

# Internet Appendix

## For “Measuring Mutual Fund Performance with Active Peer Benchmarks”

### 1. Additional results for U.S. equity funds

In this section, we weight each fund in a given out-of-sample portfolio (formed as in the paper’s description for Table 6), at the beginning of the out-of-sample year, by the difference in its alpha t-statistic between the APB-augmented four-factor model and the standard four-factor model to further magnify the differential ability of these models to find skilled managers. In Table 6 of the paper, we equal-weighted these same portfolios. This t-statistic difference weighted approach corresponds to an investor who places complete trust in the difference between the two models as being an indicator of true skill (this is motivated by the information-ratio assessment approach promulgated by Treynor and Black, 1973).

Table IA.1 presents results for this exercise. Similar to the Table 6 results, we again find positive (and statistically significant) persistent alphas for 1st quartile funds among four of nine peer groups when judging with the APB-augmented model (Panel A), and three of nine groups when judging with the APB-adjusted alpha model (Panel B). Especially noteworthy is that 1st quartile funds within the Russell 1000 category continue to exhibit persistence with either approach—that is, largecap fund managers with skills may be better identified with the APB-augmented model, relative to the four-factor model. The superior identification of skilled managers using the APB model is not limited to smallcap or midcap managers.

### 2. Results for U.S.-domiciled domestic bond funds

#### 2.1. Baseline model

Our reference model for bond funds is based on the Blake, Elton, and Gruber (1993) six factor model, plus an added equity factor,  $rmrf$ ,

$$\begin{aligned} r_{i,t} = & \alpha_i + \beta_{i,ig}r_{ig,t} + \beta_{i,lg}r_{lg,t} + \beta_{i,ic}r_{ic,t} + \beta_{i,lc}r_{lc,t} + \beta_{i,mbs}r_{mbs,t} \\ & + \beta_{i,hy}r_{hy,t} + \beta_{i,rmrf}r_{rmrf,t} + \epsilon_{i,t} , \end{aligned} \tag{1}$$

where  $r_{i,t}$  equals the monthly fund NAV return plus 1/12 of its annual expense ratio, and the factors capture bond index total returns (in excess of T-bills) for the (1) Intermediate Sub-Index of the Barclays Capital U.S. Government Bond Index (formerly Lehman Brothers U.S. Government Bond Index) ( $ig$ ), (2) Long Sub-Index of the Barclays Capital U.S. Government Bond Index ( $lg$ ), (3) Intermediate Sub-Index of the Barclays

Capital U.S. Corporate Bond Index (formerly Lehman Brothers U.S. Corporate Bond Index) (*ic*), (4) Long Sub-Index of the Barclays Capital U.S. Corporate Bond Index (*lc*), (5) Barclays Capital U.S. Mortgage Backed Security (MBS) Index (formerly Lehman Brothers U.S. MBS Index) (*mbs*), (6) Barclays Capital U.S. Corporate High-Yield Bond Index (formerly Lehman Brothers U.S. Corporate High-Yield Bond Index) (*hy*), and (7) the CRSP value-weighted NYSE/AMEX/Nasdaq portfolio (*rmrf*). We add *rmrf*, since some papers suggest that a stock market factor is important for explaining bond returns in some sectors (e.g., Fama and French, 1993, and Cornell and Green, 1991).

We apply our active peer-group benchmarking technique to U.S. bond mutual funds over the 1984 to 2007 period. Since reliable holdings data are generally unavailable for bond funds or for bond indexes over long time-periods, we use asset allocation data from the CRSP Mutual Fund Database to assign funds to categories. We require that a fund invests 70% or more of its assets in that asset category (on average over time) to belong to a given category. In our initial tests, we run this regression every three years, including only funds with at least 30 months of NAV returns and expense ratios during this period.

We examine six categories of bond funds:

- Government: Intermediate and Long-Term
- Corporate: Intermediate and Long-Term
- Municipal: Intermediate and Long-Term

A fund must have a weighted-average maturity of 1 to 7 years to be classified as intermediate term; otherwise, we classify it as long-term. Table IA.2 shows the categories and census within each category over each year within our sample period.

## 2.2. APB-augmented model

Our alternative specification uses the residual of the APB return from the seven-factor model of Equation (1), where  $r_{APB_i,t}$ , the average gross excess return (average NAV return minus T-bills, plus 1/12 of the yearly expense ratio) of the active peer-group of funds to which fund  $i$  belongs, is regressed on the seven factors, and  $\epsilon_{APB_i,t}$  is the regression residual for that APB. Following this first-stage regression, analogous to our models for the equity funds in the paper, we apply the following second-stage model to each individual mutual fund's gross excess monthly return within group  $APB_i$ :

$$r_{i,t} = \alpha_i + \beta_{i,ig}r_{ig,t} + \beta_{i,lg}r_{lg,t} + \beta_{i,ic}r_{ic,t} + \beta_{i,lc}r_{lc,t} + \beta_{i,mbs}r_{mbs,t} + \beta_{i,hy}r_{hy,t} + \beta_{i,rmrf}r_{rmrf,t} + \lambda_i\epsilon_{APB_i,t} + \epsilon_{i,t} . \quad (2)$$

We also apply an “APB-adjusted alpha” version of this augmented model,

$$\begin{aligned}
 r_{i,t} = & \alpha_i + \beta_{i,ig}r_{ig,t} + \beta_{i,lg}r_{lg,t} + \beta_{i,ic}r_{ic,t} + \beta_{i,lc}r_{lc,t} + \beta_{i,mbs}r_{mbs,t} \\
 & + \beta_{i,hy}r_{hy,t} + \beta_{i,rmrf}r_{rmrf,t} + \lambda_i(\alpha_{APB_i} + \epsilon_{APB_i,t}) + \epsilon_{i,t} .
 \end{aligned} \tag{3}$$

Finally, we present a simplified model based only on the APB:

$$r_{i,t} = \alpha_i^{APB} + \lambda_i^{APB}r_{APB_i,t} + \epsilon_{i,t}. \tag{4}$$

### 2.3. Empirical results

#### 2.3.1. ABP Groups

Table IA.3 presents the estimates of  $\alpha$  for each APB group (equal-weighted), over each three-year period, using the baseline seven-factor model of Equation (1). While the estimates are occasionally large relative to the fixed income fund expected returns, most are not significant. Yet, we still observe the same pattern of period-related sign of the  $\alpha$ 's across various groups, as we did with equity fund groups, which, again, indicates commonality of residuals.

Table IA.4 presents estimates of the cross-group residual correlations between each pair of the six fixed-income category APBs. There are several high correlations between APB seven-factor residuals. Perhaps unsurprisingly, Intermediate-Term and Long-Term Corporate, Intermediate-Term and Long-Term Government, and Intermediate-Term and Long-Term Muni funds are each highly correlated pairs of APBs. Funds within these groups hold securities with common idiosyncratic shocks, and may even have overlapping holdings (e.g., some Long-Term Corporate funds may hold a non-trivial allocation to intermediate-term corporate bonds). Even some across-sector APBs have significant positive correlations, such as Long-Term Corporate and Long-Term Government, indicating common shocks not spanned by the seven-factor model of Equation (1). In general, these correlations indicate that the seven-factor model does not capture all of the commonalities in bond fund return residuals, although the magnitude of correlations is smaller than between equity fund APB groups shown in Panel A of Table 2 of the main paper. Similarly, fewer fixed income APB residuals exhibit significant correlations over the entire sample period, but those that do are very large.

#### 2.3.2. Individual U.S. bond funds

Next, we turn to evaluating the correlation of model residuals at the individual fund level. Table IA.5 presents the percentage of positive and significant (at the 5% confidence level) pairwise correlations between

the individual fund residuals from the seven-factor regression (Equation 1) out of all possible pairwise correlations in the group (see rows labeled 7-Factor). The average proportion of significant correlations is 61%, and a very high 85% for LT Muni funds. Clearly, some fund categories fit the standard 7-factor model much better than others, but all exhibit substantial residual correlations between individual funds, indicating common loadings on idiosyncratic risks.

To illustrate the impact of our APB-augmented approach, we present the same correlations using Equation (2). Table IA.5 shows that the proportion of significant residual correlations drops (from 61%) to 23%; all groups show substantial reductions in the percentage of significant pairwise residual correlations (see rows labeled “APB-Augmented 7-Factor”). This clearly indicates that including the group return captures much of the common variation in the individual bond fund returns.

### *2.3.3. Performance estimation*

Table IA.6 presents statistics on the significance of model estimates of various parameters, using the seven-factor model (Equation (1)), the APB-augmented seven-factor model and its alpha-corrected counterpart (Equations (2) and (3), respectively), and the APB-only model (Equation (4)). Here, we find that, while the results for the Corporate and the Government Groups are well-explained by the seven factors, as shown by their high model R-squareds, the model alpha is still positive and significant in a large proportion of funds (e.g., 18.5% of Intermediate Corporate funds). Note that the APB-augmented model results in a slight increase in R-squared among Corporate and Government funds, compared to the baseline 7-Factor model, but results in a fairly large increase in the proportion of significant positive or negative alpha funds. The alpha-correction version of the APB model reduces the percentage with significant alphas, but these remain much more numerous than the 5% (two-tailed) that we would expect by random chance. Also noteworthy, and consistent with the aforementioned power of the APB-augmented model, the loadings on the APB factor in that model (see column labeled “APB (%)” are statistically significant for a large fraction of Corporate and Government funds.

Even more dramatic are results within the two Muni fund groups, whose returns are not well explained by the standard factors. Here, the group return alone yields a much higher explanatory power than the seven factors, according to a comparison of their relative R-squareds. Note that, within these muni groups, the APB-augmented model identifies much higher numbers of funds with negative- or positive-and-significant alphas—an increase in the power of identifying underperforming and outperforming funds, due to the reduction in common noise.

#### *2.3.4. Out-of-sample performance*

Analogous to the Table 6 stock fund results in the paper, we test for persistence in bond fund performance by ranking bond funds on the difference between their alpha t-statistics from the APB-augmented 7-factor model (Equation (2)) and their corresponding values using the non-augmented 7-factor model of Equation (1), both applied to monthly excess returns, gross of expenses. As with equity funds, we run this regression on overlapping three year periods, including only funds with at least 30 months of NAV returns and expense ratios during each three-year period. Funds are reassigned to APB groups, based on our above sector-based classification of funds at the beginning of each overlapping three-year period.

We estimate 12-month out-of-sample performance using the APB-augmented 7-factor model and the APB-adjusted alpha version of the APB-augmented 7-factor model (computed using Equation (3)). The ranking and out-of-sample performance evaluation is repeated at the end of each month, and overlapping-observation adjusted t-statistics for the resulting time-series average alpha are computed.

Table IA.7 shows that, similar to the results we found in the paper for stock funds, we find stronger evidence of persistence when we use the APB-augmented 7-factor model to rank funds (vs. the baseline 7-factor model), although levels of improvement in performance are more muted than they were for equity funds. Specifically, Long-Term Corporate bond funds exhibit the highest following-year alpha difference between (prior 36 month) 1st- and 4th-ranked quartiles, at 20 bps/month (consistent with manager skills being most apparent in the bond sector with the most heterogeneity). And, Intermediate Government funds exhibit a following-year alpha difference of 6 bps/month. The other four bond fund categories exhibit insignificant differences between 1st- and 4th-quartiles. Further, we find that significant alphas remain in these two categories, although smaller, when we measure out-of-sample performance with the APB-adjusted alpha version of the 7-factor model. Thus, as with equity funds, a portion (but not all) of skills of bond fund managers are common among top-quartile managers.

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- Cornell, B., Green, K., 1991. The investment performance of low-grade bond funds. *Journal of Finance* 46 (1), 29–48.
- Fama, E. F., French, K. R., 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33, 3–56.
- Treynor, J. L., Black, F., 1973. How to use security analysis to improve portfolio selection. *Journal of Business* 46 (1), 66–86.

**Table IA.1: Out of Sample Investment Performance as a Function of In Sample Alpha T-Stat Differences: T-Stat Difference Weighted Portfolios**

This table presents the out-of-sample average monthly  $\alpha$  estimates from portfolios of mutual funds, ranked into quartiles and weighted by the difference in statistical significance between in-sample  $\alpha$  estimates of the Active Peer Benchmark Model and the common 4 factor model. The differenced t-statistics were estimated monthly from 1980 through 2010 using 36 month regression windows, and normalized to sum to 1 (or -1 if negative) within each quartile. The Active Peer Benchmark is equally weighted across the mutual funds it contains. Every month, funds were then sorted into quartiles by their  $\alpha$  t-statistic difference. The table presents average out-of-sample performance over the subsequent 12 months as well as time-series t-statistics of alphas over all (overlapping) 12-month periods. T-statistics were adjusted to allow for overlapping data. Panel A presents 12 month performance results when regressed on the Active Peer Benchmark model. Panel B presents results for the same portfolios, but out-of-sample performance is regressed using the APB-adjusted alpha model. Numbers in bold are statistically significant at a 90% confidence level, those bold with one asterisk (\*) are significant at the 95% level and those bold with two asterisks (\*\*) are significant at the 99% level. T-statistics are shown in parenthesis.

| Panel A: Quartile Portfolios are Alpha T-Stat Difference Weighted, and Regressed On the APB Model |                           |                           |                         |                           |                          |                           |                          |                         |                           |                         |                           |
|---|---------------------------|---------------------------|-------------------------|---------------------------|--------------------------|---------------------------|--------------------------|-------------------------|---------------------------|-------------------------|---------------------------|
|   | Russell 1000              | Russell 1000              | Russell 1000            | Russell 1000              | Russell Midcap           | Russell Midcap            | Russell 2000             | Russell 2000            | Russell 2000              | Russell 2000            | Russell 2000              |
|   | Growth                    | Value                     | Midcap                  | Growth                    | Value                    | Midcap                    | Growth                   | Value                   | Midcap                    | Growth                  | Value                     |
| 1st - 4th Quartile  | <b>0.07%**</b><br>(2.681) | <b>0.13%**</b><br>(2.692) | <b>0.07%</b><br>(1.722) | <b>0.22%*</b><br>(2.384)  | <b>0.13%*</b><br>(2.155) | <b>0.05%</b><br>(0.786)   | <b>0.14%*</b><br>(2.225) | <b>0.11%</b><br>(1.584) | <b>0.12%**</b><br>(2.927) | <b>0.11%</b><br>(1.584) | <b>0.12%**</b><br>(2.927) |
| 1st Quartile  | <b>0.08%*</b><br>(2.051)  | <b>0.16%*</b><br>(2.384)  | 0.07%<br>(1.142)        | <b>0.28%**</b><br>(3.673) | <b>0.11%</b><br>(0.762)  | <b>0.27%**</b><br>(3.159) | 0.02%<br>(0.283)         | 0.04%<br>(0.230)        | <b>0.27%**</b><br>(3.159) | 0.02%<br>(0.283)        | 0.11%<br>(1.259)          |
| 2nd Quartile  | 0.04%<br>(1.276)          | <b>0.10%*</b><br>(2.109)  | 0.04%<br>(0.658)        | <b>0.21%**</b><br>(5.531) | 0.06%<br>(0.504)         | <b>0.20%**</b><br>(5.618) | -0.02%<br>(-0.307)       | 0.01%<br>(0.069)        | <b>0.20%**</b><br>(5.618) | -0.02%<br>(-0.307)      | 0.06%<br>(0.735)          |
| 3rd Quartile  | 0.02%<br>(0.820)          | <b>0.09%*</b><br>(2.262)  | 0.03%<br>(0.538)        | <b>0.11%*</b><br>(2.411)  | 0.07%<br>(0.561)         | <b>0.13%</b><br>(1.676)   | -0.05%<br>(-0.837)       | 0.00%<br>(0.019)        | <b>0.13%</b><br>(1.676)   | -0.05%<br>(-0.837)      | 0.07%<br>(0.850)          |
| 4th Quartile  | 0.01%<br>(0.310)          | 0.03%<br>(0.482)          | 0.00%<br>(-0.034)       | <b>0.06%*</b><br>(2.118)  | -0.02%<br>(-0.166)       | <b>0.22%*</b><br>(2.540)  | -0.12%<br>(-1.285)       | -0.08%<br>(-0.489)      | <b>0.22%*</b><br>(2.540)  | -0.12%<br>(-1.285)      | -0.02%<br>(-0.182)        |

  

| Panel B: Quartile Portfolios are Alpha T-stat Difference Weighted, and Regressed On the Alpha Adjustment APB Factor Model |                             |                             |                           |                             |                            |                           |                             |                             |                             |                             |                             |
|---|-----------------------------|-----------------------------|---------------------------|-----------------------------|----------------------------|---------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
|   | Russell 1000                | Russell 1000                | Russell 1000              | Russell 1000                | Russell Midcap             | Russell Midcap            | Russell 2000                | Russell 2000                | Russell 2000                | Russell 2000                | Russell 2000                |
|   | Growth                      | Value                       | Midcap                    | Growth                      | Value                      | Midcap                    | Growth                      | Value                       | Midcap                      | Growth                      | Value                       |
| 1st - 4th Quartile  | <b>0.08%**</b><br>(3.076)   | 0.06%<br>(1.070)            | 0.03%<br>(0.626)          | <b>0.28%*</b><br>(2.565)    | <b>0.14%*</b><br>(2.174)   | 0.00%<br>(0.057)          | <b>0.16%**</b><br>(2.593)   | <b>0.16%**</b><br>(2.764)   | <b>0.16%**</b><br>(2.593)   | <b>0.16%**</b><br>(2.764)   | <b>0.11%**</b><br>(2.808)   |
| 1st Quartile  | <b>0.03%*</b><br>(1.997)    | -0.02%<br>(-0.536)          | 0.03%<br>(1.277)          | 0.12%<br>(1.398)            | 0.05%<br>(1.237)           | 0.04%<br>(0.894)          | <b>0.07%*</b><br>(2.330)    | 0.06%<br>(1.914)            | <b>0.07%*</b><br>(2.330)    | 0.06%<br>(1.914)            | 0.02%<br>(0.691)            |
| 2nd Quartile  | 0.01%<br>(0.420)            | -0.01%<br>(-0.977)          | 0.00%<br>(0.156)          | <b>0.06%**</b><br>(4.515)   | 0.01%<br>(0.747)           | 0.00%<br>(0.161)          | 0.01%<br>(0.257)            | 0.01%<br>(0.422)            | <b>0.06%**</b><br>(4.515)   | 0.01%<br>(0.422)            | -0.01%<br>(-0.962)          |
| 3rd Quartile  | 0.00%<br>(-0.180)           | 0.02%<br>(1.007)            | <b>-0.03%</b><br>(-1.767) | <b>-0.04%*</b><br>(-2.053)  | 0.01%<br>(0.397)           | <b>-0.10%</b><br>(-1.751) | <b>-0.03%**</b><br>(-3.550) | -0.02%<br>(-0.615)          | <b>-0.03%**</b><br>(-3.550) | -0.02%<br>(-0.615)          | -0.01%<br>(-0.453)          |
| 4th Quartile  | <b>-0.05%**</b><br>(-2.843) | <b>-0.08%**</b><br>(-2.508) | 0.00%<br>(-0.008)         | <b>-0.16%**</b><br>(-6.729) | <b>-0.09%*</b><br>(-2.248) | 0.03%<br>(0.595)          | <b>-0.09%**</b><br>(-2.791) | <b>-0.10%**</b><br>(-3.029) | <b>-0.09%**</b><br>(-2.791) | <b>-0.10%**</b><br>(-3.029) | <b>-0.09%**</b><br>(-3.350) |

**Table IA.2: Summary Statistics**

This table presents the number of no-load U.S. fixed income mutual funds within each category over 3 year intervals from 1984 through 2007. Funds with multiple shareclasses of the same fund are represented by only a single shareclass in our sample. To be counted within a particular three-year period, a fund must have at least 30 monthly return observations. Bond funds are categorized by their self-reported allocation, maturity, and duration data recorded in CRSP. A bond fund is included within its APB group if over 70% of its portfolio is allocated to the respective asset type. A fund is also eliminated from the sample if its R-squared is less than 0.35 when its return is regressed against its category average return.

| Years   | Bonds  |       |           |       |        |       |           |       |
|---------|--------|-------|-----------|-------|--------|-------|-----------|-------|
|         | Interm |       | Long-Term |       | Interm |       | Long-Term |       |
|         | Corp   | Gov't | Corp      | Gov't | Corp   | Gov't | Corp      | Gov't |
| 84 - 86 | 6      | 35    | 21        | 37    | 14     | 98    |           |       |
| 85 - 87 | 8      | 50    | 26        | 61    | 20     | 130   |           |       |
| 86 - 88 | 10     | 62    | 29        | 65    | 21     | 153   |           |       |
| 87 - 89 | 13     | 68    | 31        | 68    | 25     | 164   |           |       |
| 88 - 90 | 15     | 69    | 31        | 73    | 31     | 189   |           |       |
| 89 - 91 | 15     | 85    | 33        | 87    | 34     | 219   |           |       |
| 90 - 92 | 22     | 119   | 40        | 118   | 46     | 297   |           |       |
| 91 - 93 | 34     | 164   | 54        | 158   | 82     | 474   |           |       |
| 92 - 94 | 47     | 202   | 67        | 194   | 130    | 659   |           |       |
| 93 - 95 | 55     | 213   | 76        | 214   | 146    | 759   |           |       |
| 94 - 96 | 65     | 223   | 86        | 230   | 159    | 829   |           |       |
| 95 - 97 | 85     | 228   | 100       | 242   | 166    | 864   |           |       |
| 96 - 98 | 99     | 217   | 124       | 232   | 177    | 863   |           |       |
| 97 - 99 | 119    | 203   | 136       | 219   | 172    | 841   |           |       |
| 98 - 00 | 138    | 206   | 139       | 207   | 185    | 829   |           |       |
| 99 - 01 | 173    | 205   | 138       | 193   | 189    | 823   |           |       |
| 00 - 02 | 197    | 209   | 141       | 197   | 201    | 828   |           |       |
| 01 - 03 | 212    | 216   | 143       | 199   | 212    | 817   |           |       |
| 02 - 04 | 224    | 205   | 146       | 198   | 218    | 777   |           |       |
| 03 - 05 | 250    | 202   | 148       | 216   | 220    | 747   |           |       |
| 04 - 06 | 261    | 204   | 150       | 213   | 218    | 761   |           |       |
| 05 - 07 | 254    | 197   | 146       | 206   | 211    | 744   |           |       |



**Table IA.3: In-Sample APB Alpha Estimates**

This table presents  $\alpha$  estimates for the Active Peer Benchmark, constructed from equal weighted average gross excess returns of funds that are grouped by their bond holdings characteristics from 1984 through 2007. The  $\alpha$ 's are estimated using a 7-factor model based upon Blake, Elton, and Gruber (1993):

$$r_{APB,t} = \alpha_{APB} + \beta_{APB,ig} r_{ig,t} + \beta_{APB,ic} r_{ic,t} + \beta_{APB,lc} r_{lc,t} + \beta_{APB,mbs} r_{mbs,t} + \beta_{APB,hy} r_{hy,t} + \beta_{APB,rmrf} r_{rmrf,t} + \epsilon_{APB,t}. \quad (3)$$

bond factors capture risk premia from (1) Intermediate-Term Government (*ig*) using the Intermediate Sub-Index of the "Barclays U.S. Government Bond Index", (2) Long-Term Government (*lg*) using the Long Sub-Index of the "Barclays U.S. Government Bond Index", (3) Intermediate-Term Corporate (*ic*) using the Intermediate Sub-Index of the "Barclays U.S. Corporate Bond Index", (4) Long-Term Corporate (*lc*) using the Long Sub-Index of the "Barclays U.S. Corporate Bond Index", (5) Mortgage-Backed Securities (*mbs*) using the "Barclays U.S. Mortgage Backed Securities Index", (6) High-Yield corporate bonds (*hy*) using the "Barclays U.S. Corporate High Yield Index", and the excess return on the CRSP NYSE/AMEX/Nasdaq portfolio (*rmrf*). Alpha estimates are presented on the first row of each APB group with the corresponding t-statistics immediately below. Alpha estimates that are significant at the 90% confidence level are presented in bold, those significant at the 95% level are presented in bold with one asterisk (\*), and those significant at the 99% level are presented in bold with two asterisks (\*\*). T-statistics are shown in parenthesis.

|              | 84-86   | 87-89         | 90-92   | 93-95           | 96-98   | 99-01         | 02-04         | 05-07        | 84-07         |
|--------------|---------|---------------|---------|-----------------|---------|---------------|---------------|--------------|---------------|
| Intermediate | 1.62%   | -0.91%        | 0.40%   | 0.30%           | 0.33%   | 0.13%         | <b>1.33%</b>  | <b>1.17%</b> | <b>0.55%</b>  |
| Corporate    | (1.18)  | (-1.08)       | (0.34)  | (0.66)          | (0.80)  | (0.28)        | (1.92)        | (1.93)       | (1.91)        |
| Long-Term    | -0.08%  | -1.06%        | -0.11%  | -0.71%          | -0.47%  | <b>-0.82%</b> | <b>1.85%</b>  | 0.84%        | -0.07%        |
| Corporate    | (-0.10) | (-1.10)       | (-0.10) | (-0.89)         | (-0.94) | (-1.65)       | (1.94)        | (0.96)       | (-0.20)       |
| Intermediate | 1.82%   | <b>-0.73%</b> | -0.28%  | <b>-0.44%*</b>  | 0.09%   | <b>-0.23%</b> | <b>0.53%</b>  | 0.02%        | 0.10%         |
| Government   | (1.38)  | (-1.86)       | (-1.36) | (-2.10)         | (0.53)  | (-1.68)       | (1.91)        | (0.07)       | (0.34)        |
| Long-Term    | -0.12%  | 0.21%         | -0.13%  | <b>-0.87%**</b> | 0.02%   | -0.20%        | <b>1.43%*</b> | 0.39%        | 0.09%         |
| Government   | (-0.14) | (0.46)        | (-0.37) | (-2.72)         | (0.07)  | (-0.82)       | (2.31)        | (0.52)       | (0.39)        |
| Intermediate | -0.98%  | <b>-1.98%</b> | 1.03%   | -2.03%          | -0.98%  | -0.58%        | 0.10%         | 0.20%        | <b>-0.65%</b> |
| Municipals   | (-0.47) | (-1.77)       | (0.87)  | (-1.26)         | (-1.14) | (-0.59)       | (0.10)        | (0.22)       | (-1.72)       |
| Long-Term    | -0.91%  | -1.68%        | 1.35%   | -2.37%          | -0.61%  | -1.10%        | 1.01%         | 1.62%        | -0.33%        |
| Municipals   | (-0.28) | (-0.85)       | (0.66)  | (-0.85)         | (-0.50) | (-0.66)       | (0.75)        | (1.32)       | (-0.64)       |

**Table IA.4: Correlation Coefficients across APB Return Residuals**

This table shows the correlation between different Active Peer Benchmarks during 3 year subperiods and throughout the sample from 1984 through 2007. The APB's are constructed from equal weighted gross-excess returns of fixed income mutual funds including: Intermediate and Long-Term Corporate, Intermediate and Long-Term Government, and Intermediate and Long-Term Municipals. APB returns are defined as the equal-weighted return of all funds in each category. The table shows the correlation between APB residuals after regressing each APB on a 7 factor risk model based upon Blake, Elton, and Gruber (1993) ( $r_{APB,t} = \alpha_{APB} + \beta_{APB,ig}r_{ig,t} + \beta_{APB,lg}r_{lg,t} + \beta_{APB,ic}r_{ic,t} + \beta_{APB,lc}r_{lc,t} + \beta_{APB,mbs}r_{mbs,t} + \beta_{APB,hy}r_{hy,t} + \beta_{APB,rmrf}r_{rmrf,t} + \epsilon_{APB,t}$ ) The bond factors capture risk premia from (1) Intermediate-Term Government (*ig*) using the Intermediate Sub-Index of the “Barclays U.S. Government Bond Index”, (2) Long-Term Government (*lg*) using the Long Sub-Index of the “Barclays U.S. Government Bond Index”, (3) Intermediate-Term Corporate (*ic*) using the Intermediate Sub-Index of the “Barclays U.S. Corporate Bond Index”, (4) Long-Term Corporate (*lc*) using the Long Sub-Index of the “Barclays U.S. Corporate Bond Index”, (5) Mortgage-Backed Securities (*mbs*) using the “Barclays U.S. Mortgage Backed Securities Index”, (6) High-Yield corporate bonds (*hy*) using the “Barclays U.S. Corporate High Yield Index”, and the excess return on the CRSP NYSE/AMEX/Nasdaq portfolio (*rmrf*). Numbers in bold are statistically significant at a 90% confidence level, those bold with one asterisk (\*) are significant at the 5% level and those bold with two asterisks (\*\*) are significant at the 99% level. P-values are shown in parenthesis.

| Correlation Pairs                         | (first row: correlation, second row: p-value) |               |               |               |               |               |               |               |               |
|---|---|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
|   | Period  | 84-86         | 87-89         | 90-92         | 93-95         | 96-98         | 99-01         | 02-04         | 05-07         |
| Interm Term Corp<br>and Long Term Corp    | 0.07  | <b>0.83**</b> | <b>0.89**</b> | <b>0.79**</b> | <b>0.81**</b> | <b>0.88**</b> | <b>0.94**</b> | <b>0.97**</b> | <b>0.65**</b> |
|   | (0.35)  | (0.00)        | (0.00)        | (0.00)        | (0.00)        | (0.00)        | (0.00)        | (0.00)        | (0.00)        |
| Interm Term Corp<br>and Interm Term Gov't | 0.20  | 0.04          | -0.15         | <b>0.57**</b> | <b>0.26</b>   | 0.08          | <b>0.54**</b> | <b>0.82**</b> | <b>0.22</b>   |
|   | (0.12)  | (0.41)        | (0.81)        | (0.00)        | (0.06)        | (0.33)        | (0.00)        | (0.00)        | (0.09)        |
| Interm Term Corp<br>and Long Term Gov't   | <b>0.24</b>                                   | 0.07          | -0.20         | <b>0.51**</b> | 0.02          | 0.19          | <b>0.27</b>   | <b>0.55**</b> | 0.20          |
|   | (0.08)  | (0.34)        | (0.88)        | (0.00)        | (0.46)        | (0.13)        | (0.06)        | (0.00)        | (0.12)        |
| Long Term Corp<br>and Interm Term Gov't   | <b>0.35*</b>                                  | 0.03          | -0.26         | <b>0.66**</b> | <b>0.46**</b> | 0.11          | <b>0.63**</b> | <b>0.86**</b> | <b>0.23</b>   |
|   | (0.02)  | (0.44)        | (0.94)        | (0.00)        | (0.00)        | (0.26)        | (0.00)        | (0.00)        | (0.09)        |
| Long Term Corp<br>and Long Term Gov't     | <b>0.24</b>                                   | -0.03         | -0.19         | <b>0.52**</b> | <b>0.28*</b>  | <b>0.29*</b>  | <b>0.34*</b>  | <b>0.56**</b> | <b>0.25</b>   |
|   | (0.08)  | (0.56)        | (0.87)        | (0.00)        | (0.05)        | (0.04)        | (0.02)        | (0.00)        | (0.07)        |
| Interm Term Gov't<br>and Long Term Gov't  | <b>0.83**</b>                                 | 0.04          | <b>0.44**</b> | <b>0.52**</b> | <b>0.27*</b>  | <b>0.45**</b> | <b>0.74**</b> | <b>0.72**</b> | <b>0.58**</b> |
|   | (0.00)  | (0.41)        | (0.00)        | (0.00)        | (0.05)        | (0.00)        | (0.00)        | (0.00)        | (0.00)        |
| Interm Term Gov't<br>and Interm Term Muni | 0.01  | <b>0.39**</b> | 0.01          | -0.23         | 0.09          | <b>0.34*</b>  | <b>0.37**</b> | <b>0.45**</b> | 0.10          |
|   | (0.48)  | (0.01)        | (0.47)        | (0.91)        | (0.29)        | (0.02)        | (0.01)        | (0.00)        | (0.28)        |
| Interm Term Gov't<br>and Long Term Muni   | 0.03  | <b>0.32*</b>  | -0.02         | -0.18         | 0.13          | <b>0.34*</b>  | <b>0.38**</b> | <b>0.48**</b> | 0.08          |
|   | (0.44)  | (0.03)        | (0.54)        | (0.86)        | (0.22)        | (0.02)        | (0.01)        | (0.00)        | (0.32)        |
| Long Term Gov't<br>and Interm Term Muni   | <b>0.24</b>                                   | 0.18          | -0.13         | 0.01          | -0.03         | 0.09          | <b>0.23</b>   | <b>0.34*</b>  | 0.16          |
|   | (0.08)  | (0.15)        | (0.77)        | (0.47)        | (0.57)        | (0.30)        | (0.09)        | (0.02)        | (0.17)        |
| Long Term Gov't<br>and Long Term Muni     | <b>0.29*</b>                                  | 0.16          | -0.11         | 0.02          | 0.02          | 0.10          | 0.18          | <b>0.29*</b>  | 0.18          |
|   | (0.04)  | (0.18)        | (0.74)        | (0.46)        | (0.45)        | (0.29)        | (0.15)        | (0.04)        | (0.15)        |
| Interm Term Muni<br>and Long Term Muni    | <b>0.88**</b>                                 | <b>0.92**</b> | <b>0.94**</b> | <b>0.96**</b> | <b>0.96**</b> | <b>0.94**</b> | <b>0.94**</b> | <b>0.97**</b> | <b>0.92**</b> |
|   | (0.00)  | (0.00)        | (0.00)        | (0.00)        | (0.00)        | (0.00)        | (0.00)        | (0.00)        | (0.00)        |
| Interm Term Corp<br>and Interm Term Muni  | -0.10   | 0.04          | <b>0.25</b>   | -0.15         | <b>0.24</b>   | <b>0.34*</b>  | <b>0.29*</b>  | <b>0.34*</b>  | 0.09          |
|   | (0.71)  | (0.41)        | (0.07)        | (0.81)        | (0.08)        | (0.02)        | (0.05)        | (0.02)        | (0.30)        |
| Intrm Term Corp<br>and Long Term Muni     | -0.12   | 0.11          | <b>0.24</b>   | -0.11         | 0.19          | <b>0.22</b>   | <b>0.31*</b>  | <b>0.38**</b> | 0.07          |
|   | (0.77)  | (0.27)        | (0.08)        | (0.74)        | (0.14)        | (0.09)        | (0.03)        | (0.01)        | (0.35)        |
| Long Term Corp<br>and Intrm Term Muni     | 0.06  | -0.05         | <b>0.31*</b>  | -0.18         | 0.17          | <b>0.23</b>   | <b>0.26</b>   | <b>0.42**</b> | 0.12          |
|   | (0.37)  | (0.62)        | (0.03)        | (0.85)        | (0.15)        | (0.09)        | (0.07)        | (0.01)        | (0.24)        |
| Long Term Corp<br>and Long Term Muni      | -0.07   | 0.08          | <b>0.34*</b>  | -0.17         | 0.17          | 0.16          | <b>0.34*</b>  | <b>0.46**</b> | 0.12          |
|   | (0.66)  | (0.33)        | (0.02)        | (0.84)        | (0.16)        | (0.17)        | (0.02)        | (0.00)        | (0.24)        |

**Table IA.5: Percent of Funds with Significant Residual Correlations**

This table presents the percentage of statistically significant pairwise residual correlations within the APB groups of mutual funds from 1984 through 2007. It presents results for funds in APB groups after regressing each fund's gross excess return on (1) the Blake, Elton, and Gruber (1993) 7-factor model ( $r_{i,t} = \alpha_i + \beta_{i,ig}r_{ig,t} + \beta_{i,ic}r_{ic,t} + \beta_{i,hy}r_{hy,t} + \beta_{i,rmrf}r_{rmrf,t} + \epsilon_{i,t}$ ) and (2) the APB augmented 7 factor model.

| Correlation Pairs | Model                  | Period |       |       |       |       |       |       |       |
|-------------------|------------------------|--------|-------|-------|-------|-------|-------|-------|-------|
|                   |                        | 87-89  | 90-92 | 93-95 | 96-98 | 99-01 | 02-04 | 05-07 | 87-07 |
| IT Corporate      | 7 Factor               | 76%    | 48%   | 35%   | 43%   | 31%   | 53%   | 69%   | 64%   |
|                   | APB-Augmented 7 Factor | 48%    | 25%   | 22%   | 24%   | 23%   | 21%   | 20%   | 24%   |
| LT Corporate      | 7 Factor               | 48%    | 52%   | 43%   | 34%   | 33%   | 71%   | 90%   | 55%   |
|                   | APB-Augmented 7 Factor | 24%    | 19%   | 19%   | 26%   | 21%   | 22%   | 21%   | 21%   |
| IT Government     | 7 Factor               | 28%    | 28%   | 24%   | 23%   | 26%   | 66%   | 81%   | 43%   |
|                   | APB-Augmented 7 Factor | 22%    | 26%   | 20%   | 22%   | 23%   | 20%   | 20%   | 17%   |
| LT Government     | 7 Factor               | 31%    | 31%   | 26%   | 29%   | 25%   | 66%   | 76%   | 40%   |
|                   | APB-Augmented 7 Factor | 27%    | 24%   | 24%   | 26%   | 22%   | 48%   | 48%   | 26%   |
| IT Muni           | 7 Factor               | 83%    | 94%   | 97%   | 98%   | 98%   | 97%   | 96%   | 81%   |
|                   | APB-Augmented 7 Factor | 30%    | 28%   | 28%   | 24%   | 29%   | 29%   | 23%   | 26%   |
| LT Muni           | 7 Factor               | 96%    | 98%   | 99%   | 100%  | 100%  | 100%  | 100%  | 85%   |
|                   | APB-Augmented 7 Factor | 23%    | 22%   | 24%   | 19%   | 27%   | 24%   | 22%   | 23%   |
| Average           | 7 Factor               | 60%    | 58%   | 54%   | 54%   | 52%   | 75%   | 85%   | 61%   |
|                   | APB-Augmented 7 Factor | 29%    | 24%   | 23%   | 23%   | 24%   | 27%   | 26%   | 23%   |

**Table IA.6: Percent of Funds with Significant or Insignificant Coefficients**

This table presents the percentage of funds with significant (95% confidence) and insignificant coefficient estimates when gross excess fund returns are regressed on risk factor models both with and without an Active Peer Benchmark (APB) included. Regressions are run over 36 month periods from 1984 through 2007. The table presents the percentage of U.S. fixed income mutual funds with significant and insignificant estimates of each  $\alpha$  and coefficient under 4 different models: (1) the Blake, Elton, and Gruber (1993) 7-factor model

$$(r_{i,t} = \alpha_i + \beta_{i,ig}r_{ig,t} + \beta_{i,ic}r_{ic,t} + \beta_{i,lc}r_{lc,t} + \beta_{i,mbs}r_{mbs,t} + \beta_{i,hy}r_{hy,t} + \beta_{i,rmrf}r_{rmrf,t} + \epsilon_{i,t});$$

(2) the APB augmented model (APB Augmented 7 Factor model which augments the 7-factor model with an orthogonalized APB); (3) the  $\alpha$  adjusted APB model (APB

augmented 7 factor model which augments the 7-factor model with an orthogonalized  $\alpha$  adjusted APB); and (4) APB-only model where the APB is the only factor and it is not orthogonalized to the 7-factor model. In the first column, the percentage of funds with statistically

significant and insignificant  $\alpha$  estimates under the 7 factor model are shown. The second column shows the same for  $\alpha$  estimates under the APB augmented 7 factor model, and the third column shows the same for  $\alpha$  estimates under the  $\alpha$  adjusted APB augmented 7 factor model.

The percentage of funds with statistically significant and insignificant coefficient estimates under these models are then presented in columns four through ten. Column 11 reports the percent of mutual funds with statistically significant and insignificant  $\alpha$  estimates under the

APB-only factor model. The bottom row in each APB group reports the average adjusted  $R^2$  that corresponds to the model used to estimate the results shown in that column. Beneath column 11, a second  $R^2$  is shown in parenthesis. It represents the  $R^2$  from a multi-APB model (not shown) that extends the APB augmented 7 factor model to include unrelated active peer benchmarks within the regression. Average adjusted  $R^2$  are shown below columns 1, 2, 3, and 11, with multi-APB model  $R^2$  given in parenthesis below column 11.

| 7-Factor Model $\alpha$ (%)    | APB augmented 7 factor $\alpha$ (%) | APB augmented 7 factor $\alpha$ ( $\alpha$ adj) (%) | Intern. Gov't (%) | Long Term Gov't (%) | Intern. Corp (%) | Long Term Corp (%) | Mortgages (%) | High Yield (%) | APB (%) | APB Only $\alpha$ (%) |
|--------------------------------|-------------------------------------|---|-------------------|---------------------|------------------|--------------------|---------------|----------------|---------|-----------------------|
| <b>Intermediate Corporate</b>  |                                     |   |                   |                     |                  |                    |               |                |         |                       |
| Positive Significant           | 18.5                                | 23.6  | 16.3              | 8.3                 | 9.9              | 16.7               | 6.5           | 74.1           | 58.3    | 16.1                  |
| Positive Not Significant       | 45.1                                | 40.1  | 37.6              | 39.0                | 49.4             | 45.6               | 51.5          | 16.7           | 28.5    | 37.2                  |
| Negative Not Significant       | 31.1                                | 29.3  | 36.5              | 41.8                | 35.3             | 34.8               | 39.6          | 9.0            | 10.5    | 36.6                  |
| Negative Significant           | 5.4                                 | 7.1   | 9.6               | 10.9                | 5.5              | 2.9                | 2.3           | 0.2            | 2.7     | 10.1                  |
| Adj. $R^2$                     | 80                                  | 82.8  | 82.8              |                     |                  |                    |               |                |         | 65.2 (84.3)           |
| <b>Long-Term Corporate</b>     |                                     |   |                   |                     |                  |                    |               |                |         |                       |
| Positive Significant           | 11.5                                | 15.3  | 13.9              | 5.8                 | 13.7             | 14.5               | 8.6           | 75.3           | 60.2    | 11.2                  |
| Positive Not Significant       | 41.3                                | 37.7  | 41.5              | 41.3                | 51.6             | 43.2               | 49.2          | 18.0           | 30.1    | 44.3                  |
| Negative Not Significant       | 38.3                                | 35.7  | 36.3              | 44.2                | 31.7             | 39.2               | 39.3          | 6.5            | 9.2     | 36.3                  |
| Negative Significant           | 8.9                                 | 11.4  | 8.4               | 8.8                 | 3.0              | 3.2                | 2.9           | 0.2            | 0.6     | 8.3                   |
| Adj. $R^2$                     | 85                                  | 87.5  | 87.5              |                     |                  |                    |               |                |         | 65.2 (88.8)           |
| <b>Intermediate Government</b> |                                     |   |                   |                     |                  |                    |               |                |         |                       |
| Positive Significant           | 15.7                                | 17.4  | 15.7              | 43.1                | 16.3             | 8.0                | 40.5          | 5.8            | 30.8    | 15.3                  |
| Positive Not Significant       | 43.3                                | 41.5  | 42.2              | 36.8                | 37.6             | 45.7               | 31.8          | 49.9           | 49.3    | 45.1                  |
| Negative Not Significant       | 33.2                                | 32.6  | 34.4              | 18.5                | 34.9             | 40.5               | 23.2          | 42.6           | 18.9    | 31.8                  |
| Negative Significant           | 7.8                                 | 8.6   | 7.7               | 1.6                 | 11.2             | 5.8                | 4.6           | 1.7            | 1.0     | 7.9                   |
| Adj. $R^2$                     | 87                                  | 87.9  | 87.9              |                     |                  |                    |               |                |         | 81.9 (88.5)           |
| <b>Long-Term Government</b>    |                                     |   |                   |                     |                  |                    |               |                |         |                       |
| Positive Significant           | 8.5                                 | 9.9   | 8.6               | 21.5                | 40.3             | 10.2               | 48.3          | 4.7            | 30.9    | 10.7                  |
| Positive Not Significant       | 43.3                                | 41.8  | 44.2              | 44.6                | 37.3             | 52.3               | 28.9          | 47.0           | 47.3    | 46.2                  |
| Negative Not Significant       | 40.4                                | 39.5  | 40.3              | 30.6                | 19.9             | 34.0               | 19.2          | 45.1           | 20.9    | 36.2                  |
| Negative Significant           | 7.8                                 | 8.8   | 6.9               | 3.3                 | 2.5              | 3.5                | 3.6           | 3.3            | 1.0     | 6.9                   |
| Adj. $R^2$                     | 87                                  | 88.5  | 88.5              |                     |                  |                    |               |                |         | 79.6 (89.3)           |
| <b>Intermediate Muni</b>       |                                     |   |                   |                     |                  |                    |               |                |         |                       |
| Positive Significant           | 0.9                                 | 6.7   | 14.9              | 3.4                 | 5.1              | 5.7                | 3.8           | 9.8            | 97.8    | 12.5                  |
| Positive Not Significant       | 24.7                                | 18.6  | 43.1              | 42.2                | 68.2             | 60.6               | 76.5          | 50.5           | 1.7     | 44.8                  |
| Negative Not Significant       | 64.4                                | 29.7  | 32.5              | 52.3                | 26.2             | 31.0               | 18.8          | 36.8           | 0.5     | 31.6                  |
| Negative Significant           | 10.1                                | 45.0  | 9.5               | 2.1                 | 0.5              | 2.7                | 0.9           | 2.9            | 0.0     | 11.2                  |
| Adj. $R^2$                     | 64                                  | 92.0  | 92.0              |                     |                  |                    |               |                |         | 90.1 (92.2)           |
| <b>Long-Term Muni</b>          |                                     |   |                   |                     |                  |                    |               |                |         |                       |
| Positive Significant           | 1.1                                 | 13.8  | 10.5              | 0.9                 | 18.8             | 4.0                | 10.1          | 11.9           | 99.6    | 11.3                  |
| Positive Not Significant       | 33.4                                | 20.5  | 49.9              | 38.9                | 65.7             | 59.7               | 71.8          | 52.8           | 0.3     | 48.6                  |
| Negative Not Significant       | 64.0                                | 29.6  | 33.7              | 57.8                | 15.4             | 34.7               | 18.0          | 33.4           | 0.1     | 32.3                  |
| Negative Significant           | 1.4                                 | 36.0  | 5.8               | 2.5                 | 0.2              | 1.6                | 0.1           | 1.8            | 0.0     | 7.7                   |
| Adj. $R^2$                     | 64                                  | 94.7  | 94.7              |                     |                  |                    |               |                |         | 94.1 (91.2)           |

**Table IA.7: Out of Sample Investment Performance as a Function of In-Sample  $\alpha$  Significance Quartile**

This table presents the out-of-sample average monthly  $\alpha$  estimates from portfolios of bond mutual funds, weighted by the difference in statistical significance between in-sample  $\alpha$  estimates of models that include the APB and models where the APB is excluded. The differenced t-statistics were estimated monthly from 1984 through 2007 using 36 month regression windows. Every month, funds were then sorted into quartiles by their  $\alpha$  t-statistic difference. The table presents average out-of-sample performance over the subsequent 12 months. T-statistics were adjusted to allow for overlapping data. Panel A presents out-of-sample performance results for fund portfolios regressed on the APB augmented 7 factor model. Likewise, panel B presents results regressed using the alpha adjusted APB augmented 7 factor model. Numbers in bold are statistically significant at a 90% confidence level, those bold with one asterisk (\*) are significant at the 5% level and those bold with two asterisks (\*\*) are significant at the 99% level. T-statistics are shown in parenthesis.

Mutual Fund Portfolios Weighted by: (APB Augmented 7 Factor Model  $\alpha$  Significance - 7 Factor Model  $\alpha$  Significance)

|                    |                        | Panel A: APB Augmented 7 Factor Out-of-Sample Regression $\alpha$                |                           |                  |                    |                    |  |
|--------------------|------------------------|--|---------------------------|------------------|--------------------|--------------------|--|
|                    | Intermediate Corporate | Long Term Corporate  | Intermediate Gov't        | Long Term Gov't  | Intermediate Muni  | Long Term Muni     |  |
| 1st - 4th Quartile | 0.04%<br>(0.313)       | <b>0.20%**</b><br>(3.695)  | <b>0.06%**</b><br>(3.271) | 0.04%<br>(0.942) | -0.02%<br>(-1.092) | -0.03%<br>(-0.668) |  |
| Top Quartile       | 0.00%                  | <b>0.13%**</b>   | 0.03%                     | 0.00%            | -0.02%             | 0.02%              |  |
| 2nd Quartile       | (-0.04%)               | (2.617)  | (1.559)                   | (0.050)          | (-0.513)           | (0.419)            |  |
|                    | -0.04%                 | -0.01%   | 0.01%                     | <b>-0.02%**</b>  | 0.00%              | 0.00%              |  |
| 3rd Quartile       | (-1.128)               | (-0.472)   | (0.749)                   | (-2.661)         | (0.030)            | (0.070)            |  |
|                    | <b>0.02%*</b>          | 0.01%  | <b>0.01%*</b>             | 0.01%            | -0.01%             | 0.03%              |  |
| 4th Quartile       | (2.031)                | (0.497)  | (2.402)                   | (0.744)          | (-0.209)           | (0.781)            |  |
|                    | -0.04%                 | <b>-0.07%</b>  | <b>-0.03%**</b>           | <b>-0.03%*</b>   | 0.00%              | 0.05%              |  |
|                    | (-0.613)               | (-1.761)   | (-3.387)                  | (-2.247)         | (-0.022)           | (1.217)            |  |
|                    |                        | Panel B: Alpha Adjusted APB Augmented 7 Factor Out-of-Sample Regression $\alpha$ |                           |                  |                    |                    |  |
|                    | Intermediate Corporate | Long Term Corporate  | Intermediate Gov't        | Long Term Gov't  | Intermediate Muni  | Long Term Muni     |  |
| 1st - 4th Quartile | -0.02%<br>(-0.096)     | <b>0.19%**</b><br>(4.026)  | <b>0.05%**</b><br>(3.793) | 0.04%<br>(1.050) | -0.04%<br>(-1.565) | -0.04%<br>(-0.875) |  |
| Top Quartile       | -0.08%                 | <b>0.11%*</b>  | <b>0.03%</b>              | -0.03%           | 0.00%              | 0.03%              |  |
| 2nd Quartile       | (-0.834)               | (2.260)  | (1.703)                   | (-0.634)         | (0.010)            | (0.487)            |  |
|                    | -0.09%                 | -0.02%   | 0.01%                     | <b>-0.03%*</b>   | 0.03%              | 0.02%              |  |
| 3rd Quartile       | (-1.519)               | (-0.844)   | (0.696)                   | (-2.437)         | (0.780)            | (0.278)            |  |
|                    | 0.00%                  | 0.00%  | <b>0.02%*</b>             | 0.00%            | 0.02%              | 0.05%              |  |
| 4th Quartile       | (0.031)                | (0.144)  | (2.271)                   | (0.188)          | (0.569)            | (0.736)            |  |
|                    | -0.06%                 | <b>-0.08%</b>  | <b>-0.03%**</b>           | <b>-0.07%**</b>  | 0.04%              | 0.07%              |  |
|                    | (-0.918)               | (-1.866)   | (-2.655)                  | (-4.492)         | (0.765)            | (1.227)            |  |