Internet Appendix for "Mutual Fund Performance Evaluation and Best Clienteles"

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Abstract

This internet appendix contains a detailed description of various robustness checks of the paper and presents supplementary results not included in the paper.

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I. Conditional Best Clientele Performance Evaluation

A large body of literature, starting with Ferson and Schadt (1996) and Christopherson, Ferson, and Glassman (1998), argues that accounting for public information results in improved performance measures and that alpha varies across the business cycle. In particular, Glode (2011) shows that mutual funds could be valuable to their clienteles by providing positive alphas during recessions, when their marginal utility (or SDF) is high. Moskowitz (2000), Kosowski (2011) and Kacperczyk, Van Niewerburgh, and Veldkamp (2014) also find some evidence of better fund performance in recessions. We implement a conditional version of our performance measure that considers the best clienteles of a mutual fund in an incomplete market with investor disagreement. This section describes the conditional best clientele performance measure, the estimation strategy, the information variables used empirically and the conditional best clientele performance results.

A. Performance Measure

It is possible to develop a conditional version of the best clientele performance evaluation by following the scaled payoffs strategy of Chen and Knez (1996), Ahn, Chrétien, and Cao (2009), and Ferson, Henry, and Kisgen (2006), among others. Specifically, we form public information-managed payoffs, denoted by $\mathbf{R_Z}$, by multiplying passive returns with lagged publicly available information variables, denoted by $\mathbf{Z}$. Let $\mathbf{1_Z}$ be the corresponding prices of these payoffs, obtained by multiplying the unit vector by the lagged information variables. Then, a conditional estimation of the best clientele alpha is obtained by replacing $\mathbf{R_K}$ in the solution presented in equations (9) to (15) of the paper with $\mathbf{R_K^A}$, an augmented set of assets that includes both $\mathbf{R_K}$ and $\mathbf{R_Z}$, and by replacing the unit vector $\mathbf{1}$ with $\mathbf{1^A}$, which contains both $\mathbf{1}$ and $\mathbf{1_Z}$.

B. Estimation

To estimate a conditional best clientele alpha that varies according to publicly available information, we can use the augmented sets of payoffs and prices defined above to replace $\mathbf{R_{Kt}}$ with $\mathbf{R^{A}_{Kt}}$ and $\mathbf{1}$ with $\mathbf{1^{A}_{t-1}}$ in equations (17), (18) and (19) of the paper, and substitute the moment in equation (20) of the paper with the following moments:

(A1) $$\frac{1}{T}\sum_{t=1}^{T}\left[\left(\mathbf{a}'\mathbf{R^{A}_{Kt}} + v\left(R_{\mathrm{MF}t} - \mathbf{c}'\mathbf{R^{A}_{Kt}}\right)\right)R_{\mathrm{MF}t}\right] - 1 - (\bar{\alpha}_{\mathrm{MF0}} + \bar{\boldsymbol{\alpha}}_{\mathbf{MF1}}{}'\mathbf{Z_{t-1}}) = 0,$$

(A2) $$\frac{1}{T}\sum_{t=1}^{T}\left[\left(\mathbf{a}'\mathbf{R^{A}_{Kt}} + v\left(R_{\mathrm{MF}t} - \mathbf{c}'\mathbf{R^{A}_{Kt}}\right)\right)\mathbf{R_{MFZt}}\right] - \mathbf{1_{Zt-1}} - (\bar{\alpha}_{\mathrm{MF0}} + \bar{\boldsymbol{\alpha}}_{\mathbf{MF1}}{}'\mathbf{Z_{t-1}}) = 0.$$

These moments use a scaled version of the mutual fund return, $\mathbf{R_{MFZt}} = R_{\mathrm{MF}t} \times \mathbf{Z_{t-1}}$, with its associated price $\mathbf{1_{Zt-1}} = 1 \times \mathbf{Z_{t-1}}$, to estimate a conditional best clientele alpha that is linear in the information variables and given by $\bar{\alpha}_{\mathrm{MF0}} + \bar{\boldsymbol{\alpha}}_{\mathbf{MF1}}{}'\mathbf{Z_{t-1}}$.

C. Information Variables

We consider the lagged values of 4 public information variables that are commonly used in the literature and were first introduced by Keim and Stambaugh (1986), Campbell (1987), Campbell and Shiller (1988) and Fama and French (1989). We use the dividend yield of the S&P 500 Index (DIV) from the Datastream database, which is computed as the difference between the log of the 12-month moving sum of dividends paid on the S&P 500 and the log of its lagged value; the yield on 3-month U.S. Treasury bills (YLD) from the FRED database at the Federal Reserve Bank at St. Louis; the term spread (TERM), which is the difference between the long-term yield on government bonds (from Datastream) and the yield on the 3-month Treasury bills; and the default spread (DEF), which is the difference between BAA- and AAA-rated corporate bond yields from the FRED database.

With these lagged information variables, we construct 4 public information-managed payoffs by combining them with the market portfolio returns. We then add these 4 managed payoffs to each set of basis assets described previously to obtain the augmented sets $\mathbf{R_K^A}$ used for conditional performance evaluation.

D. Empirical Results

Table A1 presents the results for the conditional version of best clientele alphas. To revisit the findings of Glode (2011) and others, it gives statistics on average conditional alphas and average conditional alphas in expansions and recessions, with months classified according to the *NBER US Business Cycle Expansions and Contractions Reference Dates*. The table shows that the unconditional findings of the previous section extend to the average conditional results. By analyzing differences between Table 3 in the paper and Table A1, we find that the conditional version decreases the alpha for 53% of funds using the LOP measure and for 74% and 80% of the funds using the best clientele performance measures, with $\bar{h} = h^* + 0.5h\text{MKT}$ and $\bar{h} = h^* + h\text{MKT}$, respectively. However, the performance changes are less than 5 basis points for more than 90% of the funds.

Notably, the results in expansions versus recessions are generally consistent with the findings of Glode (2011). Although the mean values are similar, it becomes apparent that alphas are more positive in recessions than in expansions when comparing median values or looking at the proportions in Panel B of Table A1. For example, the best clientele measure with $\bar{h} = h^* + 0.5h\text{MKT}$ provides conditional alphas with, respectively, a mean and median of 0.220% and 0.168% in expansions, versus 0.260% and 0.400% in recessions. Its proportions of significantly positive alphas are 30.3% in expansions versus 49.9% in recessions, and its proportions of skilled funds with the FC classification are 36.2% in expansions versus 72.3% in recessions. Overall, the

inclusion of conditioning information does not alter our conclusion on the importance of investor disagreement and best clienteles. We find a generally positive performance for best clienteles, with evidence that it is more favorable in recessions than in expansions.

II. Sensitivity to Passive Portfolio Choice

Tables A2 and A3 examine of the result sensitivity to the choice of basis assets. They show unconditional performance results using basis assets based on 6 style portfolios (Table A2) and the market portfolio (Table A3). In the latter case, the LOP measure is equivalent to the CAPM measure because the SDF is linear in the market return, $m^* = a_1 R_F + a_2 R_{\text{MKT}}$.

The previous findings are confirmed when using these alternative sets of basis assets. An increase in admissible investment opportunities equivalent to half the market Sharpe ratio leads to generally positive best clientele performance values, and more skilled funds than unskilled funds, for all sets of basis assets. For example, alphas estimated from the best clientele performance measure with $\bar{h} = h^* + 0.5h\text{MKT}$ have a mean of 0.289% (*t*-stat. = 3.98) for the 6 style portfolio set and 0.270% (*t*-stat. = 4.23) for the market portfolio set. These values are slightly greater than the mean of 0.236% for the 10 industry portfolio set, a result consistent with the mean LOP alpha being lower for the industry portfolio set than for the 2 other sets. This finding, along with a general comparison of the distributions of alphas from the 3 sets, suggests that the risk-adjusted benchmarks implicit in the 6 style portfolios or the market portfolio tend to give slightly greater abnormal returns than the risk-adjusted benchmarks implicit in the 10 industry portfolios.

As before, the means of the SDF alpha distributions indicate an economically important divergence in performance evaluation between clienteles. For example, the magnitudes of average disagreement between LOP alphas and best clientele alphas with $\bar{h} = h^* + 0.5h\text{MKT}$ are relatively comparable across different basis assets (i.e., 0.415% for the 10 industry portfolio set,

0.373% for the 6 style portfolio set and 0.339% for the market portfolio set). The higher disagreement for the 10 industry portfolio set can be explained with the sources of disagreement discussed in Section II.C of the paper and related to $v\,\mathrm{E}[w^2]$. Specifically, the style portfolios span fund returns slightly better than the industry portfolios on average, as shown in Panel A of Table 2 of the paper. Their marginally smaller expected squared replicating error $\mathrm{E}[w^2]$ produces a marginally smaller disagreement on average. The market portfolio generates larger $\mathrm{E}[w^2]$ than the industry portfolios, but it also has an optimal Sharpe ratio h^* approximately equal to half the one of the industry portfolios. Although its larger $\mathrm{E}[w^2]$ increase disagreement, its much smaller h^* reduces its associated v more importantly, resulting in a smaller disagreement on average.

III. Alternative Maximum Sharpe Ratios

Table A4 presents empirical results for other sensible choices of maximum Sharpe ratios, using the risk-free rate and 10 industry portfolios as basis assets. Several papers argue that the maximum Sharpe ratio $\bar{h}$ is a subjective choice. We explore 3 additional approaches for setting $\bar{h}$. In the first approach, we select it as a multiple of the attainable Sharpe ratio of the passive portfolios. Specifically, we consider $\bar{h} = 1.5h^*$ and $\bar{h} = 2h^*$. This approach is in line with the previously reviewed literature that chooses twice the Sharpe ratio of the basis assets. However, the sample h^* can be near zero or unusually high, particularly for funds with a limited time series. Taking a multiple of a potentially unrealistic h^* might lead to an unrealistic $\bar{h}$. In the second approach, we thus *add* to h^* a fraction of the full-sample optimal basis asset Sharpe ratio. The maximum Sharpe ratios become $\bar{h} = h^* + 0.5hT$ and $\bar{h} = h^* + hT$, where hT represents the optimal Sharpe ratio of the basis assets in the full sample. In the third approach, because the sample hT might be biased upward, we use instead an adjusted Sharpe ratio hTa following the

bias correction proposed by Ferson and Siegel (2003).[1] The maximum Sharpe ratios are then $\bar{h} = h^* + 0.5hTa$ and $\bar{h} = h^* + hTa$.

The empirical results in Table A4 show that SDF alphas estimated from the best clientele performance measure have means varying from 0.297% (*t*-stat. = 3.95) for $\bar{h} = h^* + 0.5hTa$ to 0.797% (*t*-stat. = 6.34) for $\bar{h} = 2h^*$. All maximum Sharpe ratios investigated lead to best clientele performance values that are generally positive and increasing with the importance of additional opportunities allowed by the choice of $\bar{h}$. Average investor disagreement, computed as the difference between the mean alpha in Table A4 and the mean LOP alpha in Table 3 of the paper (under h^*), continues to be economically important. For example, when $\bar{h} = h^* + 0.5hTa$, we obtain an average disagreement of 0.476%. Tables A5 and A6 documents similar findings using basis assets based on 6 style portfolios or the market portfolio.

Overall, these results show that the maximum Sharpe ratio of $\bar{h} = h^* + 0.5h\text{MKT}$ favored in the paper is a relatively conservative choice. It adds fewer investment opportunities than the other sensible maximum Sharpe ratios that can be justified from the literature.

IV. Finite Sample Properties of Best Clientele Alphas

All previous results use the asymptotic GMM theory of Hansen (1982), along with Newey and West's (1987) standard errors, to make inferences on estimated alphas. However, as first documented by Ferson and Foerster (1994) in an asset-pricing context, the finite sample properties of GMM estimators can deviate from their asymptotic properties. For mutual funds, Kosowski, Timmermann, Wermers, and White (2006) and Fama and French (2010) are examples

[1]Ferson and Siegel (2003) show that the sample optimal Sharpe ratio is biased upward when the number of basis assets (*K*) is large relative to number of observations (*T*). Their proposed correction is $hTa = \sqrt{(hT)^2\,(T-K-2)/T - K/T}$.

of studies on the finite sample properties of regression-type alpha estimates. This section provides finite sample evidence on our SDF alpha estimates by conducting bootstrap simulations.

Specifically, we conduct a bootstrap experiment that imposes the null hypothesis that alpha is zero by adapting the procedure proposed in Fama and French (2010) and Ferson and Chen (2015) to the case of SDF alpha. First, we create adjusted (gross) mutual fund returns, defined as $R_{\mathrm{MF}t}^{\mathrm{Adj}} = R_{\mathrm{MF}t} - \hat{\alpha}_{\mathrm{MF}}/\widehat{\mathrm{E}(m)}$, where $\hat{\alpha}_{\mathrm{MF}}$ is the best clientele or LOP alpha estimate in the actual data, and $\widehat{\mathrm{E}(m)}$ is the mean in the actual data of the best clientele or LOP SDF associated with $\hat{\alpha}_{\mathrm{MF}}$. Using these adjusted mutual fund returns in the simulations imposes the null that the "true" alphas are zero. Second, for all funds, we form a simulated sample with a size equal to the total number of observations by drawing with replacement from their adjusted returns and the passive portfolio returns. Each draw picks the data that correspond to a randomly selected date, hence capturing the correlations across funds. This bootstrap procedure is repeated to create 1,000 samples. Following Ferson and Chen (2015), we apply the 60-month survival screen only after a fund is drawn for an artificial sample.[2] Third, we obtain the empirical distributions of the SDF alpha *t*-statistics by computing the alpha estimates and their *t*-statistics for each of the 1,000 samples, following the estimation strategy of Section III.A of the paper.

Table A7 presents, in the case of the passive portfolios based on 10 industry portfolios, the results of using bootstrap empirical distributions of the SDF alpha *t*-statistics for inference purposes. Panel A of Table A7 gives statistics on the distributions of bootstrap *p*-value statistics

[2]The simulation procedure leads to missing values being distributed randomly in the artificial sample, while they occur mainly in blocks in the original data. As discussed by Ferson and Chen (2015), it preserves the important cross-sectional dependence between funds, but not the small serial dependence in the data. Consequently, the method of Newey and West (1987) with no lag is used for standard errors in the simulations.

for the LOP measure and two best clientele performance measures (with a maximum Sharpe ratio of either $\bar{h} = h^* + 0.5h\text{MKT}$ or $\bar{h} = h^* + h\text{MKT}$). Panel B of Table A7 presents proportions of alphas that are significantly positive ($\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$) and significantly negative ($\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$) using the bootstrap *p*-values, and proportions adjusted for false discoveries based on the simulated critical values for *t*-statistics that correspond to the size used in the BSW and FC classifications. Overall, the findings of the paper on the generally positive performance for best clienteles are robust to finite sample issues. For example, the proportions in Panel B of Table A7, computed from simulated empirical distributions of the *t*-statistics, are similar to the proportions in Panel B of Table 3 of the paper, where significance is assessed with the asymptotic distribution.

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Table A1. Conditional Best Clientele Alphas Using the RF + 10I + RZ Passive Portfolio Set

Table A1 shows statistics on the cross-sectional distribution of monthly conditional SDF alphas estimated with two best clientele performance measures, allowing for maximum Sharpe ratios of $h^* + 0.5h\text{MKT}$ and $h^* + h\text{MKT}$ (see definition in Section III.B of the paper), and with the LOP measure (denoted by h^*), using the risk-free rate, 10 industry portfolios and public information-managed payoffs (RF + 10I + RZ) as basis assets. Results are shown for average conditional alphas, as well as average conditional alphas in recessions and expansion. Panel A provides the mean, standard deviation (StdDev) and median of the distributions of estimated alphas. It also reports the *t*-statistics (*t*-stat) on the significance of the mean of the estimated alphas (see test description in Section III.C of the paper). Panel B gives proportions of estimated alphas that are positive ($\%\bar{\alpha}_{\text{MF}} > 0$), negative ($\%\bar{\alpha}_{\text{MF}} < 0$), significantly positive ($\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$), and significantly negative ($\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$). It also provides proportions adjusted for false discoveries according to the BSW and FC classifications (see description in Section III.C of the paper), i.e., proportions of zero alpha, unskilled and skilled funds. It finally presents the *p*-values (in parentheses) for the likelihood ratio tests (see Section III.C) that the proportions of positive estimated alphas are equal to 50%, and the proportions of significantly positive and significantly negative estimated alphas are equal to 2.5%. The data (see description in Table 1 of the paper) cover the period Jan. 1984-Dec. 2012. All statistics are in percentage except the *t*-statistics. ** and *** denote statistical significance at the 5% and 1% levels, respectively.

Panel A. Performance and *t*-statistics of Individual Mutual Funds

	Performance			*t*-statistics		
	h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$	h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$
			Average Conditional Alphas			
Mean	–0.1795	0.2298	0.4347	–1.2283	1.0138	1.8980
Std Dev	0.2684	0.3322	0.4145	1.4582	1.4399	1.4186
(*t*-stat)	$(-3.176)^{***}$	$(3.284)^{***}$	$(4.980)^{***}$			
Median	–0.1642	0.1813	0.3524	–1.1368	1.0528	1.8940
			Average Conditional Alphas in Expansions			
Mean	–0.1888	0.2200	0.4245	–1.4069	1.4647	2.6376
Std Dev	0.2576	0.3287	0.4134	1.5131	2.5582	3.1596
(*t*-stat)	$(-3.481)^{***}$	$(3.178)^{***}$	$(4.877)^{***}$			
Median	–0.1812	0.1682	0.3384	–1.2477	0.8822	1.7058
			Average Conditional Alphas in Recessions			
Mean	–0.2005	0.2596	0.4884	–0.4067	1.7604	3.0569
Std Dev	1.1634	1.0654	1.1371	6.3434	7.7998	7.8361
(*t*-stat)	(–0.818)	(1.157)	$(2.040)^{**}$			
Median	0.1232	0.3999	0.5584	0.9875	2.0451	2.6832

Table A1. Conditional Best Clientele Alphas Using the RF + 10I + RZ Passive Portfolio Set (Continued)

Panel B. Performance Proportions				
		h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$
Average Conditional Alphas				
Performance Sign	$\%\bar{\alpha}_{\text{MF}} > 0$	19.81(0.00)***	77.93 (0.00)***	91.03 (0.00)***
	$\%\bar{\alpha}_{\text{MF}} < 0$	80.19	22.07	8.97
Performance Significance	$\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$	1.01 (0.00)***	24.23 (0.00)***	47.67 (0.00)***
	$\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$	29.40 (0.00)***	2.15 (23.05)	0.36 (0.00)***
BSW Classification Adjusted for False Discoveries	Zero alpha	49.06	49.53	22.62
	Unskilled	50.94	0.00	0.00
	Skilled	0.00	50.47	77.38
FC Classification Adjusted for False Discoveries	Zero alpha	67.64	65.63	34.95
	Unskilled	32.36	0.00	0.00
	Skilled	0.00	34.37	65.05
Average Conditional Alphas in Expansions				
Performance Sign	$\%\bar{\alpha}_{\text{MF}} > 0$	16.12(0.00)***	75.09(0.00)***	89.91(0.00)***
	$\%\bar{\alpha}_{\text{MF}} < 0$	83.88	24.91	10.09
Performance Significance	$\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$	0.65(0.00)***	30.29(0.00)***	45.37(0.00)***
	$\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$	34.06(0.00)***	2.30(0.49)***	0.75(0.00)***
BSW Classification Adjusted for False Discoveries	Zero alpha	46.65	62.41	38.83
	Unskilled	53.35	0.00	0.00
	Skilled	0.00	37.59	61.17
FC Classification Adjusted for False Discoveries	Zero alpha	64.55	63.76	43.76
	Unskilled	35.45	0.00	0.00
	Skilled	0.00	36.24	56.24
Average Conditional Alphas in Recessions				
Performance Sign	$\%\bar{\alpha}_{\text{MF}} > 0$	58.08(0.00)***	75.41(0.00)***	80.15(0.00)***
	$\%\bar{\alpha}_{\text{MF}} < 0$	41.92	24.59	19.85
Performance Significance	$\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$	38.05(0.00)***	49.89(0.00)***	56.96(0.00)***
	$\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$	26.63(0.00)***	15.51(0.00)***	12.96(0.00)***
BSW Classification Adjusted for False Discoveries	Zero alpha	22.21	26.15	20.43
	Unskilled	31.23	12.79	10.50
	Skilled	46.56	61.06	69.07
FC Classification Adjusted for False Discoveries	Zero alpha	33.46	27.70	21.12
	Unskilled	2.52	0.00	0.00
	Skilled	64.02	72.30	78.88

Table A2. Best Clientele Alphas Using the RF + 6S Passive Portfolio Set

Table A2 shows statistics on the cross-sectional distribution of monthly SDF alphas estimated with two best clientele performance measures, allowing for maximum Sharpe ratios of $h^* + 0.5h\text{MKT}$ and $h^* + h\text{MKT}$ (see definition in Section III.B of the paper), and with the LOP measure (denoted by h^*), using the risk-free rate and 6 style portfolios (RF + 6S) as basis assets. Panel A provides the mean, standard deviation (StdDev) and selected percentiles of the distributions of estimated alphas (columns under Performance) and their corresponding *t*-statistics (columns under *t*-statistics). It also reports the *t*-statistics (*t*-stat) on the significance of the mean of the estimated alphas (see test description in Section III.C of the paper). Panel B gives the proportions of estimated alphas that are positive ($\%\bar{\alpha}_{\text{MF}} > 0$), negative ($\%\bar{\alpha}_{\text{MF}} < 0$), significantly positive ($\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$), and significantly negative ($\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$). It also provides proportions adjusted for false discoveries according to the BSW and FC classifications (see Section III.C), i.e., proportions of zero alpha, unskilled and skilled funds. It finally presents the *p*-values (in parentheses) for the likelihood ratio tests (see Section III.C) that the proportions of positive estimated alphas are equal to 50%, and the proportions of significantly positive and significantly negative estimated alphas are equal to 2.5%. The data (see description in Table 1 of the paper) cover the period Jan. 1984-Dec. 2012. All statistics are in percentage except the *t*-statistics. *** denotes statistical significance at the 1% level.

Panel A. Performance and *t*-statistics of Individual Mutual Funds

	Performance			*t*-statistics		
	h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$	h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$
Mean	–0.0839	0.2889	0.4724	–0.7286	1.5947	2.4692
StdDev	0.2680	0.3447	0.4168	1.5176	1.4563	1.4438
(*t*-stat)	(–1.487)	(3.980)***	(5.383)***			
99th	0.5424	1.4189	1.9912	2.7262	5.0331	6.0327
95th	0.3215	0.8744	1.1629	1.8065	3.9703	4.8819
90th	0.2063	0.7058	0.9627	1.2286	3.4759	4.3607
75th	0.0364	0.4394	0.6507	0.2899	2.5770	3.4205
50th	–0.0866	0.2174	0.3753	–0.7565	1.5263	2.4066
25th	–0.2015	0.0829	0.2119	–1.7059	0.6696	1.5284
10th	–0.3333	–0.0235	0.0948	–2.6708	–0.1833	0.7152
5th	–0.4451	–0.1086	0.0207	–3.2540	–0.8038	0.1600
1st	–0.7944	–0.3439	–0.1702	–4.3803	–1.8938	–0.9180

Panel B. Performance Proportions

		h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$
Performance Sign	$\%\bar{\alpha}_{\text{MF}} > 0$	31.19 (0.00)***	87.87 (0.00)***	95.87 (0.00)***
	$\%\bar{\alpha}_{\text{MF}} < 0$	68.81	12.13	4.13
Performance Significance	$\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$	3.73 (0.01)***	39.02 (0.00)***	63.35 (0.00)***
	$\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$	20.03 (0.00)***	0.90 (0.00)***	0.29 (0.00)***
BSW Classification Adjusted for False Discoveries	Zero alpha	58.95	49.19	12.25
	Unskilled	38.28	0.00	0.00
	Skilled	2.78	50.81	87.75
FC Classification Adjusted for False Discoveries	Zero alpha	75.02	48.88	17.19
	Unskilled	24.98	0.00	0.00
	Skilled	0.00	51.12	82.81

Table A3. Best Clientele Alphas Using the RF + MKT Passive Portfolio Set

Table A3 shows statistics on the cross-sectional distribution of monthly SDF alphas estimated with two best clientele performance measures, allowing for maximum Sharpe ratios of $h^* + 0.5h\text{MKT}$ and $h^* + h\text{MKT}$ (see definition in Section III.B of the paper), and with the LOP measure (denoted by h^*), using the risk-free rate and the market portfolio (RF + MKT) as basis assets. Panel A provides the mean, standard deviation (StdDev) and selected percentiles of the distributions of estimated alphas (columns under Performance) and their corresponding *t*-statistics (columns under *t*-statistics). It also reports the *t*-statistics (*t*-stat) on the significance of the mean of the estimated alphas (see test description in Section III.C of the paper). Panel B gives proportions of estimated alphas that are positive ($\%\bar{\alpha}_{\text{MF}} > 0$), negative ($\%\bar{\alpha}_{\text{MF}} < 0$), significantly positive ($\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$), and significantly negative ($\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$). It also provides proportions adjusted for false discoveries according to the BSW and FC classifications (see Section III.C), i.e., proportions of zero alpha, unskilled and skilled funds. It finally presents the *p*-values (in parentheses) for the likelihood ratio tests (see Section III.C) that the proportions of positive estimated alphas are equal to 50%, and the proportions of significantly positive and significantly negative estimated alphas are equal to 2.5%. The data (see description in Table 1 of the paper) cover the period Jan. 1984-Dec. 2012. All statistics are in percentage except the *t*-statistics. ** and *** denote statistical significance at the 5% and 1% levels, respectively.

Panel A. Performance and *t*-statistics of Individual Mutual Funds

	Performance			*t*-statistics		
	h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$	h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$
Mean	–0.0683	0.2703	0.4703	–0.3830	1.1799	1.9011
StdDev	0.2747	0.3034	0.3655	1.1960	1.1825	1.1831
(*t*-stat)	(–1.180)	(4.231)***	(6.110)***			
99th	0.4663	1.1161	1.6469	2.2969	3.9490	4.8580
95th	0.2957	0.7570	1.0525	1.4196	3.0472	3.8673
90th	0.2171	0.6252	0.9001	1.0338	2.6149	3.4019
75th	0.0767	0.4427	0.6824	0.4046	1.9450	2.6431
50th	–0.0515	0.2531	0.4381	–0.3137	1.2177	1.8795
25th	–0.1845	0.0793	0.2136	–1.1147	0.4580	1.1640
10th	–0.3458	–0.0381	0.0829	–1.8898	–0.2371	0.5229
5th	–0.4818	–0.1437	–0.0015	–2.4349	–0.8009	–0.0157
1st	–0.8637	–0.4081	–0.2692	–3.7594	–1.9842	–1.1347

Panel B. Performance Proportions

		h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$
Performance Sign	$\%\bar{\alpha}_{\text{MF}} > 0$	39.63 (0.00)***	86.04 (0.00)***	94.94 (0.00)***
	$\%\bar{\alpha}_{\text{MF}} < 0$	60.37	13.96	5.06
Performance Significance	$\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$	1.87 (2.50)**	24.37 (0.00)***	47.31 (0.00)***
	$\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$	9.37 (0.00)***	1.08 (0.00)***	0.22 (0.00)***
BSW Classification Adjusted for False Discoveries	Zero alpha	84.41	41.78	15.21
	Unskilled	15.59	0.00	0.00
	Skilled	0.00	58.22	84.79
FC Classification Adjusted for False Discoveries	Zero alpha	91.53	64.46	34.92
	Unskilled	8.47	0.00	0.00
	Skilled	0.00	35.54	65.08

Table A4. Best Clientele Alphas for Alternative Maximum Sharpe Ratio Choices Using the RF + 10I Passive Portfolio Set

Table A4 shows statistics on the cross-sectional distribution of monthly SDF alphas estimated with 6 best clientele performance measures, allowing for maximum Sharpe ratios of $1.5h^*$, $2h^*$, $h^* + 0.5hT$, $h^* + hT$, $h^* + 0.5hTa$ and $h^* + hTa$ (see definition in Section III of the Internet Appendix), using the risk-free rate and 10 industry portfolios (RF + 10I) as basis assets. It provides the mean, standard deviation (StdDev) and selected percentiles of the distributions of estimated alphas (columns under Performance) and their corresponding *t*-statistics (columns under *t*-statistics). It also reports the *t*-statistics (*t*-stat) on the significance of the mean of the estimated alphas (see test description in Section III.C of the paper). The data (see description in Table 1 of the paper) cover the period Jan. 1984-Dec. 2012. All statistics are in percentage except the *t*-statistics. *** denotes statistical significance at the 1% level.

	Performance						*t*-statistics					
	$1.5h^*$	$2h^*$	$h^* + 0.5hT$	$h^* + hT$	$h^* + 0.5hTa$	$h^* + hTa$	$1.5h^*$	$2h^*$	$h^* + 0.5hT$	$h^* + hT$	$h^* + 0.5hTa$	$h^* + hTa$
Mean	0.4493	0.7973	0.4312	0.7669	0.2972	0.5428	1.9078	2.9954	1.8554	2.9386	1.3012	2.2612
StdDev	0.4197	0.5924	0.4127	0.5744	0.3571	0.4638	1.3900	1.3804	1.4022	1.3971	1.4220	1.3934
(*t*-stat)	(5.083)***	(6.392)***	(4.961)***	(6.341)***	(3.953)***	(5.557)***						
99th	1.8227	2.8781	1.8027	2.7665	1.4215	2.1207	5.3865	6.5569	5.3976	6.5673	4.8006	5.8459
95th	1.1659	1.8490	1.1321	1.7692	0.8968	1.3376	4.2270	5.4629	4.2018	5.4228	3.6333	4.6873
90th	0.9781	1.5523	0.9554	1.4971	0.7342	1.1374	3.5974	4.7727	3.5349	4.7671	3.0294	4.0023
75th	0.6834	1.1134	0.6655	1.0742	0.4995	0.8020	2.7638	3.8115	2.7182	3.7946	2.2002	3.0911
50th	0.3694	0.6661	0.3471	0.6416	0.2340	0.4455	1.9116	2.9080	1.8529	2.8461	1.3327	2.2237
25th	0.1518	0.3558	0.1417	0.3359	0.0592	0.2075	1.0726	2.1229	1.0197	2.0424	0.4554	1.4120
10th	0.0198	0.1967	0.0113	0.1896	–0.0668	0.0696	0.1690	1.3675	0.1077	1.2541	–0.5156	0.5470
5th	–0.0579	0.1241	–0.0793	0.1171	–0.1541	–0.0044	–0.4036	0.8194	–0.5104	0.7237	–1.1268	–0.0315
1st	–0.2559	–0.0336	–0.2503	–0.0190	–0.3882	–0.1543	–1.4611	–0.1925	–1.5536	–0.1024	–2.2417	–0.9806

Table A5. Best Clientele Alphas for Alternative Maximum Sharpe Ratio Choices Using the RF + 6S Passive Portfolio Set

Table A5 shows statistics on the cross-sectional distribution of monthly SDF alphas estimated with 6 best clientele performance measures, allowing for maximum Sharpe ratios of $1.5h^*$, $2h^*$, $h^* + 0.5hT$, $h^* + hT$, $h^* + 0.5hTa$ and $h^* + hTa$ (see definition in Section III of the Internet Appendix), using the risk-free rate and 6 style portfolios (RF + 6S) as basis assets. It provides the mean, standard deviation (StdDev) and selected percentiles of the distributions of estimated alphas (columns under Performance) and their corresponding *t*-statistics (columns under *t*-statistics). It also reports the *t*-statistics (*t*-stat) on the significance of the mean of the estimated alphas (see test description in Section III.C of the paper). The data (see description in Table 1 of the paper) cover the period Jan. 1984-Dec. 2012. All statistics are in percentage except the *t*-statistics. *** denotes statistical significance at the 1% level.

	Performance						*t*-statistics					
	$1.5h^*$	$2h^*$	$h^* + 0.5hT$	$h^* + hT$	$h^* + 0.5hTa$	$h^* + hTa$	$1.5h^*$	$2h^*$	$h^* + 0.5hT$	$h^* + hT$	$h^* + 0.5hTa$	$h^* + hTa$
Mean	0.5070	0.8336	0.5032	0.8272	0.4460	0.7300	2.6056	3.6689	2.5965	3.6593	2.3555	3.3887
StdDev	0.4290	0.5826	0.4300	0.5815	0.4057	0.5343	1.4315	1.4607	1.4440	1.4732	1.4441	1.4607
(*t*-stat)	(5.612)***	(6.795)***	(5.557)***	(6.755)***	(5.222)***	(6.489)***						
99th	2.0568	3.0482	2.0701	2.9757	1.9312	2.6753	6.1934	7.4169	6.1807	7.3761	5.9092	7.0363
95th	1.2594	1.8209	1.2278	1.7985	1.1265	1.6204	5.0098	6.1325	5.0009	6.1443	4.7509	5.8024
90th	1.0066	1.4777	1.0080	1.4722	0.9228	1.3332	4.4851	5.5998	4.4896	5.6057	4.2352	5.3185
75th	0.6886	1.0655	0.6868	1.0549	0.6203	0.9451	3.5186	4.5684	3.5481	4.5700	3.3115	4.3208
50th	0.4074	0.6936	0.4028	0.6901	0.3529	0.6033	2.5387	3.6057	2.5349	3.5986	2.2913	3.3433
25th	0.2371	0.4592	0.2327	0.4545	0.1928	0.3902	1.6615	2.6673	1.6476	2.6374	1.4268	2.3905
10th	0.1154	0.3101	0.1132	0.3034	0.0798	0.2483	0.8503	1.8516	0.8314	1.8336	0.6052	1.5958
5th	0.0509	0.2361	0.0394	0.2296	0.0053	0.1748	0.3139	1.4199	0.3067	1.3465	0.0305	1.1069
1st	–0.1142	0.0961	–0.1449	0.0646	–0.1918	0.0151	–0.7048	0.5640	–0.7545	0.4216	–1.0606	0.1196

Table A6. Best Clientele Alphas for Alternative Maximum Sharpe Ratio Choices Using the RF + MKT Passive Portfolio Set

Table A6 shows statistics on the cross-sectional distribution of monthly SDF alphas estimated with two best clientele performance measures, allowing for maximum Sharpe ratios of $1.5h^*$ and $2h^*$ (see definition in Section III of the Internet Appendix), using the risk-free rate and the market portfolio (RF + MKT) as basis assets. It provides the mean, standard deviation (StdDev) and selected percentiles of the distributions of estimated alphas (columns under Performance) and their corresponding *t*-statistics (columns under *t*-statistics). It also reports the *t*-statistics (*t*-stat) on the significance of the mean of the estimated alphas (see test description in Section III.C of the paper). The data (see description in Table 1 of the paper) cover the period Jan. 1984-Dec. 2012. All statistics are in percentage except the *t*-statistics. *** denotes statistical significance at the 1% level.

	Performance		*t*-statistics	
	$1.5h^*$	$2h^*$	$1.5h^*$	$2h^*$
Mean	0.2505	0.4352	1.1110	1.7837
StdDev	0.3049	0.3757	1.2105	1.2607
(*t*-stat)	(3.901)***	(5.501)***		
99th	1.1289	1.6323	3.9514	4.8521
95th	0.7287	1.0219	3.0206	3.8211
90th	0.5985	0.8716	2.5699	3.3744
75th	0.4220	0.6381	1.8873	2.5850
50th	0.2280	0.4002	1.1412	1.7706
25th	0.0601	0.1835	0.3614	1.0109
10th	–0.0588	0.0505	–0.3316	0.2718
5th	–0.1636	–0.0524	–0.8830	–0.3185
1st	–0.4768	–0.3821	–2.2526	–1.6330

Table A7. Bootstrap *p*-values and Proportions Using the RF + 10I Passive Portfolio Set

Table A7 shows statistics on the cross-sectional distribution of bootstrap *p*-values for alphas estimated with two best clientele performance measures, allowing for maximum Sharpe ratios of $h^* + 0.5h\text{MKT}$ and $h^* + h\text{MKT}$ (see definition in Section III.B of the paper), and with the LOP measure (denoted by h^*), using the risk-free rate and 10 industry portfolios (RF + 10I) as basis assets. Panel A provides the mean, standard deviation (StdDev) and selected percentiles of the distributions of the bootstrap *p*-values. Panel B gives proportions of alphas that are significantly positive ($\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$) and significantly negative ($\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$) using the bootstrap *p*-values. It also provides proportions adjusted for false discoveries, i.e., proportions of zero alpha, unskilled and skilled funds, based on the simulated critical values for the *t*-statistics that correspond to the size used for the BSW or FC classifications (see description in Section III.C of the paper). It finally presents the *p*-values (in parentheses) for the likelihood ratio tests (see Section III.C) that the proportions of significantly positive and significantly negative estimated alphas are equal to 2.5%. The data (see description in Table 1 of the paper) cover the period Jan. 1984-Dec. 2012. All statistics are in percentage. *** denotes statistical significance at the 1% level.

Panel A. Bootstrap Performance *p*-values

	h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$
Mean	32.19	32.13	19.20
StdDev	31.43	30.88	26.23
99th	98.80	98.40	96.00
95th	91.60	91.80	80.80
90th	82.80	82.40	62.60
75th	56.80	56.60	29.60
50th	21.80	21.80	5.94
25th	3.20	4.20	0.40
10th	0.20	0.40	0.00
5th	0.00	0.00	0.00
1st	0.00	0.00	0.00

Panel B. Bootstrap Performance Proportions

		h^*	$h^* + 0.5h\text{MKT}$	$h^* + h\text{MKT}$
Performance	$\%\bar{\alpha}_{\text{MF}}\text{signif} > 0$	0.93 (0.00)***	22.47 (0.00)***	46.73 (0.00)***
Significance	$\%\bar{\alpha}_{\text{MF}}\text{signif} < 0$	28.46 (0.00)***	4.31 (0.00)***	1.08 (0.00)***
BSW Classification Adjusted for False Discoveries	Zero alpha	52.18	58.22	27.40
	Unskilled	47.82	0.00	0.00
	Skilled	0.00	41.78	72.60
FC Classification Adjusted for False Discoveries	Zero alpha	69.19	68.71	38.47
	Unskilled	30.81	0.00	0.00
	Skilled	0.00	31.29	61.53