Are Reported Mutual Fund Yields Useful?
An Analysis of Municipal Bond Funds

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Abstract

Bond funds report both a distribution yield and a SEC yield, which are roughly analogous to the current yield and yield to maturity on an individual bond. We analyze the quarterly yields reported by municipal bond funds from September 1993 to September 2009. Despite substantial variation in the reported yields, we find that the yields provide no information concerning the future risk adjusted performance of the funds. We do find that the yield gap, defined as the difference between the distribution and SEC yield, does serve as a reliable predictor of the funds that will have the worst future risk adjusted performance. However, we find no evidence that investors use this information to avoid selecting poorer performing funds.

Introduction

Bond fund managers have a wide variety of decisions to make when selecting their portfolios. Depending on the fund's stated objective, managers must decide on the portfolio's maturity, quality, pricing, cash holdings, and leverage. Along with these decisions, the fund family makes decisions concerning the fund's load, expense ratio, and number of fund classes offered. The combination of these choices is reflected in the income that the fund can or is expected to payout to investors over time. To convey this payout, bond funds report the fund's yield. The yield serves as a focal point for marketing and the advertising materials of the fund in an attempt to convey managerial ability and to convince individuals and institutions to invest in the fund.

In general, bond funds report two yield calculations. The first, and generally most popular among bond funds, is the distribution yield which is roughly analogous to the current yield on individual bonds. The second is the SEC yield which is roughly analogous to the yield to maturity calculations for bonds. Although we defer a full discussion of the calculations until the next section, it suffices for now to indicate that there can be substantial differences between the values reported using each of the two yields. A Wall Street Journal article documented that differences between the two yields can approach 200 basis points. The article also indicated that during low interest rate environments, bond funds prefer to focus on the distribution yield, which is likely to be higher, in an attempt to attract investors to their fund.[1]

Often, investors' interest in bond funds is driven by a desire for a stable income flow, and thus the distribution and SEC yields are likely to be a significant part of the information they use in making choices among available funds. Thus, given the importance of these yields in fund

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[1] May 16, 2003 "Fund Track: Bond Fund Yield Quotations Can Yield a Bit of Confusion", by Karen Damato, *Wall Street Journal*

marketing materials and the impact these yields may have on investor decision making, our study focuses on the following question: do the yields reported by bond funds contain useful information about future fund performance? For a variety of reasons, high reported yields may not translate into high total or risk adjusted returns. For example, a fund that invests heavily in premium bonds may report a high distribution yield given the higher coupon payments generally associated with these higher priced bonds, however, if the bonds in the portfolio are called before maturity at a price close to par, the fund could suffer a substantial drop in its net asset value and thus have lower future returns.

To analyze this question, we focus on national municipal bond funds. Our choice of muni bond funds is motivated by the fact that these funds are unique in the bond fund universe as the income paid out by the fund is exempt from taxes at the federal level and may also be tax free at the state level. As a result of this feature, investors in muni bond funds are most likely to focus on yield information provided by the funds when making their investing decisions. We choose to focus on national funds instead of state specific funds since managers of national funds have a far greater selection of munis from which to choose, and thus have more opportunities to distinguish themselves through their portfolio choices from other muni fund managers. In addition, although they were very close in total assets under management during the 1990's, national funds have surged ahead of state funds in popularity. According to data from the Investment Company Institute, at the end of 2009, national munis had $298 billion in total net assets compared to $158 billion for state muni funds. In addition, for every year since 2002, national funds have had greater cash inflows (or smaller cash outflows) than state funds.

Most work in the bond fund literature has focused on performance measurement but has not incorporated reported fund yields as part of the analysis nor has focused exclusively on municipal bond funds (e.g., Blake, Elton and Gruber, 1993; Elton, Gruber, and Blake, 1996; Ferson, Kisgen, and Henry, 2006; Boney, Comer, and Kelly, 2009; Chen, Ferson, and Peters, 2010).Given that we focus on the predictive ability of the yields, our empirical methodology is more closely related to recent papers in the equity mutual fund literature done by Kacperczyk, Sialm, and Zheng (2008) and Cremers and Petajisto (2009). Both studies calculate a fund specific variable (return gap and active share respectively) and demonstrate that the variable provides additional information about the strategies being employed by managers that is not available by traditional analysis. Both find substantial variation in their measures across the universe of equity funds and demonstrate that the variables are able to predict future fund performance.

In this study, we examine the yields of national municipal bond funds reported quarterly by Morningstar from September 1993 through September 2009. Given that substantial differences often exist between the distribution and SEC yields, we also analyze the difference between the two yields which we refer to as the yield gap. As expected, there is substantial cross section variation in the reported yields as our sample of funds varies in investment style. Of particular interest is the behavior of the yield gap. The yield gap has a strong negative correlation with the SEC yield and virtually no relationship with the distribution yield. In addition, the mean of the bottom quintile for the yield gap is negative while the other yield gap quintiles have positive averages.

We then test to see if any of the three yield variables provide information about future risk adjusted returns. Each quarter, we sort funds into quintiles based on the yields and then examine the performance of each quintile over the subsequent three months. Using muni bond specific factor models which are based on work by Fama and French (1993) and Blake, Elton, and Gruber (1993), we estimate the alpha for each of the quintiles. We find that the distribution and SEC yields provide no information concerning the future risk adjusted performance of the funds as there is no statistically significant difference between the alphas of the yield quintiles. But we do find that managers who consistently engage in strategies that result in a negative yield gap have significantly lower risk adjusted performance. Depending on the model used, funds in the bottom quintile of the yield gap sort generate annualized alphas that are 35 to 65 basis points worse than the alphas of the other yield sorts, and in all but a few cases, this underperformance is statistically significant. We examine the characteristics of these negative yield gap funds, and we find that the underperformance is not a function of specific investment styles or fund characteristics such as the expense ratio.

Given that the yield gap serves as a reliable predictor of poor future fund performance, we examine investor cash flows to the muni funds to see if they are avoiding these specific funds. Our evidence indicates that investors focus on the distribution and SEC yields when making their investing decisions. We then partition our sample into two groups 1) high distribution yield funds, negative yield gap funds and 2) high distribution yield, positive yield gap funds and examine the cash flows to each partition. We find no difference in the cash flows across the groups indicating that investors clearly do not understand the predictive power of the yield gap variable. The same results hold when we substitute the SEC yield for the distribution yield.

Our paper is organized as follows: Section 1 provides a description of the distribution and SEC yields. Section 2 provides a description of our fund sample. Section 3 focuses on the performance predictability tests. Section 4 examines the factors that explain each of the yields.

Section 5 analyzes the implications of our empirical results for investor decision making. Section 6 concludes.

1. Description of Bond Fund Yields

Mutual fund data providers such as Morningstar generally report two yields for bond funds. The most popular yield is the distribution yield which is also known as the 12 month yield or the dividend yield. The yield is calculated as follows:

$$DY_t = \frac{\sum_{i=12}^{1} INC_{t-i}}{NAV_{t-1} + \sum_{i=12}^{1} CG_{t-i}} \quad (1)$$

where *INC* represents income from the fund, *NAV* represents the fund's net asset value, and *CG* is the fund's capital gains. The distribution yield of a fund is based on the sum of the trailing 12 month's income distribution divided by the sum of last month's ending NAV plus any capital gains distributed over the previous 12 months.[2] Income in this calculation refers only to interest payments received by the fund from the fixed income securities held in the fund's portfolio. As calculated, this yield is analogous to the current yield calculation for an individual bond and is designed to give investors a picture of the yield that they are currently receiving from their funds.

However, with its focus only on past income distributions and no consideration given to capital gains or losses based on the purchase price of the bonds in the portfolio, the dividend yield does not give a full picture of a fund's income generating potential. Since 1988, funds have been required by law to report their 30 day SEC yield whenever they advertise their bond yields. The SEC yield is calculated as follows:

[2] An alternative distribution yield calculation is calculated by taking the fund's income dividends from the most recent month, multiplying by 12, and then dividing by a recent fund share price. This calculation assumes that distributions remain constant for a year which is unlikely to be the case. We focus on the definition mentioned in the text since that is the definition used by Morningstar which serves as our data source. More details are discussed in Section 2.

$$SY_t = 2\left\{\left[\left(\frac{(INT_{t-1} - EXP_{t-1})}{NUM_{t-1} * P_{t-1}} + 1\right)^6\right] - 1\right\} \quad (2)$$

INT represents interest earned on debt obligations over the previous 30 day period, *EXP* represents the expenses accrued over the period, *NUM* is the average daily number of shares outstanding during the period that are entitled to receive interest distributions, and *P* represents the maximum offering price per share on the last day of the period.

To calculate *INT* in Equation (2), the fund first calculates the yield to maturity of each bond held by the fund based on the market value of the obligation which includes actual accrued interest.[3] Then the yield to maturity is divided by 360, and this value is multiplied by the market value of the bond to determine the interest income on the bond for each day of the subsequent month that the fund is in the portfolio. As calculated, the SEC yield reported at the end of month *t* lags one month.

The above calculation differs in specific cases involving tax exempt securities. If a tax exempt security was issued at par and has a current market discount, the coupon rate is used in the calculation instead of the yield to maturity. If the bond was issued at a discount, and the current discount, based on the current market value, exceeds the remaining portion of the original discount at issue, then the yield to maturity should be based on the imputed interest using the original issue discount calculation. The reason for these alternative calculations is that capital gains on muni bonds bought at a market discount are taxed as ordinary income.

The distribution yield is considered a backward looking calculation that gives an investor the best indication of the income they can expect to receive over the short term. Since it explicitly incorporates the yield to maturity of the fund's holdings and the expenses and loads

[3] The Federal Register (Volume 63, No. 55, March 23, 1998, Rules and Regulations, pages 13961-13963) provides more details on how to handle various situations not covered in the above discussion.

charged by the fund, the SEC yield is considered a forward looking calculations and a more complete measure of overall performance. However, a weakness with the SEC yield is the assumption in the calculation that the fund will hold securities until they mature. A primary difference between the yield calculations can be seen in their treatment of premium bonds. A fund that invested heavily in premium muni bonds over the previous twelve months would most likely have a distribution yield that exceeds its SEC yield, as the distribution yield would reflect the higher coupon payments from the premium bonds but not factor in the capital loss that investors are likely to occur if the bonds are called or redeemed at par. Several investment guides and websites warn investors that a substantial difference between the distribution yield and the SEC yield is a potential red flag concerning the strategies being employed by a fund and that investors should be very cautious about investing in such funds.[4]

Because of this issue, we calculate a third yield variable that we refer to as the yield gap. We define the yield gap as

$$YG_t = DY_t - SY_t \tag{3}$$

For the remainder of this study, we analyze these three yield variables to determine the information they convey about future muni bond fund performance.

2. Data and Fund Sample

To derive our sample, we use the quarterly Morningstar Principia Pro CDs from September 1993 through September 2009. Morningstar is used as our data source as they are the only database provider that reports both the distribution yield and SEC yield for bond funds for

[4] One of the best discussions of these concerns is done by Annette Thau, "The Bond Book," Second Edition, 2001.

this entire period.[5] Although Morningstar began reporting this data in September 1991, the starting point for our sample is September 1993 since the data necessary to calculate the benchmarks used in our factors models is not available until late 1993.

To obtain the distribution yield, Morningstar computes the figure in house using the trailing 12 month income distributions, NAV, and capital gains. Thus, Morningstar reports a distribution yield for any fund that has been in existence for at least a year. Given the more complicated calculations involved for the SEC yield, Morningstar does not calculate this value but instead asks funds to voluntarily provide this information in the fund surveys that funds submit to Morningstar. If a fund does not report this data or if the SEC yield available from the fund is more than 30 days old from the date of the quarterly CD, Morningstar leaves the SEC yield field blank for the fund.

Because our study focuses on the information provided by fund yields, our sample is composed only of muni funds for which Morningstar reports both a distribution and SEC yield for the quarter. As a result of this selection, we note that our fund sample suffers from two weaknesses. First, the sample is biased against younger funds as funds must have been in existence for at least one year in order for Morningstar to compute the distribution yield. Second, due to the complex calculations, not all funds calculate and report an SEC yield to Morningstar when submitting their fund surveys. Thus, within our sample, a fund that existed for the entire time period may not be included in our sample each and every quarter if the necessary yields are not available.

However, the advantage to this data source is twofold. First, Morningstar reports the distribution yield in a consistent manner through time for all funds in the sample. Within the

[5] We note the CRSP, the standard academic database for mutual funds, does not provide either of these yields for bond funds.

mutual fund world, there is no consistent definition of what constitutes a distribution yield nor is the terminology consistent across funds when discussing this type of yield. Some funds refer to a distribution yield as the annual distribution rate or the dividend yield. In addition, when calculating these yields, individual funds may use last month's NAV, an average over the previous year, or even a more recent fund price that potentially makes the yield look more attractive.

The second advantage of using Morningstar is that the strategies on which our empirical tests are based could have been easily replicated by any investor. Del Guercio and Tkac (2008) document the popularity of Morningstar as a data provider for retail mutual fund investors. No other database that we examined comes close in the amount of information provided about bond funds, and it is likely that, given this information advantage, Morningstar carries the same weight among bond investors as it does stock fund investors. Any muni bond investor with a Morningstar subscription over our time period would have had access to the same data that we use to conduct this study.

We include all share classes of a fund in our sample. Although the portfolios of the multiple classes are the same, the distribution yield, SEC yield, and yield gap differ across the fund classes since the loads and expenses charged by the classes differ. As a specific example, for September 2009, there are five separate classes (A, B, C, I, and Investor) of the American Century Long Term Tax Free Municipal Bond fund. The reported distribution yields for the five classes range from 2.81% to 3.92% with only the B and C classes reporting the same distribution yield. The reported SEC yields are all different with a range of 2.34% to 3.52%. The yield gaps also differ across all five classes ranging from 0.40% to 0.57%. In the final section of the paper, we examine the impact yields have on investor cash flows to muni funds. Zhao (2005) provides evidence that bond fund investors are sensitive to sales loads when making their investment decisions. Thus, we follow Zhao (2005) and include the different classes as part of the sample.

Overall, we have 22,918 fund-quarter observations. The average number of funds in the sample each quarter is 353. Before March 1995, there are less than 200 funds in our sample with the smallest number being 106 in December 1993. The average sample size then grows steadily and peaked during the 2002 through 2004 period with a maximum of 585 funds in June 2004. The sample then steadily declines with our last quarter composed of 309 funds. Based on a comparison of our sample size to the annual number of national municipal bond funds reported by the Investment Company Institute, 60% of the total number of funds is covered by our sample.

Table 1 includes basic statistics about variables that impact reported yields. All values in the table are obtained by first averaging across all observations within the quarter and then calculating statistics across the time series of quarterly values. The average front end load shows a steady decline throughout the sample period. The maximum average load of 2.20% occurs during the first quarter of our sample period while the two lowest values (0.89% and 0.91%) occur during the last two quarters. The downward trend is driven by fewer funds charging loads. 51.4% of funds charged loads at the beginning of the sample period while only 25.6% charged loads by sample period end.

For both the average expense ratio and 12b-1 fees, the smallest values occur during the first five quarters of our sample period and then the values remained close to the reported mean over the remaining quarters. Fund size, as represented by total net assets, is virtually the same at the beginning ($631.8 million) and end ($604.9 million) of the period. The variation is due to a large decline during the 1999-2001 periods as size dropped into the $200 million range.

Turnover shows a general downward trend as it averaged over 70% for the first two years, but all of the smallest values have occurred since 2005. For average cash holdings and fund age, no substantial trends stand out that may impact our empirical results.

Table 2 examines the quarterly cross section distribution of the distribution yield, SEC yield, and yield gap for our sample. We first examine the overall variation in the yields before explicitly controlling for differences in investment style in the next section. On average, we see substantial variation in all three yield variables. For the distribution yield, the average quarterly standard deviation is 98 basis points, while the value is 137 and 115 basis points for the SEC yield and yield gap respectively. Each quarter, we sort the funds into quintiles based on each yield and then calculate the average yield for funds within a specific quintile. We then average the time series of the quintile yields and report these values in the table. These averages give a stronger indication of the variation in yields within our sample. The average difference between the yields for the top quintile and for the bottom quintile is 223 basis points (5.44% - 3.21%) for the distribution yield, 305 basis points for the SEC yield, and 185 basis points for the yield gap.

Of particular interest is the behavior of the yield gap. On average, the distribution yield is greater than the SEC yield, thus the yield gap is positive. However, the bottom quintile of the yield gap is consistently negative with an average gap of -0.41%. Only seven of the 65 quarters in our sample have a positive yield gap for the bottom quintile. Thus, our sample is partly composed of a group of muni funds that consistently engage in portfolio decisions that generate a negative yield gap.

Because of the large variation in market interest rates across our sample period and the magnitude of the 2008 financial crisis, we split our time period in two to examine whether the same relationships continue to hold. We report these results in Table 2. We choose September

2001 as our break point as it is halfway through our sample period. With this breakpoint, both the first and second half of the sample contains periods when the Federal Reserve used both restrictive and expansionary monetary policy in an attempt to moderate economic conditions. Although yields are lower for the second time period, the same patterns hold across both intervals, thus reducing concerns that our empirical results will be driven by a subset of the sample.

We also examine the correlation between our yield variables to determine the strength of the relationship among the variables. We find that the distribution yield and the SEC yield have a correlation of 0.56. This correlation is stronger in the second half of our sample (0.63) than in the first half (0.37). However, the yield gap has virtually no relationship with the distribution yield. The overall correlation is 0.19, and it is consistent for both the first (0.15) and second (0.19) half of our time period. Although these correlations are positive, they would not be considered particularly strong. There is, however, a strong negative relationship between the yield gap and the SEC yield as the overall value is -0.71. Values for both the first and second half of sample period are also strong (-0.86 and -0.65, respectively).

This consistent variation in the cross section of reported yields and the behavior of the yield gap variable suggests that national municipal bond funds are not a homogenous group. We next examine whether the information contained in these yield variables is helpful in explaining future fund performance.

3. Muni Bond Fund Yields and Return Predictability

To determine whether the variation in yields is helpful in predicting future risk adjusted performance, we conduct the following test which is similar to empirical tests used most recently by Kacperczyk, Sialm, and Zheng (2008) and Cremers and Petajisto (2009). Beginning with September 1993, each quarter, we sort funds into quintiles based on one of the yield variables. Then for each fund, we obtain its monthly return for each of the subsequent three months. Next, we equal weight the returns each month for the group of funds within each quintile. At the end of this procedure, we have a time series of monthly returns for each quintile of each yield variable.

As designed, our test represents the returns an investor can expect by following an investment strategy based on the yield information reported quarterly by Morningstar. We estimate the alpha for each quintile time series to determine if the yield variables contain any information about future performance. Because the yield variables are affected by the maturity and quality of the holdings of the funds, we use models that explicitly control for these two factors. Unfortunately, unlike the academic literature on stock fund performance, there is no direct equivalent to the Carhart (1997) model that is widely accepted as the appropriate empirical model for estimating bond fund alphas. Thus, we use three separate models to estimate alpha.

Our first model is a two factor model based on Fama and French (1993)

$$r_{i,t} = \alpha_i + \beta_{i,term} r_{term,t} + \beta_{i,def} r_{def,t} + e_{i,t} \tag{4a}$$

where r_i, r_{term} and r_{def} refer to the excess return of fund quintile i, the return of a long maturity muni bond index minus a short maturity index, and the return of a low quality muni bond index minus the return of a high quality muni bond index. The term and default factors are constructed in a similar fashion to those of Fama and French (1993) except that we use muni bond indices rather than broad bond market indices. Our term factor is defined as the return on the Barclays'

20 year municipal bond index minus the return on the one year index, while our default factor is defined as the return to the Barclays' muni high yield index minus the muni AAA index.[67]

Fama and French (1993) do not include a bond market factor as one of the explanatory variables in their factor model as they show that a stock market variable captures most of the variation in bond returns. Recent work by Comer, Larrymore, and Rodriguez (2009) indicates that the relationship between bonds and stocks changed during the 2000s and that a stock market factor was no longer sufficient to explain bond returns. So for our second model, we add a muni bond market factor to equation 4a to create the following three factor model:

$$r_{i,t} = \alpha_i + \beta_{i,mkt} r_{mkt,t} + \beta_{i,term} r_{term,t} + \beta_{i,def} r_{def,t} + e_{i,t} \qquad (4b)$$

where r_{mkt} is the excess return to the Barclays' municipal bond index.

For our third model, we follow the work of Blake, Elton, and Gruber (1993). We compare the excess return of each quintile to the indexing strategy that most closely replicates the quintile's return series. Our model is

$$r_{i,t} = \alpha_i + \beta_{i,int} r_{int,t} + \beta_{i,long} r_{long,t} + \beta_{i,hiqual} r_{hiqual,t} + \beta_{i,loqual} r_{loqual,t} + e_{i,t} \qquad (4c)$$

where r_{int}, r_{long}, r_{hiqual}, and r_{loqual} are the excess returns on the Barclays' intermediate municipal bond index, the long municipal bond index, the AAA municipal bond index, and the high yield municipal bond index.[8] We will subsequently refer to this model as our four factor model.

We report the alphas from each of the models for each quintile for our three yield variables in Table 3a. All alphas in the table have been annualized. For the distribution yield, our results indicate that the yield provides no information about funds that are most likely to be

[6] Our use of Barclays' bond indices throughout this section is motivated by the fact that these indices are the most comprehensive market weighted indices available and the most widely used family of indices in bond portfolio evaluation.

[7] The Barclays' high yield municipal bond fund index is not available until 1996. Before that period, we used the BAA index to represent low quality municipal bonds.

[8] Barclays defines the intermediate index as the weighted average of muni bonds with 1 to 10 years left before maturity. The long index is defined as the weighted average of bonds with 10+ years left until maturity.

the best or worst performers. Focusing first on the two factor model, we find that the quintile 3 funds have the best relative performance with an alpha of -1.02% while the quintile 1 funds have the worst performance of -1.19%. This small difference of 7 basis points is not statistically significant, and tests across the other quintile pairs also are not significant. Similar results hold across our other two performance models. The difference between the best performing and worse performing quintile is also 17 basis points according to the three factor model and is 22 basis points based on the four factor model. None of these differences are statistically significant.

Similar results hold for the SEC yield as the quintile sorts do not appear to provide any information about future performance. According to the two factor model, the difference between the best and worst performing quintiles is 16 basis points (-1.03% vs -1.19%). For the three and four factor model, the differences are 14 basis points (-1.13% vs -1.27%) and 20 basis points (-1.10% vs -1.30%) respectively. These differences are not significantly different nor are the differences between any of the remaining quintile pairs.

However, the results for the yield gap tell a different story. According to the two factor model, the quintile 1 alpha of -1.54% is 41 basis points worse that the next worst performing group (quintile 5) and 62 basis points worse than the best performing group (quintile 2). A similar performance gaps holds for the remaining two models. For the three factor model, the quintile 1 funds underperform the quintile 5 funds by 42 basis points and the quintile two funds by 62 basis points. The corresponding numbers for the four factor model are 43 and 64 basis points. Not only is the underperformance substantial relative to the other yield gap quintiles, the quintile 1 yield gap funds perform worse than any of the distribution and SEC yield quintiles.

In Table 3b, we formally test whether the difference between the alphas generated by the quintile 1 yield gap funds and those of the other quintiles is statistically significant. We calculate the time series of returns for a strategy that has a long exposure to a specific quintile and is short the quintile 1 yield gap funds. We then regress this return series against each of our three models. The results reported in the table are the annualized alphas to this strategy. We find that all of the alphas to such a strategy are positive, and in 12 of the 14 cases the differences are statistically significant. Across all three models, the strategy generates an alpha of at least 0.35% and as high as 0.65% providing evidence that the yield gap provides information about the group of funds most likely to underperform.

As we did in our discussion of the yields in the previous section, we split the sample period using June 2001 as the breakpoint to examine whether the results are consistent across the two time periods. For ease of exposition, we report the results using the three factor model in Table 4, but we do note the same results hold for both the two and four factor model.[9] Panel A reports the alphas of each of the quintiles, and the alpha of the long short strategy involving a given quintile and the quintile 1 yield gap funds is reported in Panel B. We see that the same relationships hold across both periods, and the results are much stronger in the second time period. From September 1993 through June 2001, the quintile 1 yield gap funds under perform all other yield gap, distribution yield, and SEC yield quintiles with an alpha of -1.46%. The alpha of the long short strategy is positive for all quintiles, but the overall positive performance is small ranging from 8 to 29 basis points. For the September 2001 to September 2009 period, the performance of the quintile 1 yield gap funds is much poorer with an alpha of -1.81%. The

[9] We choose the three factor model since its reported alphas are between the alphas reported by the two and four factor models.

performance of the long short strategy is much greater with alphas ranging from 31 to 97 basis points and with 8 of the 14 alphas having statistical significance.

As an additional test, we conduct a double sort using the yield gap and each of the other yield variables to see if there is any additional information contained in the yields that may predict future performance. Each quarter, we sort funds into 25 groups based on their yield gap and distribution yield and then repeat using the yield gap and SEC yield. We then calculate the monthly return over the next three months for each of the groups and then estimate the alpha of the time series of returns generated by each group. In both cases, we find that the five groups that contain the quintile 1 yield gap funds underperform the remaining twenty groups, but there are no performance differences across the five quintile 1 yield gap groups.

Thus, our empirical evidence suggests that the yield gap contains information about the future performance of municipal bond funds that is not provided by the distribution and SEC yields separately. The tests that we conducted in this section explicitly controlled for the quality and maturity of the portfolio, but it is possible that there is something unique about the investment style of the quintile 1 yield gap funds that is driving our results. In addition, it is possible that specific fund characteristics are influencing the results. We specifically address these concerns in the next section as we examine the determinants of the yield gap.

4. Explaining the Yield Gap

The results in the previous section will be of greater interest if the information contained in the yield gap does not simply reflect specific fund investment styles or specific fund characteristics. In order to gain a better understanding of the yield gap, we run a panel regression of the yield gap on a variety of explanatory variables. We can classify our independent variables into three groups: 1) fund specific investment styles, 2) fund specific characteristics, and 3) bond market variables.

For the fund specific investment styles, we use Sharpe's (1992) quadratic programming technique to estimate each fund's average exposure to the returns of a set of municipal bond indices. Within the context of bond funds, Sharpe's methodology has been used by Blake, Elton, and Gruber (1993) to compare the actual styles of bond funds to their reported investment style while Boney, Comer, and Kelly (2009) used the technique to examine the maturity timing ability of high quality bond funds.

Our quadratic program takes the following form:

$$\min \ \{var\ [tr_i - (b_k tr_k + b_j tr_j)]\} \tag{5}$$

$$subject\ to$$

$$0 \ \leq b_k, b_j \leq 1$$

where tr_i represents the total return to fund *i* while tr_k and tr_j represent the total return to bond indices which reflect a specific investing style.

Each quarter for each fund observation, we obtain from CRSP the monthly fund returns covering the previous twelve months. We use this time frame, instead of the traditional 36 or 60 months used in Sharpe's methodology, because it corresponds to the time period used by Morningstar to calculate the fund's distribution yield. These returns are net of expenses, so we then add back to each monthly return 1/12 of the annual expense ratio in effect during the time frame to obtain the total return of the fund.

We measure investment style along the following three separate dimensions that we believe could potentially influence our yield variables: 1) average maturity, 2) average quality, and 3) average price. For each of these style dimensions, Barclays' Capital provides several total return municipal bond indices that meet the criteria of Sharpe's methodology in that the indices are mutually exclusive and the indices exhaust the universe of municipal bonds along the specific style dimension. To preserve sufficient degrees of freedom in the estimation process given that we are estimating the style loadings using only twelve observations, we combine the available indices into two mutually exclusive indices that reflect a specific partition of the style dimension.

For average maturity, tr_k represents the returns to a long maturity municipal bond fund index while tr_j represents a short maturity municipal index. The long maturity index is calculated as the weighted average of the total returns to the Barclays' 15 year, 20 year, and 22 year municipal bond indices where the weights used to calculate each of the indices are the total number of bonds outstanding. The short maturity index is calculated in a similar manner using the Barclays' 1 year, 5 year, and 10 year indices.

We create similar indices for the other two investment styles. For quality, the first index used is the returns to a high quality bond fund index which is calculated as the weighted average of the Barclays' AAA, AA, A, and BAA indices. The second index is the return to a low quality index where the Barclays' high yield index is used. For price, we use the Barclays' premium municipal bond index for bonds trading over par, and we calculate the weighted average of the current and discount municipal bond indices for bonds trading at or below par.[10]

For each fund each quarter, we solve Sharpe's quadratic program to obtain b_k and b_j for each of the three investment styles. Because we need twelve months of returns and index data previous to the date of the reported yield, our first set of Sharpe regressions is run beginning with the June 1994 sample. Traditionally, Sharpe's methodology restricts all coefficients to values

[10] We combine the current index with the discount index, instead of the premium index, as the average number of discount bonds available during our sample period is substantially smaller than the number of premium bond available. During several months of our period, discount bonds represent less than 10% of the total bonds outstanding.

between zero and one with the sum of the coefficients equaling one. The first constraint is appropriate as bond funds are not allowed to short securities. However, we do not incorporate the latter constraint as bond funds are allowed to pursue leveraged strategies. Table 5 provides an overview of the investment styles. As done in the previous tables, all values in the table are obtained by first averaging across all observations within the quarter and then calculating statistics across the time series of quarterly values. On average, funds have a greater exposure to long maturity (.577), high quality (.783), and premium bonds (.482). The results also indicate the wide variation in investment style across our sample. Each quarter and for each investment style, we sort funds into quintiles based on their exposure to a specific style and then calculate the average exposure of the funds in each quintile. The average difference between the exposures of the top and bottom quintiles for the styles range from .520 (low quality) to 1.17 (long maturity). Many funds in the bottom quintile of a given investment style have zero exposure to the style as evidenced by the extremely low overall averages ranging from .001 to .029 for all styles except for the high quality bonds.

To explain the yield gap, we use these estimates of investment style along with the fund specific characteristics discussed in the previous section as independent variables in a panel regression. Given the variation in economic conditions across the sample period, we also include four variables that capture overall conditions in the municipal bond fund market. For the Barclays' Municipal Bond Index, we obtain the average coupon, maturity, price, and yield to worst for all bonds that are included in the index. The values used in the regression represent the value at month's end and for each quarter are the same across all funds.

We estimate the regression for the yield gap where we cluster standard errors by fund. Table 6 reports the results of our main specification where each style variable is defined in ratio form as $b_k / b_k + b_j$. where b_k represents exposure to long maturity, low quality, and premium bonds respectively.[11] Our results indicate that fund investment style and fund characteristics are not able to explain much variation in the yield gap across our sample. The r-squared for the regression is only .051. None of the three style variables are statistically significant. Among the style characteristics, we find that turnover and cash have a statistically significant negative relationship with the yield gap while fund size and front load have positive and statistically significant relationships. However, expenses nor the amount of 12b-1 fees is able to explain significant variation in the yield gap.

For comparison, we examine the results of the same regression for both the distribution yield and the SEC yield which helps us to determine if our specification is reasonable. We find that our specification is able to explain the variation in the distribution and SEC yields. For the distribution yield, all three style variables are statistically significant at the one percent level. In addition, all fund characteristics are statistically significant with the exception being the deferred load variable. The r-squared of .618 indicates a strong model fit. Relative to the distribution yield, the results for the SEC yield are weaker, but still much stronger than those of the yield gap. The r-squared is .244, while all three style variables and several of the fund characteristic variables continue to be statistically significant.

The results from the panel regression indicate that the yield gap is capturing some aspect of fund performance that is not easily observed from fund investment styles or characteristics. We next narrow our focus to the quintile 1 yield gap funds to see if the quintile differs significantly in either investment style or fund characteristics which would suggest a reason for

[11] We use several variations of our main specification, but in the interest of space, we only report our main specification in the paper. Among the variations, we run the regression with time fixed effects rather than the bond market variables. There is a small increase in explanatory power with the specification, but no difference in the coefficient estimates or their statistical significance. We also tried various definitions of our style variables, both in absolute and ratio form. None of the variations had any impact on the statistical significance of the style variables.

the overall poorer performance of the quintile. For each of our fifteen quintiles, we take the time series of monthly returns first calculated in Table 3, add back $1/12^{th}$ of the average annual expense ratio of the funds in the quintile during each quarter, and estimate equation (5) for each of the three style dimensions.

We report these style exposures in Table 7. Across the three style dimensions, we find that the style exposures for the quintile 1 yield gap funds do not represent any extreme values for any specific style nor does the sum of the exposures for any style dimension reflect an extreme value. For the quality style dimension, the high quality loading of .663 ranks 12^{th} as the quintile 1 distribution yield funds (.657), quintile 0 distribution yield funds (.501), and quintile 0 SEC yield funds (.525) all have lower exposures. The low quality loading of .286 ranks third surpassed by the quintile 5 distribution yield funds and the quintile 5 SEC yield funds, and the sum of the two loadings (.949) ranks 6^{th} across the 15 quintiles.

The results are similar for the maturity dimension. The long maturity exposure of .785 ranks 3^{rd}, the short maturity exposure of .043 ranks 13^{th}, and the total maturity exposure of .828 also ranks 13^{th}. For the pricing dimension, the quintile 1 yield gap funds have no exposure to premium bonds which is matched by both the quintile 5 distribution yield funds and quintile 5 SEC yield funds. But both of the quintile 5 groups have much greater exposure to discount bonds (.916 and .928 vs .809) than the quintile 1 yield gap funds, and as demonstrated in the previous section, performed better than the yield gap funds.

We next examine the average fund characteristics of each quintile. For each quarter and each quintile, we average the value of each fund characteristic across all funds in the quintile. We then average the quarterly time series to come up with the mean value for each characteristic for each quintile. We rank each quintile from one to fifteen based on this mean value and we report the rankings in Table 8. Similar to the style results, we find that the quintile 1 yield gap funds do not have the maximum or minimum average value for any of the fund characteristics. Across the eight fund characteristics we examine (12b-1 fees, deferred load, front load, expense ratio, cash holdings, turnover ratio, age, and size), the quintile 1 yield gap funds rank between 2nd (front load) and 14th (turnover ratio). The same results hold when using the median instead of the mean of the characteristics.

Given that the quintile 1 yield gap funds underperformed all other quintiles yet the funds' investment styles and characteristics cannot be considered extreme relative to the other quintiles suggest that these two attributes are not the primary determinant of the relatively poorer performance. Similar to the return gap measure of Kacperczyk, Sialm, and Zheng (2008), a negative yield gap appears to capture unobserved actions of fund managers that tend to consistently generate poorer performance.

5. Fund Yields and Cash Flows

Our evidence thus far indicates that the yield gap is a reliable predictor of future fund returns as negative yield gap funds significantly underperform sorts based on the distribution and SEC yields. This result leads us to examine two final questions. First, is there evidence that muni fund investors use reported yields as a basis for their investment decisions?[12] If investors do rely on yields when making their investment decisions, are they aware of the poorer performance of negative yield gap funds when making their investment decisions?

[12] Zhao (2005) examines the determinants of flows into retail bond funds, but due to his use of the CRSP database, he is unable to analyze the impact of reported yields on cash flows.

To answer the first question, for each yield variable, we sort funds into quintiles each quarter based on their reported yield. Then for each fund in each quintile, we calculate the quarterly percentage cash flow to the fund as

$$pcf_{i,q} = \frac{tna_{i,q}}{tna_{i,q-1}} - \left(1 + r_{i,q}\right) \quad (6)$$

where *tna* represents fund total net assets, and $r_{i,q}$ represents the quarterly holding period return of the fund. Each quarter, we average the percentage cash flow across funds within each quintile and then average the time series of flows for each quintile. To ensure that our results are not distorted by extreme values generated by either extremely small funds or questionable net assets data, we eliminate all fund observations where the fund quarterly percentage cash flow is greater than 200%. This restriction eliminates 216 of our 22,919 observations which is less than one percent of our total sample.[13]

Results are reported in Table 9. The evidence indicates that funds reporting higher yields do on average receive greater cash flows on a percentage basis than other funds. For the distribution yield, the top quintile has an average yield of 5.44% and also has the highest inflows averaging 1.90%. Similarly, the funds with the highest SEC yield of 5.18% have the highest inflows of 1.99%. Using a matched pairs t-test, we find that the cash flows to the top quintile of distribution yield funds is significantly greater at the five percent level than the average cash flows to the remaining four quintiles. The same test for the top quintile SEC yield funds also indicates a statistically significant difference between that quintile and the remaining quintiles.

[13] The overwhelming majority of data points that were eliminated include funds for which CRSP listed total net assets as $0.01 million for the current quarter which in CRSP is a generic value used to represent small total net asset values. An example of a problematic data point that we eliminate based on concerns of the data available from CRSP, one fund in our sample generated a pcf of 3094% over the quarter covering June 2005 to September 2005, as total net assets jumped from $0.1 million to $310 million.

Given the influence that the distribution yield and SEC yield have on cash flows to funds, we want to test whether investors are aware that funds with negative yield gaps should be avoided. Each quarter, we take the group of funds ranked in the top quintile based on the distribution yield, and we partition this group into funds with a positive yield gap and a negative yield gap. We calculate the average percentage cash flows to the funds in each partition and then we average the cash flows to each partition across quarters. We repeat the same test using the SEC yield in place of the distribution yield. If investors are aware of the poorer performance of funds with negative yield gaps, we would expect that the cash flows to the high distribution (SEC) yield, positive yield gap funds would be significantly greater than those to the high distribution (SEC), negative yield gap funds.

Results are reported in Table 10. We find no evidence that investors understand the importance of our yield gap measure. For the distribution yield, we find that the average yield across the partitions is virtually identical (5.43% vs 5.44%), but the average cash flows to the negative yield gap partition are higher on average (2.68%) than those to the positive yield gap partition (2.00%). A more detailed look at the cash flows indicates that for 33 of the 61 months (54.1%) in our sample, the cash flows to the negative yield gap funds are greater.[14] The results are similar for the SEC yield. The average SEC yield for the negative yield gap partition is 4.80% which is 42 basis points less than the yield of 5.43% for the positive yield gap partition. However, the percentage cash flows to each partition are virtually identical as the negative yield gap partition generates an average flow of 2.51% compared to 2.57% for the positive yield gap partition.

[14] Four quarters of our sample period (September 1993, March 1994, June 1999, and December 1999) are excluded from this analysis as there are no funds in the top distribution yield quintile that have negative yield gaps.

This final result combined with our earlier evidence on the poorer performance of the negative yield gap funds presented in Table 4, indicate that investors clearly could earn better risk adjusted returns by using the yield gap as an additional piece of information when making their choices among municipal bond funds.

6. Conclusion

Although bond funds report their distribution and SEC yields in their marketing materials, no academic study has examined the usefulness or the influence of these yield measures. Our study analyzes the yields reported by national municipal bond funds. We focus on this specific category of bond funds since the income paid out by the fund is exempt from taxes at the federal level and may also be tax free at the state level. As a result of this feature, investors in muni bond funds are most likely to focus on yield information provided by the funds in making their investing decisions.

We examine the yields of national municipal bond funds reported quarterly by Morningstar from September 1993 through September 2009. Given that substantial differences often exist between the distribution and SEC yields, we also analyze the difference between the two yields which we refer to as the yield gap. The focus of our study is whether any of the three yield variables provide any information about future risk adjusted returns.

Each quarter, we sort funds into quintiles based on the yields and then examine the performance of each quintile over the next three months. Using muni bond specific factor models, we find that the distribution and SEC yields provide no information concerning the future risk adjusted performance of the funds as there is no statistically significant difference between the alphas of the yield quintiles. However, we do find that managers who consistently engage in strategies that result in a negative yield gap have significantly lower risk adjusted performance. Depending on the model used, funds in the bottom quintile of the yield gap sort generate annualized alphas that are 35 to 65 basis points worse than the alphas of the other yield sorts, and in all but a few cases, this underperformance is statistically significant.

Given that the yield gap serves as a reliable predictor of poor future fund performance, we examine whether investors understand the value of using the yield gap measure in their investment decisions. Our evidence indicates that investors focus more on the distribution and SEC yields. Controlling for the distribution yield, we find no difference in the cash flows across the groups indicating that investors clearly do not understand the predictive power of the yield gap variable, and are not maximizing the risk adjusted returns that they could be receiving on their investments.

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Table 1
Summary Statistics of Muni Fund Characteristics

The table presents summary statistics for the sample of national municipal bond funds. The sample period covers all quarters from September 1993 to September 2009. All values reported in the table are obtained by first averaging across all observations covering a specific quarter and then averaging across the time series of quarterly values. All data is based on information reported by Morningstar through their Principia Pro Mutual Fund CDs.

	Mean	**Median**	**Standard Deviation**	**Minimum (Quarter)**	**Maximum (Quarter)**
Number of observations	353	334	111.86	106 (Dec 1993)	585 (Sep 2004)
Front load	1.23%	1.19%	0.27%	0.89% (Jun 2009)	2.20% (Sep 1993)
12b-1 fee	0.37%	0.39%	0.06%	0.15% (Dec 1993)	0.44% (Jun 2000)
Expense ratio	0.99%	1.01%	0.09%	0.68% (Dec 1993)	1.09% (Sep 2000)
Size (in millions)	$360.57	$321.91	$109.89	$205.27 (Dec 2000)	$631.88 (Sep 1993)
Age (in months)	110.41	108.93	25.76	68.83 (Mar 1996)	160.91 (Sep 2009)
Cash holdings	3.08%	3.16%	1.07%	0.99% (Sep 1999)	5.05% (Dec 1994)

Table 2
Distribution of Muni Bond Fund Yields

The table presents descriptive statistics for the distribution yield, SEC yield, and the difference between the two yields which we refer to as the yield gap. All reported yields are based on information reported by Morningstar. Panel A reports data for our entire sample period (September 1993 to September 2009) while Panel B and C report results for the first and second half of the sample period. The reported mean, median, and standard deviation are calculated by first averaging all observations for a given quarter and then averaging across the time series of quarterly values. The 20th and 80th quintiles values are also calculated by averaging the time series of quarterly quintile values.

Panel A: Entire Sample Period			
	Distribution Yield	**SEC Yield**	**Yield Gap**
Mean	4.21%	3.69%	0.53%
Median	4.23%	3.80%	0.38%
Standard Deviation	0.98%	1.37%	1.15%
Avg 20th quintile	3.21%	2.13%	-0.41%
Avg 80th quintile	5.44%	5.18%	1.85%
Panel B: September 1993 to June 2001			
	Distribution Yield	**SEC Yield**	**Yield Gap**
Mean	4.71%	4.07%	0.64%
Median	4.67%	4.26%	0.38%
Standard Deviation	0.73%	1.42%	1.33%
Avg 20th quintile	3.82%	2.38%	-0.30%
Avg 80th quintile	4.99%	5.38%	2.26%
Panel C: September 2001 to September 2009			
	Distribution Yield	**SEC Yield**	**Yield Gap**
Mean	3.85%	3.41%	0.44%
Median	3.84%	3.40%	0.39%
Standard Deviation	0.97%	1.26%	1.00%
Avg 20th quintile	2.65%	1.91%	-0.52%
Avg 80th quintile	5.17%	4.99%	1.47%

Table 3a
Alphas of Quintiles Based on the Yield Variables

The table reports the alpha generated by quintiles of mutual funds sorted according to the distribution yield, SEC yield, and yield gap. For each quarter and each yield variable, we sort funds into quintiles. For each fund, we obtain its monthly returns for the next three months. We then equal weight the returns each month for the group of funds within each quintile. The procedure is repeated each quarter. For each of the quintiles for each variable, we regress the time series of returns against our three performance models and report the alpha for each model. The two factor model includes a term and default factor and is based on the Fama French (1993) model. The three factor model adds a bond market factor to the two factor model. The four factor model is based on Blake, Elton, and Gruber (1993) and includes an intermediate muni bond index, a long muni index, a high quality muni index, and a low quality muni index. All alphas in the table have been annualized. The statistical significance of the alphas is based on heteroskedasticity consistent standard errors. ***, **, and * denote statistical significance at the one, five, and ten percent level of significance respectively.

Two Factor Model			
Quintile	**Distribution Yield**	**SEC Yield**	**Yield Gap**
5	-1.08%***	-1.19%***	-1.13%***
4	-1.03%***	-1.03%***	-0.98%***
3	-1.02%***	-1.06%***	-0.95%***
2	-1.16%***	-1.08%***	-0.91%***
1	-1.19%***	-1.14%***	-1.54%***
Three Factor Model			
Quintile	**Distribution Yield**	**SEC Yield**	**Yield Gap**
5	-1.18%***	-1.27%***	-1.22%***
4	-1.13%***	-1.13%***	-1.09%***
3	-1.13%***	-1.18%***	-1.06%***
2	-1.27%***	-1.20%***	-1.02%***
1	-1.30%***	-1.24%***	-1.64%***
Four Factor Model			
Quintile	**Distribution Yield**	**SEC Yield**	**Yield Gap**
5	-1.22%***	-1.30%***	-1.24%***
4	-1.10%***	-1.10%***	-1.10%***
3	-1.13%***	-1.20%***	-1.07%***
2	-1.32%***	-1.24%***	-1.03%***
1	-1.32%***	-1.27%***	-1.67%***

Table 3b
Alphas of Difference in Returns Between Various Yield Quintiles and Quintile 1 Yield Gap Funds

The table reports the alphas generated by a strategy of being long a specific quintile and short the quintile 1 yield gap funds. For each quarter and each yield variable, we sort funds into quintiles. For each fund, we obtain its monthly returns for the next three months. We then equal weight the returns each month for the group of funds within each quintile. The procedure is repeated each quarter. We then subtract the return of the quintile 1 yield gap funds from the returns of each quintile. We then regress this time series of returns against our three performance models and report the alpha for each model. The two factor model includes a term and default factor and is based on the Fama French (1993) model. The three factor model adds a bond market factor to the two factor model. The four factor model is based on Blake, Elton, and Gruber (1993) and includes an intermediate muni bond index, a long muni index, a high quality muni index, and a low quality muni index. All alphas in the table have been annualized. The statistical significance of the alphas is based on heteroskedasticity consistent standard errors. ***, **, and * denote statistical significance at the one, five, and ten percent level of significance respectively.

Two Factor Model			
Quintile	**Distribution Yield**	**SEC Yield**	**Yield Gap**
5	0.46%**	0.35%*	0.41%*
4	0.50%**	0.50%**	0.55%**
3	0.52%*	0.47%*	0.59%**
2	0.37%	0.46%*	0.62%**
1	0.35%*	0.40%	na
Three Factor Model			
Quintile	**Distribution Yield**	**SEC Yield**	**Yield Gap**
5	0.47%**	0.36%*	0.41%*
4	0.51%**	0.50%**	0.54%**
3	0.51%*	0.47%*	0.58%**
2	0.36%	0.43%*	0.61%**
1	0.35%*	0.40%	na
Four Factor Model			
Quintile	**Distribution Yield**	**SEC Yield**	**Yield Gap**
5	0.44%**	0.38%**	0.43%*
4	0.56%**	0.58%**	0.58%**
3	0.55%*	0.47%*	0.60%**
2	0.35%	0.43%*	0.65%**
1	0.35%*	0.41%	na

Table 4
Yield Quintile Alphas for the Subperiods of the Sample

The table reports the alpha generated by quintiles of mutual funds sorted according to the distribution yield, SEC yield, and yield gap for two subperiods of our sample: September 1993 to June 2001 and September 2001 to September 2009. For each quarter and each yield variable, we sort funds into quintiles. For each fund, we obtain its monthly returns for the next three months. We then equal weight the returns each month for the group of funds within each quintile. The procedure is repeated each quarter. For each of the quintiles for each variable, we regress the time series of returns against our three factor performance model and report the alpha. We also report the alpha generated by a strategy of being long a specific quintile and short the quintile 1 yield gap funds. All alphas in the table have been annualized. The statistical significance of the alphas is based on heteroskedasticity consistent standard errors. ***, **, and * denote statistical significance at the one, five, and ten percent level of significance respectively.

Three Factor Model: Sep 1993 to Jun 2001							
Alpha of Quintiles				**Alpha of Quintile vs Quintile 1 of Yield Gap**			
Quintile	**DY**	**SEC**	**YG**	**Quintile**	**DY**	**SEC**	**YG**
5	-1.28%**	-1.18%**	-1.27%**	5	0.17%	0.29%	0.19%
4	-1.27%**	-1.31%**	-1.33%**	4	0.19%	0.16%	0.13%
3	-1.22%**	-1.20%**	-1.20%**	3	0.24%	0.25%	0.25%
2	-1.32%**	-1.38%**	-1.22%**	2	0.14%	0.08%	0.24%
1	-1.38%**	-1.37%**	-1.46%**	1	0.08%	0.08%	na
Three Factor Model: Sep 2001 to Sep 2009							
Alpha of Quintiles				**Alpha of Quintile vs Quintile 1 of Yield Gap**			
Quintile	**DY**	**SEC**	**YG**	**Quintile**	**DY**	**SEC**	**YG**
5	-1.20%**	-1.49%**	-1.30%**	5	0.60%**	0.31%	0.50%
4	-1.12%**	-1.03%**	-1.02%**	4	0.68%**	0.78%**	0.78%*
3	-1.15%**	-1.22%**	-1.07%**	3	0.66%*	0.58%	0.74%**
2	-1.27%**	-1.07%**	-0.84%**	2	0.53%	0.74%*	0.97%**
1	-1.25%**	-1.22%**	-1.81%***	1	0.55%	0.59%	na

Table 5
Investment Styles of Muni Bond Funds

The table presents results from the Sharpe (1992) quadratic programming technique that is used to estimate the average exposure that the funds in the sample have to various investment styles. The results cover June 1994 to September 2009. Each quarter for each fund, we regress the previous 12 months of total fund returns against a maturity style model, a quality style model, and a price style model. The maturity model includes the average returns to long maturity and short maturity bonds. The quality model includes the average return to high quality and low quality bonds. The price model includes the average returns to premium and discount bonds. The regression coefficients are constrained to be between zero and one. The reported mean, median, and standard deviation are calculated by first averaging all observations for all funds in a given quarter and then averaging across the time series of quarterly values. The 20^{th} and 80^{th} quintiles values are also calculated by averaging the time series of quarterly quintile values.

	Maturity		**Quality**		**Price**	
	Long	**Short**	**High**	**Low**	**Premium**	**Discount**
Mean	0.577	0.403	0.782	0.153	0.483	0.446
Median	0.592	0.380	0.840	0.063	0.488	0.365
Standard Deviation	0.416	0.339	0.316	0.219	0.383	0.417
Minimum	0	0	0	0	0	0
Maximum	2.802	2.381	3.062	1.814	3.460	2.848
20^{th} percentile	0.027	0.021	0.292	0.001	0.025	0.029
80^{th} percentile	1.194	0.884	1.132	0.521	0.950	1.032

Table 6
Panel Regression of the Yield Variables

The table reports the coefficients of the panel regression of each of the three yield variables on fund specific characteristics, fund specific investment styles, and municipal bond market variables. The investment style variables (ratio long maturity, low quality, and premium) are based on the coefficients from the Sharpe regressions reported earlier. The municipal bond market variables are based on average values for all bonds in the Barclays' municipal bond index and the values used in the regression represent the value at quarter's end and are the same across all funds. The regressions are performed at a quarterly frequency and cover the period June 1994 to September 2009.Standard errors are clustered by fund.***, **, and * denote statistical significance at the one, five, and ten percent level of significance respectively.

	Yield Gap	**Distribution Yield**	**SEC Yield**
Intercept	3.252***	1.397***	-1.855**
Turnover/100	-0.126***	-0.159***	-0.034
Front load	0.055***	0.040***	-0.015
Deferred load	-0.013	0.012	0.025
12b-1 fees	0.064	-0.387***	-0.451***
Expense/100	0.118	-0.216***	-0.335***
Log of total net assets	0.047***	0.078***	0.031**
Age in months	0.000*	0.000*	0.000
Cash holdings	-0.018***	-0.048***	-0.030***
Ratio long maturity	-0.048	0.609***	0.657***
Ratio low quality	-0.016	1.063***	1.079***
Ratio premium	-0.046	-0.184***	-0.137***
Index average coupon	2.326***	1.784***	-0.542***
Index average maturity	-0.576***	0.068***	0.644***
Index average price	-0.043***	-0.067***	-0.024***
Index average yield to worst	-0.713***	-0.244***	0.469***
R-square	.051	.618	.244

Table 7
Investment Styles of Bond Fund Quintiles

The table presents results from the Sharpe (1992) quadratic programming technique that is used to estimate the average exposure that each yield variable quintile has to various investment styles. The results cover September 1993 to September 2009. For each quarter and each yield variable, we sort funds into quintiles. For each fund, we obtain its monthly returns for the next three months. We then equal weight the returns each moth for the group of funds within each quintile. The procedure is repeated each quarter. For each of the quintiles for each variable, we regress the time series of returns against a maturity style model, a quality style model, and a price style model. The maturity model includes the average returns to long maturity and short maturity bonds. The quality model includes the average return to high quality and low quality bonds. The price model includes the average returns to premium and discount bonds. The regression coefficients of each of the style models are constrained to be between zero and one.

		Maturity		**Quality**		**Price**	
Yield	**Quintile**	**Long**	**Short**	**High**	**Low**	**Premium**	**Discount**
DY	5	0.501	0.580	0.927	0.000	0.000	0.916
	4	0.821	0.197	0.730	0.235	0.057	0.821
	3	0.874	0.085	0.532	0.481	0.344	0.571
	2	0.825	0.015	0.358	0.604	0.497	0.365
	1	0.657	0.000	0.189	0.616	0.523	0.184
SY	5	0.525	0.567	0.937	0.000	0.000	0.928
	4	0.819	0.198	0.724	0.243	0.051	0.827
	3	0.832	0.100	0.521	0.462	0.321	0.565
	2	0.810	0.024	0.344	0.618	0.518	0.343
	1	0.678	0.000	0.213	0.608	0.551	0.182
YG	5	0.761	0.104	0.477	0.434	0.300	0.519
	4	0.795	0.124	0.554	0.389	0.279	0.582
	3	0.732	0.177	0.569	0.342	0.213	0.614
	2	0.737	0.173	0.584	0.320	0.155	0.659
	1	0.663	0.286	0.785	0.043	0.000	0.809

Table 8
Rank of Mean of Fund Characteristics for the Bond Fund Quintiles

The table reports the rank of the value of various fund characteristics across each of the quintiles for the three yield variables. A rank of 1 indicates that the quintile has the highest value while 15 indicates the fund has the lowest value. For each quarter and each quintile, we average the value of each fund characteristic across all funds in the quintile. We then average the quarterly time series to come up with the mean value for each characteristic for each quintile which is used as the basis for the ranking.

	12b-1	**Load**	**Expense**	**Cash**	**Turnover**	**Age**	**Size**
DY quint 5	15	1	13	15	15	1	1
DY quint 4	12	3	12	13	11	2	3
DY quint 3	10	8	11	11	9	9	10
DY quint 2	3	12	4	5	6	12	12
DY quint 1	2	15	2	1	1	15	15
SY quint 5	14	4	15	14	12	4	2
SY quint 4	13	7	14	12	8	3	4
SY quint 3	11	6	10	8	7	7	8
SY quint 2	4	10	3	4	5	11	13
SY quint 1	1	13	1	2	4	14	14
YG quint 5	9	2	5	10	14	5	6
YG quint 4	6	5	8	9	13	6	5
YG quint 3	7	9	9	7	10	8	7
YG quint 2	5	11	6	6	3	10	9
YG quint 1	8	14	7	3	2	13	11

Table 9
Relationship Between Yield Quintiles and Subsequent Cash Flows

The table reports the relationship between the yield quintiles and subsequent cash flows into the funds. For each yield variable, we sort funds each quarter into quintiles based on the yield. We then calculate the percentage cash flow to the fund over the subsequent quarter where the flow is defined as the percentage change in fund total net assets adjusted for the appreciation in assets. For both the average yield and percentage cash flow, we average the time series of yields and flows for each quintile and report this average value in the table.

Quintile	**DY**	**Pcf**	**SY**	**Pcf**	**YG**	**Pcf**
1	3.21	0.013	2.14	0.010	-0.41	0.009
2	3.88	0.004	3.44	0.008	0.13	0.007
3	4.28	0.009	3.88	0.004	0.37	0.012
4	4.70	0.006	4.31	0.009	0.64	0.017
5	5.44	0.019	5.18	0.020	1.84	0.006

Table 10
Cash Flows to Top Quintile Distribution and SEC Yield Funds Partitioned by the Yield Gap

The table reports the cash flows to top quintile distribution yield funds partitioned by the yield gap. Each quarter, we separate the top quintile distribution yield funds into two groups: 1) those with a positive yield gap and 2) those with a negative yield gap. Then each quarter, we calculate the percentage cash flow to each group over the subsequent quarter. For all the reported variables in the table, we average the quarterly time series of the variables and report this average value in the table.

Cash flows to top quintile distribution yield funds				
	No. of observations	**Distribution yield**	**Yield gap**	**Percentage cash flow**
Group 1	58.8	5.43	0.99	0.020
Group 2	11.0	5.44	-0.39	0.027
Cash flows to top quintile SEC yield funds				
	No. of observations	**SEC yield**	**Yield gap**	**Percentage cash flow**
Group 1	42.9	5.43	0.40	0.026
Group 2	26.9	4.80	-0.58	0.025