banking analyst and CEO of Meredith Whitney Advisory Group LLC, appeared on 60 Minutes and predicted “hundreds of billions” in losses from municipal bond defaults starting in 2011. Her comments drew a lot of attention. But we have yet to see the tidal wave of defaults in munis. Whitney may be early, but she raises a provocative point. Given (p. 398) that this asset class is perceived as being so low in risk, how much credit risk do munis really have?

Municipalities enter bankruptcy all the time. Orange County, California, caused a huge stir when it entered bankruptcy in 1994. In 2013, the City of Detroit filed for bankruptcy—the largest municipal bankruptcy in history with debts close to $20 billion. Since the financial crisis, scattered defaults among municipalities have arisen partly from the fall in house prices and the legacy of the subprime crisis. A partial list is as follows: in 2008, City of Vallejo, California; in 2009, City of Prichard, Alabama; in 2011, City of Central Falls, Rhode Island, City of Harrisburg, Pennsylvania, Jefferson County, Alabama; and in 2012, City of Stockton, California. But, overall, credit risk in munis is extremely low. The decomposition estimated by Ang, Bhansali, and Xing (2012) in equation (12.7) shows that credit risk plays a negligible part in municipal bond spreads, but this is for the sample used by
Ang, Bhansali, and Xing since the mid-1990s. Perhaps muni risk now is higher?

Moody’s reports only four defaults among towns, cities, or counties from 1970 to 2009, and only fifty-four defaults of municipal entities over the same period. The average five-year cumulative default for investment grade muni debt is 0.03% compared to 1% for investment-grade corporate. Thus, credit risk in munis has been very low—an order of magnitude lower than credit risk for investment grade corporate debt. Moody’s also reports that the recovery rates when a default occurred were 60 cents on the dollar, compared to 38 cents for investment grade corporate debt. Hempel’s (1971) study gave special attention to the many municipal defaults that occurred during the 1920s and 1930s and also found that default rates were much lower, and recovery rates much higher, than for corporate debt.

Whitney’s prediction may yet come true. States have gone bankrupt before. In the early 1830s and 1840s, eight states and one territory defaulted: Arkansas, Florida Territory, Indiana, Louisiana, Maryland, Michigan, Mississippi, and Pennsylvania. U.S. states during that era were the emerging markets of the time, and there was heavy borrowing for infrastructure that could not be paid back (“canals to nowhere,” in the words of John Cochrane). Some states, like Florida and Mississippi, repudiated completely. In Charles Dickens’s 1843 novel, A Christmas Carol, the protagonist Ebenezer Scrooge has a nightmare in which his wealth has withered into a “mere United States security.” Scrooge was not dreaming about Treasuries but these state issues that were widely held in the United Kingdom at the time.

In the 1870s and 1880s, ten states defaulted, including some two-time losers: Alabama, Arkansas, Florida, Georgia, Louisiana, Minnesota, North Carolina, South Carolina, Tennessee, and Virginia. All were adversely affected by the Civil War except Minnesota, which went bankrupt because it failed to meet payments on railroad bonds (“railroads to nowhere”).

And then finally, in 1933, Arkansas defaulted, again. Arkansas has the dubious distinction of being the only state to default three times.
In all these defaults, there was no bankruptcy mechanism. States are sovereign entities under the constitution (in particular, under the Eleventh Amendment). Furthermore, the federal government did not step in to offer aid. Will the Feds intervene in a state default in the future? I doubt it. New York City almost defaulted in 1975. New York City is notable because its metropolitan area has a gross domestic product larger than most states (and most countries). The mayor at the time, Abraham Beame, appealed to the federal government and President Ford for assistance, which was denied. The *Daily News* had the pithy headline, “FORD TO CITY: DROP DEAD.” There is no federal obligation to provide a muni bailout, there never has been a bailout, and in my opinion a federal bailout will not happen when the next state defaults (hopefully not Arkansas for the fourth time).

I think Whitney is right in one respect: there will be defaults amounting to “hundreds of billions of dollars.” I do not believe, however, that the defaults will be substantial in muni bond markets. State and muni governments will default implicitly (these are not legal defaults but defaults on social contracts) by reducing or eliminating services and benefits to residents. States and municipalities will cut public pension payments—which may be explicit defaults depending on how pension obligations rank in the liability pecking order. These defaults have already started. The full force of muni downsizing, however, will not be borne by muni bond holders.

### 3.5. Advice for Investors

I summarize with the following recommendations:

1. Overall for muni interest rates, the same factors operate as in other fixed income markets: economic growth, inflation, monetary policy, volatility, and so on.
2. The tax-exempt status is the distinguishing characteristic of munis. Investors benefit from the tax exemption but need to be choosy because ...
3. There are huge illiquidity and information shortcomings in muni markets. Try to avoid buying individual munis unless you know what you are doing. And even if you know what you are doing, pay attention to comparable prices and *(p.400)* shop around. The opacity of muni markets means investors have to be especially vigilant—you will likely be ripped off and,
given the poor transparency in the muni market, you won’t even know it.
4. If you’re a small investor, hold munis through low-cost mutual funds or ETFs (see chapter 16).
5. The MOB trade is not an “arbitrage.” The same factors driving term spreads, such as volatility, are at play as in regular fixed-income markets. But there is a large added dose of illiquidity risk. See point 3 above.
6. Credit risk is likely to remain small. Of course, be smart about what kind of munis you buy. See point 3 again.

I close with a muni investment strategy. Many investors buying munis, including pass-through institutional investors like mutual funds, do so to avoid paying taxes. Munis are tax-exempt only at issue. Investors trading munis in secondary markets have to pay taxes. For example, if an investor purchases a par bond for a price less than par on the secondary market, he has to pay income tax on the difference between purchase price and the par value at maturity. This is taxation on market discount (as opposed to the no taxation on OID, which at issue is equivalent to tax-exempt coupon interest). Ang, Bhansali, and Xing (2010b) show that there are some very cheap munis with market discounts. Buying cheap market discount munis is like buying second-hand time shares. Everyone wants the new condo, but you get the exact same one for 50% less on the secondary market. Investors are reluctant to buy market discount munis because they are averse to tax—and many major muni mutual funds don’t wish to pass on taxes to retail investors and thus avoid purchasing these bonds. The pricing anomaly is likely to persist because the muni market is fragmented: even if you were to know about this effect, you may not be offered the deals at cheap enough prices.

4. Tax-Efficient Allocation
The optimal asset allocation decision (ideally an optimal factor allocation decision, see chapter 14) concerns how much of each asset to hold. The optimal location decision is about where to hold these assets. The simplest choice is between a taxable or tax-deferred account. There are other asset locations: joint accounts with spouses and/or children, charitable vehicles, and many different kinds of trusts.
The optimal location problem is complicated because of the existence of *dynamic tax strategies*, and in some cases there are pure *tax arbitrages*. Some of these tax arbitrages are legal but permitted only to a certain extent, others are prohibited outright, and some are allowed but prohibited in “pure” forms and so fall into a murky area. For example, universities are prevented from issuing tax-exempt debt—they borrow at a rate lower than the federal government (see Section 3)—and then using that money to buy stocks. But, money is fungible. So the money in (p.401) the university’s endowment that would have gone to building the dormitory can be allocated to equities, so the dormitory gets built anyway and is used as collateral for the university’s muni bond issue. A second example is an individual who receives a tax deduction for the interest on a mortgage. She could borrow using a home equity loan and invest that money in dividend-paying stocks. Money is again fungible. This allows her to allocate the money she is saving for her son’s college tuition to equities. Then she borrows money with a home equity loan and uses those proceeds for the money she would have put into her son’s college savings fund. One of the largest tax arbitrages (in terms of the cost to the federal government) is the mortgage deduction, which the IRS limits to a mortgage of no more than $1 million.
4.1. Tax Timing Options

In 1983, George Constantinides published a major paper showing how the one-year cut-off between short-term capital gains (which are taxed as income) and long-term capital gains gave rise to tax-timing options. Constantinides showed that it is optimal to realize losses immediately as they arise and to defer (to infinity ... and beyond!) the realization of capital gains. The loss is deductible at income tax rates, and the deferment delays paying capital gains taxes. Furthermore, the tax strategy is separable from the portfolio choice problem.

There are some strong conditions in Constantinides’ original paper, but they have been relaxed in follow-on work. For example, in Constantinides’ basic model there are no constraints on buying or selling. If there are short sale constraints, then the asset allocation decisions depend on the tax basis (in a complicated fashion). In the original model, there was no limit on tax rebates for capital losses. In the current tax code, only $3,000 of losses can be offset against ordinary income (but amounts in excess of $3,000 can be carried over to future tax years). With such a constraint, it may be optimal to realize gains and pay taxes to regain the option of using new losses against other income. But overall the basic idea holds: realize the loss as soon as you can (but with transactions costs it may pay to wait) and try to defer capital gains. So come the end of the tax year, sell your losers.

This advice sounds like the opposite of rebalancing, which I advocated in chapter 4. Rebalancing buys losers. Tax timing sells losers. How are these consistent with each other? The Constantinides tax timing option is different from the underlying asset allocation decision. Suppose there is a 40% allocation to equities, which an investor has implemented using the AA Index Fund. Then at the end of the tax year suppose there is a loss. Rebalancing would say buy more equities. The tax timing option says sell AA index Fund. The investor proceeds to sell AA Index Fund, thus realizing the loss which is deductible, and then buys the same amount and more of BB Market ETF. Economically, AA Index Fund is equivalent to BB Market ETF. For tax purposes, they are different. Doing this, the investor has both rebalanced and harvested the tax losses.

4.2. Tax-Efficient Asset Allocation
The asset allocation and asset location problems are potentially complex given the potential interactions and dynamic tax strategies. There are two common approaches:

1. To specify the joint asset allocation and asset location problem and to solve the two problems simultaneously. An example is Dammon, Spatt, and Zhang (2004).
2. To ignore the interaction between the two decisions and implement ad hoc rules. Usually the asset allocation problem is solved first and then, taking the asset allocation as a given, the asset location problem is solved.

The second method is by far the more popular in the financial services industry. For example, Vanguard says:21

Consider placing the most tax-efficient holdings (such as tax-managed, index, and tax-exempt funds) in your taxable accounts while holding tax-inefficient investments in your tax-advantaged accounts—such as IRAs or employer plans.

It turns out that industry is right (partly). The optimal location problem is separable from the asset allocation problem, and the overall allocation problem can be done by considering only taxable accounts, rather than a considerably more complex joint problem over taxable and tax-deferred accounts. Jennifer Huang (2008), in a paper that was her PhD dissertation, was the first to show this.

Huang’s model aligns with popular industry advice, with an extremely important caveat which I detail below. Investors place assets with the highest tax rates in the tax-deferred account to maximize the tax benefit. Bonds are highly taxed because coupons are taxed as income (at 36.9%). So these are placed in the tax-deferred account. Stocks with no dividends are subject only to the long-term capital gains tax (at 23.8%). So stocks are placed in taxable accounts.

**The major result in Huang (2008) is that she is able to compute the optimal allocation with tax effects, which industry models rarely do (or if they do, rarely do correctly). Moreover, Huang does it only using a taxable account. Huang’s insight is that you can convert any tax-deferred return into a taxable return. A holding of an asset in a tax-**
 deferred account is equivalent to a levered holding of the same asset in a taxable account. We’ve already seen this in equation (12.6): $1 contributed pre-tax to a pension fund is worth \( \frac{1}{1 - 0.396} = 1.66 \) in a taxable account. The taxable portfolio levers up the tax-deferred portfolio to generate the same return. Anything that the investor can do in a tax-deferred account, the same investor can undo (or re-do) in his taxable account.

Huang’s procedure is to compute the equivalent taxable wealth, which is the sum of wealth already in the taxable account, \( w^T \), and then convert all the tax-deferred wealth, \( w^D \), to an equivalent amount in taxable wealth. She redefines total wealth, \( W \), as the sum of

\[
(12.8) \quad w = w^T + Z \times w^D,
\]

where \( Z \) is the appropriate factor that converts the tax-deferred wealth to the taxable equivalent. Most popular industry advice, unfortunately, does not perform optimal allocation calculations on equivalent taxable wealth amounts as per equation (12.8).

Now the standard Merton (1971, 1973) solution applies to total wealth, \( W \), as in chapter 4. The asset allocation and asset location decisions are separable. What makes them so is that there is an appropriate adjustment, \( Z \), which transforms the value of the tax-deferred wealth to taxable wealth and vice versa. The asset allocation problem hence requires an adjustment for the impact of tax deferment.

The key driver in Huang’s analysis is the ability to sell short in the taxable account. Small investors will not be able to do this, but large and sophisticated investors certainly can. If investors cannot borrow in the taxable account, then investors may prefer to hold lower taxed assets in the tax-deferred account as this lowers the volatility of the tax benefit. The basic analysis in Huang also misses Constantinides-style tax timing. This can be incorporated. The factor \( Z \) in equation (12.8) that converts taxable to tax-deferred wealth can be modified to take into account tax option benefits, where \( Z \) now captures effective tax rates rather than statutory tax rates. In theory, all these effects can be captured in Huang’s framework. The
downside, however, is that in practice, Huang’s $Z$ factor may be difficult to compute.

With the answer to optimal location and optimal asset allocation in hand, we circle back to a question involving munis. If the main benefit of munis is the tax exemption, what about holding munis in a taxable account instead of Treasury or corporate bonds in a tax-deferred account? Dammon, Spatt, and Zhang (2004) examine this question and come to the conclusion that if you want to hold bonds, it is better to hold taxable bonds in a tax-deferred account rather than holding tax-exempt bonds in a taxable account. The exception is if you are so risk averse and subject to constraints (like the ones above), that you need to hold bonds in both the taxable and tax-deferred accounts. So the case for munis for a moderately risk tolerant investor should be made on the basis of factor exposure, as I have advocated for any other asset class (see chapters 7 to 10), not the tax exemption per se.
4.3. Taxes and Dynamic Factors

Taxes have a significant effect on dynamic trading strategies, especially strategies that have high turnover and generate plentiful short-term capital gains (which are taxed as income). Bergstresser and Pontiff (2009) and Israel and Moskowitz (2011) examine the effect of taxes on the value-growth and momentum factors described in chapter 7. Not surprisingly, since the dynamic factors involve continual trading, taxes reduce the value-growth and momentum premiums. Bergstresser and Pontiff document that the tax-exempt value-growth premium of 3.5% is reduced to 1.8% for a high income resident of New York State using the tax rates investors were subject to between 1927 and 2009. The same investor would reap an after-tax momentum premium of 8.1% while a tax-exempt investor undertaking the momentum strategy would have enjoyed a return of 10.5%. Value-growth and momentum investing are tax inefficient because of the large dividends that value stocks generate and the high turnover of the momentum strategies.

Taxable asset owners implementing dynamic factor strategies should be encouraged that while the value-growth and momentum premiums are diminished, they are still present on an after-tax basis. There is ample scope for tax optimization of these strategies. Israel and Moskowitz (2011) find that tax optimization induces large improvements to value and momentum styles. I also advise taxable asset owners to locate these dynamic factor strategies, as far as possible, in tax-exempt accounts and consider tax-optimized versions of these factors in taxable accounts.
4.4. Trusts

Trusts do not exist solely to avoid or defer taxes; some trusts are designed primarily to protect assets from profligate family members rather than to minimize paying Uncle Sam. Some trusts are designed to actually disinherit family members and to preserve estates. But most trusts are set up with some intention of minimizing taxes, especially the estate tax (called the “death tax” by those who advocate removing all estate taxes).

(p.405) At the time of writing in 2013, the estate tax exemption is $5.25 million per spouse, or $10.5 million per married couple. The top tax rate assessed for estates in excess of these amounts is 40%. Ultra high net worth asset owners have many trusts they can play with: grantor retained annuity trusts (GRATs), charitable remainder unitrusts, and their close cousins charitable lead trusts, intentionally defective grantor trusts (IDGTs, which are called “I Dig It” trusts), and dynasty trusts—just to name a few. GRATs are very popular among the wealthy and it would be rare to find an ultra-high net worth asset owner without at least one GRAT in her estate. Along with these instruments are family partnerships or corporate structures with valuation and control discounts, which set a different value of the shares for tax purposes than more realistic market values.

While the rules for these are very complicated (that is why you hire your tax attorney), they have three key economic components:

1. Alternative location
   They offer taxpayers another asset location with a tax break. GRATs are initially set up by a donation to a tax-advantaged trust.

2. The trust generates income
   The trust takes advantage of income compounding at tax-advantaged rates (see Section 1). In a GRAT, the trust pays money to the person setting up the trust, which is taxable, but any appreciation in excess of a hurdle rate (which is computed by the IRS, is adjusted every month, and is based on a market interest rate) flows back into the trust. Thus assets with high expected returns are ideally held in GRATs. They compound tax free.
3. The trust transfers to beneficiaries
At death, assets in the trust are transferred to beneficiaries and are not subject to the gift tax. (In 2012, the IRS permitted a parent to transfer up to $5.12 million to a child tax free.) The GRAT is set up with a specific maturity (at least two years), and one risk is that if the grantor dies before the trust matures, then the value of the trust is included in her estate—but this would have been exactly the same situation if the GRAT had not been set up, so the grantor’s estate has not lost anything (except the lawyer’s fees in setting up the GRAT).

Absent the probability of dying before the expiration of the trust, computing optimal allocations to a GRAT can be handled in Huang’s model. With appropriate assumptions on the expected returns and dividend streams of the assets, we can (p.406) compute a taxable value of money in the GRAT (equation (12.8)). This calculation is more difficult than the simple case because it involves valuing payments in excess of a (pre-determined but stochastic) hurdle rate. Different trusts will have different taxable income conversion factors. Conceptually, Huang’s basic model is unchanged.

One disadvantage of trusts is that they can be hard to dismantle. (Many are irrevocable.) Of course, not being able to touch your money could be an advantage, but it is a form of liquidity constraint. The standard Merton models, and Huang’s tax-adjusted extension of Merton’s models, do not take into account illiquidity risk or constraints. In chapter 13, we discuss asset allocation models that do.
4.5. Taxes, Consumption, Investment, and Other Decisions

Investors also use taxes to their advantage in timing consumption and investment decisions. Some of these can be pure tax arbitrages. A famous example is the pension tax arbitrage of Black (1980) and Tepper (1981). They show that a corporate defined pension fund allows a corporation to engage in a form of tax arbitrage by allowing the corporation (the plan sponsor) to borrow money, take a tax deduction for the interest, and then invest the proceeds in the pension plan. Pension funds are tax exempt and are a natural clientele for highly taxed assets like corporate bonds and U.S. Treasuries. The corporation gets a tax break for the pension fund contribution, and the pension fund gets to house highly taxed assets in a tax-efficient vehicle. Moreover, since the corporation is actually a stock, the Black-Tepper tax arbitrage allows the corporation to harvest an equity risk premium by investing in bonds!

Frank (2002) presents evidence that corporations do undertake the Black-Tepper strategy and shows that there is a positive relation between the amount held by the company’s pension plan in bonds and the tax benefit. But the Black-Tepper strategy is vastly inefficiently taken up. Company pension plans seem to hold way too much equity, at least solely according to tax arguments. Perhaps this is optimal according to other arguments, as chapter 1 discusses.

Pension fund contributions are deductible by corporations. Firms strategically time the contributions when tax rates are high. This practice now has limits because contributions when the plan is more than 150% overfunded cannot be deducted under the 1987 Tax Act. The 1990 Tax Act also raised the excise tax to 50% on a corporation taking out assets from an overfunded pension plan. The same concept applies to individuals—deductions for contributions to charities, pensions, and so on are more valuable when tax rates are high.

On a final morbid note, the ultimate economic decision is timing one’s death to minimize, or in some cases entirely avoid, income taxes. In the U.S. in 2010, there was no estate tax. Anecdotal evidence suggested that people tried to postpone (p.407) their deaths until 2010 so their heirs could reap the windfall. Serious academic studies show that people do time deaths to avoid taxes, either postponing or hastening
death.\textsuperscript{24} (Deaths are \textit{elastic} with respect to taxes.) While death and taxes are both inevitable, people evidently do exercise some control over the one to minimize the other.

4.6. Are Investors Tax Efficient?

No.

Tax-efficient allocation implies that we should see investors hold heavily taxed assets (corporate bonds and Treasuries) in tax-deferred accounts and lightly taxed assets (stocks) in taxable accounts. But investors generally don’t do this. Poterba and Samwick (2002), Bergstresser and Poterba (2004), and others find that asset allocations in taxable and tax-deferred accounts are very similar. More than one-third of U.S. investors could cut their taxes by shifting heavily taxed assets to tax-deferred accounts and vice versa. The data show that wealthier households (and these are more heavily taxed) are more tax-efficient but not as tax efficient as they should be.

The Constantinides tax timing options imply that investors should be ready to realize losses and defer gains. Investors tend to do the opposite. Barber and Odean (2003) find that investors realize gains far more than they realize losses. They also locate large amounts of bonds in taxable accounts. Barber and Odean also find investors are far from being fully tax efficient.

An important question for many individual investors is whether they should allocate savings to paying off a mortgage early or to contribute to a tax-deferred account. Both are tax advantaged: the mortgage interest payment is tax deductible, and the pension saving is tax-exempt. Where should a household put that extra $1: paying off the mortgage or saving in a pension? According to Amromin, Huang, and Sialm (2007), the answer is that, assuming you have a low (optimally refinanced) mortgage interest rate, you should not pay off the mortgage early; instead, contribute to the pension. You maintain the benefit of the mortgage tax deduction and allow the pension to earn the pre-tax return (see equation (12.6)). Most households do the opposite, possibly because they are reluctant to participate in markets as lenders or borrowers; Shakespeare’s adage “neither a borrower nor a lender be” costs them money.
Hopefully after reading this chapter, your investment portfolio will become more tax efficient.

(p.408) 5. Taxes as a Factor
Taxes clearly affect individuals’ behavior, but do taxes affect asset prices? Originally there were two schools of thought. Miller and Scholes (1978—yes, the same Nobel Prize winning Scholes who asserted his own lack of tax expertise) said that although a given individual is affected by taxes, the average investor is not and taxes are not a factor. Intuitively, investors sort themselves into two groups: those with low tax rates, who tend to hold assets with high tax burdens such as high-dividend stocks, and highly taxed investors who hold assets with low tax burdens, such as stocks that pay no dividends. In this way, taxes should become irrelevant for equilibrium pricing.

The other school of thought is that the representative investor is subject to taxes, and equity evaluations are affected (inversely) by tax burdens. Increases in tax burdens should be compensated by higher expected returns. The first model along these lines was by Brennan (1970). The empirical evidence has strongly settled the debate in favor of this camp. Taxes are a factor.

There are two ways taxes induce pricing effects. There is a dividend tax penalty, where high dividend yield stocks are disadvantaged because of the higher rate of tax levied on dividends than on capital gains. In addition, stocks that have done well provide shareholders with accrued capital gains. Investors with too many shares of a stock that has appreciated in the past sell fewer shares than would otherwise be the case in order to avoid paying capital gains tax. There is no effect for investors buying because buying does not trigger capital gains. Thus prices of stocks with large accrued capital gains must be higher, and thus expected returns lower, to induce more selling by investors who are locked in. This is an example of tax capitalization, and it can lead to long-term reversals.

Sialm (2009) shows that tax effects exist in both the time series and cross-section of equity returns. Sialm computes an expected tax yield, which is the sum of taxes on dividends, short-term capital gains yields, and long-term capital gains yields. The capital gains yields component is small, as expected from the Constantinides (1983) tax-timing option.
Sialm shows that when tax yields are high, aggregate market valuations are low. This is a time-series effect. In the cross section, Sialm shows that stocks with high tax yields (high dividend paying stocks) have higher returns. These returns are in excess of the Fama–French size, value, and momentum factors. This control is very important because stocks with high tax burdens are likely to have dividend payments, and these are more likely to be value stocks—which we know already have high returns (see chapter 7). Sialm (p.409) finds that the stocks with the high tax burdens have average returns 2.5% higher, after controlling for the Fama–French effects, than stocks with low tax burdens.

The fact that taxes affect expected returns does not mean that the clientele sorting predicted by Miller and Scholes (1978)—where different types of investors are drawn to stocks with high or low dividend yields—does not occur. Institutions prefer to own stocks that pay dividends and individual investors are drawn to non-dividend paying stocks. Graham and Kumar (2006) show, however, that while taxes do induce clientele effects in individual investors, the effects are much smaller than non-tax-based investor characteristics such as age and wealth.

The average, representative investor is affected by taxes, so tax as a factor is ideally exploited by a tax-exempt investor. By definition, individuals buying stocks with high tax yields will be paying more tax. But tax-exempt investors will not, and they should use their comparative advantage.

6. Pre-Tax and After-Tax Returns Redux
Duncan’s accountant is right in emphasizing after-tax returns over pre-tax returns. The latter are relevant for holding assets in a taxable account. But Duncan may be able to hold the assets in a tax-deferred account. Thus Duncan faces both an asset allocation problem and an asset location problem.

The overriding rule is to maximize savings in tax-deferred vehicles first and to hold assets with the most onerous tax treatments (corporate bonds and high dividend paying stocks) in tax-deferred vehicles. This aligns with popular industry advice, but to do it properly requires computing an adjustment to convert tax-deferred wealth to taxable wealth so that a standard asset allocation problem can be solved over taxable wealth. The optimal asset location decision implies we should
not observe the same mix of stocks and bonds in tax-deferred and taxable accounts. Sadly, most investors are very far from being tax efficient.

Taxes are a factor for asset prices. The fact that muni bonds have lower yields, on average, is evidence that asset prices reflect tax effects. Munis have historically had little credit risk. Muni yield curves have never sloped downward and are more steeply sloped than Treasuries. But munis are extremely illiquid and the market is hugely inefficient.

Taxes also affect equity prices. Stocks with high tax burdens have higher returns than stocks with low tax burdens, in excess of those predicted by the standard value/growth, momentum, and other factor premiums.

Notes:

(1) This example ignores state income taxes. I live in New York City and have the privilege of paying New York State tax and New York City tax. Both jurisdictions tax long-term capital gains as ordinary income. On the other hand, Duncan could live in Texas and not worry about state income tax.


(4) Fewer companies now are paying dividends but those that do pay out big ones. In fact, while the number of firms paying dividends has dropped over the past few decades, the sum of dividends paid by all companies has increased in both nominal and real terms. See Fama and French (2001) and DeAngelo, DeAngelo, and Skinner (2004).

(5) See Allen and Michaely (1995) for a literature summary, which is a little dated but still relevant.

(6) There are taxable munis, of which one important class is Build America Bonds. See Ang, Bhansali, and Xing (2010a).
The calls to rescind the tax exemption of municipal debt are not a recent phenomenon: Ott and Meltzer (1963) report that there were 114 resolutions to repeal the municipal tax exemption from 1920 to 1943.

See Ang, Bhansali, and Xing (2010b, Table 1).

There are still bank-qualified muni issues, which are restricted to issues less than $10 million in size. Banks can tax deduct 80% of the carrying costs of these munis. The 2009 Recovery Act temporarily allowed banks to deduct 80% of the carry costs up to 2% of the bank’s total assets (this is called the 2% de minimus rule) for a much wider set of bonds and raised the $10 million bank qualified size limit to $30 million.

There is no penalty for noncompliance with Governmental Accounting Standards Board (GASB) standards. Only thirty-eight states require state and local government entities to use GASB. Certain states, like Kansas, New Jersey, and Washington, set their own accounting standards and some government entities within those states keep three sets of books: the GASB standard so that they are able to receive a clean GAAP opinion by auditors, the state standard, and their own accounts.

The SEC itself calls for legislative change to better police these markets. See the SEC “Report on the Municipal Securities Market,” July 31, 2012. The report makes for some very sad reading of cases where the SEC has been able to take action.


See Ang and Green (2011). This also contains a good summary of muni market inefficiencies and is a reference for the numbers reported in this section.

This is formulated by Miller (1977).

Another way of stating the muni puzzle is that marginal tax rates implied by the ratio of the muni curve to the Treasury curve are much smaller than they should be given federal income tax rates. Estimates of implied tax rates from other muni prices, however, are high. Longstaff (2011) estimates
implied tax rates around 38% using muni swaps. Ang, Bhansali, and Xing (2010) estimate marginal tax rates that exceed over 100% using muni market discount bonds. 


(17) For more details see Ang and Longstaff (2013), who also compare the credit risk of U.S. states with the credit risk of Eurozone nations. U.S. states are sovereign borrowers in a currency union, just as Eurozone nations are. Germany, however, is not going to send troops to prevent a country from leaving the Eurozone, while the United States had Gettysburg.

(18) http://johnhcochrane.blogspot.com/2012/02/sargent-on-debt-and-defaults.html

(19) Deferring to infinity is not academic. In many circumstances, when you leave appreciated securities to your heirs, the basis is reset at your death.

(20) See, for example, DeMiguel and Uppal (2005), Gallmeyer and Srivastava (2011), and Marekwica (2012).


(22) An exemption of $5 million was introduced in 2010 under the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act (TRA), but at the time of passage the exemption was temporary. In 2013, the American Taxpayer Relief Act made the TRA exemption permanent and indexed it to inflation.


(25) Miller and Modigliani (1961) also predicted that investors in high tax brackets would be attracted to stocks with low dividend yields and vice versa. The paper does not focus on equilibrium with taxes; its major result is that the value of the firm is independent of the firm’s dividend policy and was cited

(26) This discussion follows Klein (2000).