

Does Institutional Outperform Retail? Performance Comparisons of Mutual Funds  
Using Traditional Measures

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**WEB APPENDIX**

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## APPENDIX A. Tables for measures of fund performance and differences in measures.

The following tables show the Treynor Index (TI), Sharpe ratio (SR) and Jensen's "alpha" for each Morningstar classification and the differences between institutional and retail funds for each measure. The following symbols and abbreviations are used throughout the tables.

<b>R(p)</b>	: Average monthly return of the fund (portfolio)
<b>Rf</b>	: The risk-free rate, average yield on the 3-month treasury bill
<b>Cov(pb)</b>	: Covariance of the fund's risk premium with the benchmark's risk premium
<b>Var(b)</b>	: variance of the benchmark's risk premium
<b>Beta</b>	: Volatility of the fund's risk premium relative to the benchmark risk premium =Cov(pb)/Var(b)
<b>Stdev (R(p))</b>	: Volatility of the funds returns.
<b>TI</b>	: Treynor Index ;
<b>SR</b>	: Sharpe Ratio;
<b>Alpha</b>	: Jensen's alpha

**Table 1. Measures for Large cap funds and differences in measures.**

(a) Large Cap Value funds

	Institutional				Retail			
	1 year	3 year	5 year	10 year	1 year	3 year	5 year	10 year
R(p)	0.0143	0.0063	0.0115	0.0067	0.0102	0.0048	0.0101	0.0053
Rf	0.0049	0.0022	0.0016	0.0045	0.0046	0.0021	0.0015	0.0045
Cov (pb)	0.0005	0.0008	0.0007	0.0021	-0.0002	0.0000	0.0002	0.0017
Var(b)	0.0007	0.0015	0.0012	0.0024	0.0005	0.0012	<b>0.0009</b>	0.0022
Beta	0.6737	0.4917	0.5624	0.8407	-0.3236	-0.0134	0.2032	0.7884
Stdev(R(p))	0.0260	0.0393	0.0350	0.0495	0.0224	0.0342	0.0308	0.0471
R(b)	0.0099	0.0042	0.0092	0.0039	0.0127	0.0063	0.0102	0.0055
<b>TI</b>	<b>0.0139</b>	<b>0.0082</b>	<b>0.0176</b>	<b>0.0027</b>	<b>-0.0174</b>	<b>-0.2024</b>	<b>0.0425</b>	<b>0.0011</b>
<b>SR</b>	<b>0.3605</b>	<b>0.1031</b>	<b>0.2829</b>	<b>0.0452</b>	<b>0.2512</b>	<b>0.0793</b>	<b>0.2807</b>	<b>0.0178</b>
<b>Alpha</b>	<b>0.0060</b>	<b>0.0031</b>	<b>0.0056</b>	<b>0.0028</b>	<b>0.0083</b>	<b>0.0028</b>	<b>0.0069</b>	<b>0.0000</b>

  

Differences: Institutional – retail				
	1 year	3 year	5 year	10 year
<b>TI</b>	0.0313	0.2106	-0.0249	0.0016
<b>SR</b>	0.1094	0.0238	0.0022	0.0275
<b>Alpha</b>	-0.0022	0.0003	-0.0012	0.0028

## (b) Large Cap Blend funds

	Institutional				Retail			
	1 year	3 year	5 year	10 year	1 year	3 year	5 year	10 year
R(p)	0.0149	0.0082	0.0120	0.0071	0.0127	0.0077	0.0108	0.0056
Rf	0.0049	0.0022	0.0016	0.0045	0.0060	0.0026	0.0018	0.0046
Cov (pb)	0.0003	0.0008	0.0007	0.0022	0.0003	0.0008	0.0007	0.0022
Var(b)	0.0003	0.0009	0.0008	0.0022	0.0004	0.0009	0.0008	0.0024
Beta	1.0228	0.9805	0.9778	0.9820	0.7199	0.9562	0.9199	0.9144
Stdev(R(p))	0.0171	0.0293	0.0274	0.0469	0.0204	0.0296	0.0283	0.0486
R(b)	0.0127	0.0063	0.0102	0.0055	0.0105	0.0069	0.0102	0.0054
<b>TI</b>	<b>0.0097</b>	<b>0.0060</b>	<b>0.0106</b>	<b>0.0026</b>	0.0094	0.0054	0.0098	0.0011
<b>SR</b>	<b>0.5792</b>	<b>0.2027</b>	<b>0.3772</b>	<b>0.0549</b>	<b>0.3313</b>	<b>0.1730</b>	<b>0.3170</b>	<b>0.0199</b>
<b>Alpha</b>	<b>0.0020</b>	<b>0.0020</b>	<b>0.0020</b>	<b>0.0016</b>	<b>0.0035</b>	<b>0.0010</b>	<b>0.0012</b>	<b>0.0002</b>

  

Differences: Institutional – retail				
	1 year	3 year	5 year	10 year
<b>TI</b>	0.0003	0.0007	0.0008	0.0016
<b>SR</b>	0.2478	0.0297	0.0601	0.0350
<b>Alpha</b>	-0.0015	0.0010	0.0007	0.0014

## (c) Large Cap Growth funds

	Institutional				Retail			
	1 year	3 year	5 year	10 year	1 year	3 year	5 year	10 year
R(p)	0.0161	0.0112	0.0138	0.0090	0.0129	0.0086	0.0119	0.0070
Rf	0.0046	0.0021	0.0015	0.0045	0.0046	0.0021	0.0015	0.0045
Cov (pb)	0.0003	0.0009	0.0008	0.0023	0.0003	0.0009	0.0007	0.0023
Var(b)	0.0003	0.0010	0.0008	0.0022	0.0003	0.0010	0.0008	0.0022
Beta	1.0473	0.9244	0.9080	1.0275	0.9865	0.8927	0.8746	1.0100
Stdev(R(p))	0.0161	0.0310	0.0288	0.0473	0.0161	0.0310	0.0288	0.0473
R(b)	0.0127	0.0090	0.0112	0.0070	0.0127	0.0090	0.0112	0.0070
<b>TI</b>	<b>0.0110</b>	<b>0.0099</b>	<b>0.0135</b>	<b>0.0044</b>	<b>0.0085</b>	<b>0.0073</b>	<b>0.0119</b>	<b>0.0025</b>
<b>SR</b>	<b>0.7163</b>	<b>0.2961</b>	<b>0.4273</b>	<b>0.0956</b>	<b>0.5186</b>	<b>0.2103</b>	<b>0.3605</b>	<b>0.0531</b>
<b>Alpha</b>	<b>0.0031</b>	<b>0.0027</b>	<b>0.0035</b>	<b>0.0019</b>	<b>0.0004</b>	<b>0.0003</b>	<b>0.0019</b>	<b>-0.0001</b>

  

Differences: Institutional – retail				
	1 year	3 year	5 year	10 year
<b>TI</b>	0.0026	0.0026	0.0017	0.0019
<b>SR</b>	0.1977	0.0858	0.0668	0.0425
<b>Alpha</b>	0.0027	0.0024	0.0016	0.0020

**Table 2. Measures for Mid-cap funds and differences in measures.**

(a) Midcap Value funds

	Institutional				Retail			
	1 year	3 year	5 year	10 year	1 year	3 year	5 year	10 year
R(p)	0.0144	0.0053	0.0115	0.0073	0.0135	0.0047	0.0110	0.0070
Rf	0.0049	0.0022	0.0016	0.0045	0.0049	0.0022	0.0016	0.0045
Cov (pb)	0.0005	0.0008	0.0008	0.0025	0.0009	0.0012	0.0010	0.0030
Var(b)	0.0005	0.0009	0.0008	0.0024	0.0019	0.0019	0.0015	0.0036
Beta	0.9053	0.8977	0.9008	1.0123	0.4976	0.6272	0.6643	0.8300
Stdev(R(p))	0.0231	0.0305	0.0289	0.0493	0.0431	0.0432	0.0389	0.0597
R(b)	0.0103	0.0042	0.0092	0.0040	0.0171	0.0046	0.0094	0.0055
<b>TI</b>	<b>0.0104</b>	<b>0.0034</b>	<b>0.0110</b>	<b>0.0027</b>	<b>0.0173</b>	<b>0.0039</b>	<b>0.0142</b>	<b>0.0030</b>
<b>SR</b>	<b>0.4097</b>	<b>0.1003</b>	<b>0.3425</b>	<b>0.0561</b>	<b>0.1997</b>	<b>0.0561</b>	<b>0.2419</b>	<b>0.0413</b>
<b>Alpha</b>	<b>0.0045</b>	<b>0.0013</b>	<b>0.0031</b>	<b>0.0033</b>	<b>0.0025</b>	<b>0.0009</b>	<b>0.0042</b>	<b>0.0017</b>

  

Differences: Institutional – retail				
	1 year	3 year	5 year	10 year
<b>TI</b>	-0.0069	-0.0005	-0.0032	-0.0002
<b>SR</b>	0.2100	0.0442	0.1006	0.0148
<b>Alpha</b>	0.0020	0.0004	-0.0012	0.0016

(b) Midcap Blend funds

	Institutional				Retail			
	1 year	3 year	5 year	10 year	1 year	3 year	5 year	10 year
R(p)	0.0132	0.0057	0.0110	0.0070	0.0132	0.0061	0.0112	0.0070
Rf	0.0049	0.0022	0.0016	0.0045	0.0049	0.0022	0.0016	0.0045
Cov (pb)	0.0004	0.0008	0.0007	0.0023	0.0004	0.0007	0.0006	0.0022
Var(b)	0.0003	0.0009	0.0008	0.0023	0.0003	0.0009	0.0008	0.0022
Beta	1.1816	0.8516	0.8769	1.0050	1.2068	0.8459	0.8427	1.0013
Stdev(R(p))	0.0182	0.0299	0.0280	0.0477	0.0171	0.0293	0.0274	0.0469
R(b)	0.0130	0.0062	0.0102	0.0056	0.0127	0.0063	0.0102	0.0055
<b>TI</b>	<b>0.0070</b>	<b>0.0040</b>	<b>0.0107</b>	<b>0.0025</b>	<b>0.0068</b>	<b>0.0046</b>	<b>0.0114</b>	<b>0.0025</b>
<b>SR</b>	<b>0.4548</b>	<b>0.1147</b>	<b>0.3350</b>	<b>0.0531</b>	<b>0.4802</b>	<b>0.1325</b>	<b>0.3496</b>	<b>0.0538</b>
<b>Alpha</b>	<b>-0.0013</b>	<b>0.0001</b>	<b>0.0019</b>	<b>0.0015</b>	<b>-0.0011</b>	<b>0.0005</b>	<b>0.0024</b>	<b>0.0015</b>

  

Differences: Institutional – retail				
	1 year	3 year	5 year	10 year
<b>TI</b>	0.0002	-0.0006	-0.0007	0.0000
<b>SR</b>	-0.0255	-0.0177	-0.0146	-0.0007
<b>Alpha</b>	-0.0001	-0.0004	-0.0005	-0.0001

## (c) Midcap Growth Funds

	Institutional				Retail			
	1 year	3 year	5 year	10 year	1 year	3 year	5 year	10 year
R(p)	0.0152	0.0061	0.0105	0.0070	0.0144	0.0079	0.0116	0.0079
Rf	0.0049	0.0022	0.0016	0.0045	0.0049	0.0023	0.0016	0.0045
Cov (pb)	0.0005	0.0009	0.0008	0.0024	0.0003	0.0007	0.0007	0.0026
Var(b)	0.0004	0.0010	0.0008	0.0023	0.0019	0.0018	0.0015	0.0036
Beta	1.5065	0.9277	0.9523	1.0638	0.1469	0.3811	0.4694	0.7191
Stdev(R(p))	0.0191	0.0314	0.0291	0.0476	0.0434	0.0424	0.0383	0.0596
R(b)	0.0157	0.0082	0.0112	0.0072	0.0171	0.0047	0.0095	0.0055
<b>TI</b>	<b>0.0068</b>	<b>0.0042</b>	<b>0.0093</b>	<b>0.0023</b>	<b>0.0648</b>	<b>0.0146</b>	<b>0.0213</b>	<b>0.0047</b>
<b>SR</b>	<b>0.5412</b>	<b>0.1235</b>	<b>0.3041</b>	<b>0.0517</b>	<b>0.2196</b>	<b>0.1311</b>	<b>0.2614</b>	<b>0.0568</b>
<b>Alpha</b>	<b>-0.0059</b>	<b>-0.0016</b>	<b>-0.0003</b>	<b>-0.0004</b>	<b>0.0077</b>	<b>0.0046</b>	<b>0.0063</b>	<b>0.0027</b>

  

Differences: Institutional – retail				
	1 year	3 year	5 year	10 year
<b>TI</b>	-0.0580	-0.0104	-0.0120	-0.0024
<b>SR</b>	0.3217	-0.0075	0.0428	-0.0051
<b>Alpha</b>	-0.0136	-0.0062	-0.0066	-0.0031

Table 3. Measures for small cap funds and differences in measures.

## (a) Small cap Value funds

	Institutional				Retail			
	1 year	3 year	5 year	10 year	1 year	3 year	5 year	10 year
R(p)	0.0158	0.0052	0.0105	0.0072	0.0120	0.0073	0.0110	0.0074
Rf	0.0049	0.0022	0.0016	0.0045	0.0051	0.0023	0.0016	0.0041
Cov (pb)	0.0017	0.0014	0.0011	0.0030	0.0017	0.0016	0.0014	0.0033
Var(b)	0.0019	0.0019	0.0015	0.0036	0.0017	0.0018	0.0015	0.0036
Beta	0.8936	0.7586	0.7576	0.8422	0.9963	0.9329	0.9160	0.9309
Stdev(R(p))	0.0431	0.0432	0.0389	0.0597	0.0416	0.0418	0.0388	0.0596
R(b)	0.0171	0.0046	0.0094	0.0055	0.0139	0.0065	0.0097	0.0053
<b>TI</b>	<b>0.0122</b>	<b>0.0039</b>	<b>0.0117</b>	<b>0.0033</b>	<b>0.0069</b>	<b>0.0054</b>	<b>0.0103</b>	<b>0.0035</b>
<b>SR</b>	<b>0.2524</b>	<b>0.0683</b>	<b>0.2287</b>	<b>0.0460</b>	<b>0.1659</b>	<b>0.1193</b>	<b>0.2420</b>	<b>0.0547</b>
<b>Alpha</b>	<b>0.0000</b>	<b>0.0011</b>	<b>0.0030</b>	<b>0.0019</b>	<b>-0.0018</b>	<b>0.0011</b>	<b>0.0020</b>	<b>0.0021</b>

  

Differences: Institutional – retail				
	1 year	3 year	5 year	10 year
<b>TI</b>	0.0052	-0.0015	0.0015	-0.0002
<b>SR</b>	0.0865	-0.0511	-0.0133	-0.0086
<b>Alpha</b>	0.0018	0.0001	0.0010	-0.0002

## (b) Small cap Blend funds

	Institutional				Retail			
	1 year	3 year	5 year	10 year	1 year	3 year	5 year	10 year
R(p)	0.0188	0.0070	0.0117	0.0074	0.0147	0.0057	0.0108	0.0071
Rf	0.0049	0.0022	0.0016	0.0045	0.0049	0.0022	0.0016	0.0045
Cov (pb)	0.0012	0.0014	0.0011	0.0030	0.0012	0.0015	0.0012	0.0031
Var(b)	0.0015	0.0019	0.0016	0.0035	0.0015	0.0019	0.0016	0.0035
Beta	0.8011	0.7311	0.7211	0.8549	0.8448	0.7753	0.7892	0.8797
Stdev(R(p))	0.0382	0.0435	0.0396	0.0595	0.0382	0.0435	0.0396	0.0595
R(b)	0.0182	0.0058	0.0104	0.0068	0.0182	0.0058	0.0104	0.0068
<b>TI</b>	<b>0.0174</b>	<b>0.0065</b>	<b>0.0140</b>	<b>0.0034</b>	<b>0.0116</b>	<b>0.0045</b>	<b>0.0117</b>	<b>0.0029</b>
<b>SR</b>	<b>0.3640</b>	<b>0.1098</b>	<b>0.2553</b>	<b>0.0492</b>	<b>0.2570</b>	<b>0.0802</b>	<b>0.2327</b>	<b>0.0434</b>
<b>Alpha</b>	<b>0.0033</b>	<b>0.0022</b>	<b>0.0038</b>	<b>0.0010</b>	<b>-0.0014</b>	<b>0.0008</b>	<b>0.0023</b>	<b>0.0006</b>

Differences: Institutional – retail				
	1 year	3 year	5 year	10 year
<b>TI</b>	0.0057	0.0020	0.0023	0.0005
<b>SR</b>	0.1070	0.0296	0.0226	0.0058
<b>Alpha</b>	0.0047	0.0014	0.0015	0.0004

## (c) Small cap Growth funds

	Institutional				Retail			
	1 year	3 year	5 year	10 year	1 year	3 year	5 year	10 year
R(p)	0.0175	0.0070	0.0113	0.0077	0.0174	0.0066	0.0112	0.007647
Rf	0.0049	0.0022	0.0016	0.0045	0.0049	0.0022	0.0016	0.0045
Cov (pb)	0.0012	0.0017	0.0015	0.0034	0.0011	0.0018	0.0016	0.0033127
Var(b)	0.0013	0.0021	0.0018	0.0037	0.0013	0.0021	0.0018	0.0036985
Beta	0.9282	0.8054	0.8309	0.9211	0.9085	0.8735	0.8817	0.8956661
Stdev(R(p))	0.0354	0.0455	0.0420	0.0608	0.0354	0.0455	0.0420	0.0608156
R(b)	0.0183	0.0066	0.0112	0.0080	0.0183	0.0066	0.0112	0.0079972
<b>TI</b>	<b>0.0135</b>	<b>0.0059</b>	<b>0.0117</b>	<b>0.0034</b>	<b>0.0137</b>	<b>0.0050</b>	<b>0.0109</b>	<b>0.0035136</b>
<b>SR</b>	<b>0.3542</b>	<b>0.1039</b>	<b>0.2314</b>	<b>0.0518</b>	<b>0.3519</b>	<b>0.0957</b>	<b>0.2286</b>	<b>0.0517466</b>
<b>Alpha</b>	<b>0.0001</b>	<b>0.0012</b>	<b>0.0017</b>	<b>-0.0001</b>	<b>0.0003</b>	<b>0.0006</b>	<b>0.0011</b>	<b>1.464E-05</b>

Differences: Institutional – retail				
	1 year	3 year	5 year	10 year
<b>TI</b>	-0.0002	0.0009	0.0008	-0.0001
<b>SR</b>	0.0023	0.0082	0.0028	0.0001
<b>Alpha</b>	-0.0002	0.0007	0.0006	-0.0001

## APPENDIX B. Morningstar style box and Russell indices

Morningstar's style classification allocates funds into different categories based on fund's investment methodology and the market capitalization of the companies in which it invests. It places the funds in large-cap, medium-cap or small-cap based on the market capitalization of the equities they hold. Funds are characterized as growth oriented, value oriented and blend. The combination of orientation and market capitalization yields nine categories: Large-Cap Growth, Mid-Cap Growth and Small-Cap Growth; Large-Cap value, Mid-Cap Value and Small-Cap Value; Large-Cap Blend, Mid-Cap Blend and Small-Cap Blend. A midcap value fund (X) would be categorized as shown in the box below.

**Table B-1. Illustration of the Morningstar Style Box**

			Market Cap (size)
Orientation			Large
			Midcap
			Small
	Value	Blend	Growth

**Table B-2. Fund classifications and appropriate benchmarks.**

Fund Category	Relevant benchmark
Large-Cap Growth	Russell 1000 Growth index
Large-Cap Value	Russell 1000 Value Index
Large-Cap Blend	Russell 1000 index
Mid-Cap Growth	Russell 3000 Growth index
Mid-Cap Value	Russell 3000 Value index
Mid-Cap Blend	Russell 3000 index
Small Cap Growth	Russell 2000 Growth index
Small-Cap Value	Russell 2000 Value index
Small-Cap Blend	Russell 2000 index

## APPENDIX C. Variables, symbols and detailed formulas

There are several variables used to assess risk in performance evaluation, the two most commonly used are beta and standard deviation. The beta for (the manager of) a fund ( $\beta_p$ ) is the covariance of the fund's risk premium with the benchmark's risk premium divided by the variance of the benchmark's risk premium:

$$\beta_p = \frac{\text{Cov}(RP_{pt}, RP_{bt})}{\text{Var}(RP_{bt})} \quad \text{or}$$

$$\beta_p = \frac{\rho_{pb}}{\sigma_m^2}$$

$$\text{where } \rho_{pb} = \frac{\text{Cov}(RP_{pt}, RP_{bt})}{(\sigma(RP_{pt}))(\sigma(RP_{bt}))} \text{ and}$$

$\sigma_m^2$  is the market volatility.

where fund return observations are substituted for x and n is the sample size.

Treynor index:

$$TI = \frac{R_p - r_f}{\beta_p}$$

where,

$R_p$  = the average rate of return for the portfolio during a specified time period;

$r_f$  = the average rate of return for risk-free asset;

$\beta_p$  = the slope of the portfolio's characteristic line during the same time period.



Sharpe ratio

$$S = \frac{R_p - r_f}{\sigma_p}$$

where

$R_p$  = the average rate of return on the portfolio during a specified time period;

$\sigma_p$  = the standard deviation on the portfolio;

$r_f$  = the average rate of return on risk-free assets during the same time period; and

$(R_p - r_f)$  = the “risk premium”.

Standard deviation can be calculated readily through a software package or a program such as Microsoft

Excel, or by the following formula:

$$\sigma = \sqrt{\frac{n \sum x^2 - (\sum x)^2}{n(n-1)}}$$