Internet Appendix to

Passive versus Active Fund Performance: Do Index Funds Have Skill?

In this appendix, we report additional analyses supporting the discussion in the paper.

IA.1. Fama-French Bootstrap Plots

Figure IA.1 plots the bootstrapped and actual distributions of gross zero-alpha performance (in terms of $t(\alpha)$) for index and active funds under CAPM, the Fama-French-Carhart, and Cremers-Petajisto-Zitzewitz 7-factor models. The figures in the right column show that the results for actively-managed funds in our sample are consistent with Fama and French (2010). For the Fama-French-Carhart model, there is evidence active funds both underperform (below the 40th percentile) and outperform (above the 40th percentile) the bootstrapped zero-alpha distribution. However, the left column of Figure IA.1 shows that index funds also generally outperform the no-skill distributions above the 20th percentile. The values of the CDFs at select points in the distribution are tabulated in Table 2 of the paper.

IA.2. League Tables

We present the league table under the CPZ7 model in the paper. Here, we report league tables listing the top and bottom 10 index funds under the other benchmark models (Tables IA.1–IA.5). For a given benchmark model/performance measure pair, the league tables also report the fund's average alpha and t-stat ranks across all benchmark models.

IA.3. Gross dollar returns

Berk and van Binsbergen (2015) argue that model-based alphas are poor measures for mutual fund skill and that skill should be measured as the total dollar value extracted from the market by fund managers. Specifically, they calculate skill as the time-series average of the dollar value of model-adjusted performance:

$$d_i = \frac{1}{T_i} \sum_{t=1}^{T_i} q_{it-1} \cdot \alpha_{it}$$

where q_{it-1} is the lagged real assets under management and α_{it} is the gross benchmark-adjusted performance of fund i in month t. Given the size disparity between active and passive funds, this measure could lead to different conclusions relative to the tests in the paper.

We calculate d_i for active and index funds using our set of benchmark models and report the results in Table IA.6. Our skill measures are denoted in 2013 dollars. The distribution of the dollar amount extracted from the market by active funds largely overlaps with the performance distribution of index funds in the right tail while index funds generally substantially outperform active funds in the left tail.[25]

In our sample, the median active fund loses \$33,000 per month to the market on a benchmark-adjusted basis (Fama-French-Carhart), before fees. The point estimate for the median index fund is higher, a difference of \$69,000 per month. At the 5th percentile, the index funds outperform active funds by \$1.5 million per month under the FFC model. On the other hand, the performance differential in the right tail only consistently favors (across models) active funds at the 99th percentile. At the 75th and 95th percentiles, 9 of 12 point estimates across models indicate that index funds perform at least as well as the active funds at these points of the distribution.

IA.4. Comparison of high Active Share or Return Gap funds to index funds

The stochastic dominance tests in Section 4.3 suggest index funds provide an investment opportunity set that is at least as good as active funds if an investor faces a random draw from index funds versus active funds. However, investors may not randomly choose between all active funds. Instead, they may first screen active funds based on characteristics previously identified to be correlated with subsequent performance like Active Share (Cremers and

[25]Berk and van Binsbergen (2015) report the distribution of their value added measure for active and index funds in Table 7 of their paper. Consistent with the main results of our paper, their active and index fund distributions exhibit remarkably similar levels of dispersion from the 5th to 95th percentile. Unlike our sample, they find that index fund dollar returns are lower at the 1st and 99th percentiles, presumably due to different sample periods and filters.

Petajisto (2009)) or Return Gap (Kacperczyk, Sialm and Zheng (2008)). Accordingly, we report a comparison of the performance of active funds in the top quartile of Active Share (Cremers and Petajisto (2009)) and Return Gap (Kacperczyk, Sialm and Zheng (2008)) over our sample period to the performance of index funds. Distributions of performance using the Fama-French-Carhart model are summarized in Figure IA.2.

If these most actively-managed funds all provide value incremental to index funds, their performance distribution should be shifted to the right; that is, they should first-order stochastically dominate the index funds. The plots of gross alphas show that the distribution of the most active actively-managed funds is wider than that of index funds, but they do not first-order dominate the index funds. While some of the most active funds exhibit higher alpha estimates in the right tail before fees, the most active funds also underperform in the left tail. If gross alphas are scaled by idiosyncratic risk (t-statistics), the index fund distribution is still remarkably similar to that of the most active actively-managed funds, and active funds are indistinguishable from passive funds over most of the distribution.

In terms of second-order stochastic dominance, the alphas of index funds dominate even the alphas of these most-active funds for either top quartile Active Share or Return Gap funds. The test of the null Index dominates Active has a p-value of 0.923 (0.821) for Active Share (Return Gap) while the test of the null Active dominates Index is strongly rejected with a p-value of 0.000 (0.003) for Active Share (Return Gap). The most active funds look most attractive under the t-statistic distributions, under which we cannot reject the null of second-order dominance in either direction for either high Active Share or high Return Gap funds.

The results suggest that a fraction, but not all, of the more active funds outperform the index funds, validating the use of cross-sectional sorts to help identify skill. Nonetheless, these cross-sectional sorts are noisy enough that investors who base decisions on benchmark-adjusted returns should still prefer an investment in index funds before fees.

Table IA.1: League Table - Excess of S&P 500 benchmark

This table reports the top and bottom ten index funds based on alpha and $t(\alpha)$ as well as the average rank of each measure across six benchmarks: Excess of S&P 500, CAPM, Fama-French-Carhart, Vanguard Basis, Cremers-Petajisto-Zitzewitz 7-factor, and Ferson-Schadt. The ranks are out of the 237 funds.

Top 10 Alpha (Excess of S&P 500)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Rydex ETF Trust: Guggenheim S&P SmallCap 600 Pure Value ETF	92	133
2	Rydex ETF Trust: Rydex S&P 500 Pure Value ETF	5	19
3	Rydex ETF Trust: Rydex S&P MidCap 400 Pure Value ETF	41	96
4	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8
5	Schwab Capital Trust: Schwab Institutional Select Small-Cap Value Index Fund	133	152
6	Rydex ETF Trust: Rydex S&P MidCap 400 Pure Growth ETF	17	66
7	Rydex ETF Trust: Rydex S&P SmallCap 600 Pure Growth ETF	19	56
8	First Trust ETF: First Trust US IPO Index Fund	6	11
9	Rydex Series Funds: S&P MidCap 400 Pure Growth Fund	10	26
10	RiverSource Market Advantage Series, Inc: RiverSource Small Company Index Fund	60	82

Bottom 10 Alpha (Excess of S&P 500)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	iShares Trust: iShares Morningstar Large Value Index Fund	20	36
2	First Trust ETF: First Trust Value Line 100 ETF	2	12
3	PowerShares ETF Trust: PowerShares Dynamic OTC Portfolio	4	11
4	First Trust ETF: First Trust Value Line Equity Allocation Index Fund	6	21
5	PowerShares ETF Trust: PowerShares High Yield Equity Dividend Achievers Portfolio	74	72
6	iShares Trust: iShares NYSE 100 Index Fund	37	46
7	Vanguard Specialized Funds: Vanguard Dividend Appreciation Index Fund	128	120
8	Rydex ETF Trust: Rydex Russell Top 50 ETF	90	82
9	iShares Trust: iShares Dow Jones Select Dividend Index Fund	137	106
10	db-X Exhange Traded Funds Inc: db X-trackers 2040 Target Date Fund	28	40

Top 10 $t(\alpha)$ (Excess of S&P 500)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Vanguard Index Funds: Vanguard 500 Index Fund	126	60
2	Vanguard Institutional Index Fund: Vanguard Institutional Index Fund	128	69
3	T Rowe Price Index Trust; T Rowe Price Equity Index 500 Fund	123	47
4	AIM Counselor Series Trust (Invesco Counselor Series Trust): Invesco S&P 500 Index Fund	150	109
5	Schwab Capital Trust: S&P 500 Index Fund	139	78
6	T Rowe Price Index Trust; T Rowe Price Total Equity Market Index Fund	110	24
7	First Trust ETF: First Trust US IPO Index Fund	6	11
8	Schwab Capital Trust: Schwab Total Stock Market Index Fund	102	9
9	PowerShares ETF Trust: Buyback Achievers Portfolio	10	14
10	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8

Bottom 10 $t(\alpha)$ (Excess of S&P 500)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	iShares Trust: iShares Morningstar Large Value Index Fund	20	36
2	iShares Trust: iShares S&P 100 Index Fund	57	49
3	iShares Trust: iShares NYSE 100 Index Fund	37	46
4	Advantus Index 500 Fund	79	67
5	Vanguard Specialized Funds: Vanguard Dividend Appreciation Index Fund	128	120
6	Fidelity Commonwealth Trust: Fidelity Series 100 Index Fund	54	59
7	db-X Exhange Traded Funds Inc: db X-trackers 2040 Target Date Fund	28	40
8	Rydex ETF Trust: Rydex Russell Top 50 ETF	90	82
9	WisdomTree Trust: WisdomTree Earnings 500 Fund	133	134
10	PowerShares ETF Trust: PowerShares Dynamic OTC Portfolio	4	11

Table IA.2: League Table - CAPM benchmark

This table reports the top and bottom ten index funds based on alpha and $t(\alpha)$ as well as the average rank of each measure across six benchmarks: Excess of S&P 500, CAPM, Fama-French-Carhart, Vanguard Basis, Cremers-Petajisto-Zitzewitz 7-factor, and Ferson-Schadt. The ranks are out of the 237 funds.

Top 10 Alpha (CAPM)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8
2	First Trust ETF: First Trust Morningstar Dividend Leaders Index Fund	19	53
3	Schwab Capital Trust: Schwab Institutional Select Small-Cap Value Index Fund	133	152
4	RiverSource Market Advantage Series, Inc: RiverSource Small Company Index Fund	60	82
5	PowerShares ETF Trust: Buyback Achievers Portfolio	10	14
6	Dreyfus Index Funds, Inc: Dreyfus SmallCap Stock Index Fund	42	48
7	Rydex Series Funds: S&P MidCap 400 Pure Growth Fund	10	26
8	WisdomTree Trust: WisdomTree Equity Income Fund	35	83
9	First Trust ETF: First Trust US IPO Index Fund	6	11
10	California Investment Trust: S&P SmallCap Index Fund	54	66

Bottom 10 Alpha (CAPM)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	PowerShares ETF Trust: PowerShares Zacks Micro Cap Portfolio	4	10
2	First Trust ETF: First Trust Value Line 100 ETF	2	12
3	iShares Trust: iShares Morningstar Large Value Index Fund	20	36
4	Claymore ETF Trust: Wilshire Micro-Cap ETF	36	50
5	PowerShares ETF Trust: PowerShares Dynamic OTC Portfolio	4	11
6	First Trust ETF: First Trust Value Line Equity Allocation Index Fund	6	21
7	First Trust ETF: First Trust Capital Strength ETF	42	57
8	PowerShares ETF Trust: PowerShares High Yield Equity Dividend Achievers Portfolio	74	72
9	Schwab Capital Trust: Schwab Fundamental US Small-Mid Company Index Fund	67	59
10	iShares Trust: iShares NYSE 100 Index Fund	37	46

Top 10 $t(\alpha)$ (CAPM)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	PowerShares ETF Trust: Buyback Achievers Portfolio	10	14
2	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8
3	Dreyfus Index Funds, Inc: Dreyfus SmallCap Stock Index Fund	42	48
4	California Investment Trust: S&P SmallCap Index Fund	54	66
5	First Trust ETF: First Trust US IPO Index Fund	6	11
6	SPDR S&P MidCap 400 ETF	60	77
7	RiverSource Market Advantage Series, Inc: RiverSource Small Company Index Fund	60	82
8	Rydex Series Funds: S&P MidCap 400 Pure Growth Fund	10	26
9	California Investment Trust: S&P MidCap Index Fund	55	56
10	Columbia Funds Series Trust: Columbia Small Cap Index Fund	66	80

Bottom 10 $t(\alpha)$ (CAPM)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	MassMutual Select Funds: MM S&P Index Fund	58	28
2	Legg Mason Partners Equity Trust: Legg Mason Batterymarch S&P 500 Index Fund	73	72
3	Vantagepoint Funds: 500 Stock Index Fund	70	65
4	AIM Stock Funds: AIM S&P 500 Index Fund	52	33
5	E*TRADE Funds: E*TRADE S&P 500 Index Fund	63	54
6	PNC Funds: PNC S&P 500 Index Fund	76	78
7	Thrivent Mutual Funds: Thrivent Large Cap Index Fund	67	53
8	Schwab Capital Trust: Schwab Institutional Select S&P 500 Fund	78	85
9	Calvert Social Index Series, Inc: Calvert Social Index Fund	29	26
10	iShares Trust: iShares Morningstar Large Value Index Fund	20	36

Table IA.3: League Table - FFC benchmark

This table reports the top and bottom ten index funds based on alpha and $t(\alpha)$ as well as the average rank of each measure across six benchmarks: Excess of S&P 500, CAPM, Fama-French-Carhart, Vanguard Basis, Cremers-Petajisto-Zitzewitz 7-factor, and Ferson-Schadt. The ranks are out of the 237 funds.

Top 10 Alpha (FFC)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	First Trust ETF: First Trust Morningstar Dividend Leaders Index Fund	19	53
2	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8
3	WisdomTree Trust: WisdomTree Equity Income Fund	35	83
4	Rydex ETF Trust: Rydex S&P 500 Pure Value ETF	5	19
5	PowerShares ETF Trust: Buyback Achievers Portfolio	10	14
6	First Trust ETF: First Trust US IPO Index Fund	6	11
7	Rydex Series Funds: NASDAQ-100 Fund	24	51
8	WisdomTree Trust: WisdomTree MidCap Dividend Fund	24	43
9	Rydex Series Funds: S&P MidCap 400 Pure Growth Fund	10	26
10	WisdomTree Trust: WisdomTree SmallCap Dividend Fund	15	31

Bottom 10 Alpha (FFC)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	PowerShares ETF Trust: PowerShares Zacks Micro Cap Portfolio	4	10
2	First Trust ETF: First Trust Value Line 100 ETF	2	12
3	Schwab Capital Trust: Schwab Institutional Select Small-Cap Value Index Fund	105	87
4	PowerShares ETF Trust: PowerShares Fundamental Pure Mid Growth	11	30
5	PowerShares ETF Trust: PowerShares Dynamic OTC Portfolio	4	11
6	PowerShares ETF Trust: PowerShares Dynamic Small Cap Growth Portfolio	56	58
7	First Trust ETF: First Trust Value Line Equity Allocation Index Fund	6	21
8	Federated Index Trust: Federated Mini-Cap Index Fund	44	28
9	Claymore ETF Trust: Wilshire Micro-Cap ETF	36	50
10	First Trust ETF: First Trust Dow Jones Select MicroCap Index Fund	38	45

Top 10 $t(\alpha)$ (FFC)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Rydex ETF Trust: Rydex S&P 500 Pure Value ETF	5	19
2	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8
3	PowerShares ETF Trust: Buyback Achievers Portfolio	10	14
4	Schwab Investments: Schwab 1000 Index Fund	113	58
5	WisdomTree Trust: WisdomTree SmallCap Dividend Fund	15	31
6	First Trust ETF: First Trust US IPO Index Fund	6	11
7	First Trust ETF: First Trust Morningstar Dividend Leaders Index Fund	19	53
8	Rydex Series Funds: NASDAQ-100 Fund	24	51
9	WisdomTree Trust: WisdomTree MidCap Dividend Fund	24	43
10	PowerShares ETF Trust: PowerShares Dynamic Large Cap Value Portfolio	37	42

Bottom 10 $t(\alpha)$ (FFC)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	PowerShares ETF Trust: PowerShares Zacks Micro Cap Portfolio	4	10
2	Federated Index Trust: Federated Mini-Cap Index Fund	44	28
3	Northern Institutional Funds: Small Company Index Portfolio	73	71
4	First American Investment Funds, Inc: Nuveen Small Cap Index Fund	98	93
5	First Trust ETF: First Trust Value Line 100 ETF	2	12
6	Northern Funds: Small Cap Index Fund	85	76
7	PowerShares ETF Trust: PowerShares Dynamic OTC Portfolio	4	11
8	American Beacon Funds: American Beacon Small Cap Index Fund	76	58
9	Schwab Capital Trust: Schwab Institutional Select Small-Cap Value Index Fund	105	87
10	BNY Hamilton Funds, Inc: BNY Hamilton S&P 500 Index Fund	48	18

Table IA.4: League Table - Vanguard benchmark

This table reports the top and bottom ten index funds based on alpha and $t(\alpha)$ as well as the average rank of each measure across six benchmarks: Excess of S&P 500, CAPM, Fama-French-Carhart, Vanguard Basis, Cremers-Petajisto-Zitzewitz 7-factor, and Ferson-Schadt. The ranks are out of the 237 funds.

Top 10 Alpha (Vanguard basis)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Rydex ETF Trust: Rydex S&P 500 Pure Value ETF	5	19
2	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8
3	First Trust ETF: First Trust US IPO Index Fund	6	11
4	First Trust ETF: First Trust Morningstar Dividend Leaders Index Fund	19	53
5	Rydex Series Funds: S&P 500 Pure Value Fund	58	99
6	PowerShares ETF Trust: PowerShares FTSE RAFI US 1000 Portfolio	41	62
7	Rydex ETF Trust: Rydex S&P MidCap 400 Pure Value ETF	41	96
8	Rydex ETF Trust: Guggenheim S&P 500 Pure Growth ETF	23	56
9	Rydex ETF Trust: Rydex S&P SmallCap 600 Pure Growth ETF	19	56
10	Rydex Series Funds: S&P MidCap 400 Pure Growth Fund	10	26

Bottom 10 Alpha (Vanguard basis)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	First Trust ETF: First Trust Value Line 100 ETF	2	12
2	PowerShares ETF Trust: PowerShares Dynamic OTC Portfolio	4	11
3	PowerShares ETF Trust: PowerShares Zacks Micro Cap Portfolio	4	10
4	PowerShares ETF Trust: PowerShares Dynamic Mid Cap Value Portfolio	46	56
5	PowerShares ETF Trust: PowerShares Fundamental Pure Mid Growth	11	30
6	PowerShares ETF Trust: PowerShares High Yield Equity Dividend Achievers Portfolio	74	72
7	PowerShares ETF Trust: Dynamic Small Cap Portfolio	43	55
8	First Trust ETF: First Trust Dow Jones Select MicroCap Index Fund	38	45
9	WisdomTree Trust: WisdomTree LargeCap Value Fund	21	32
10	iShares Trust: iShares Russell Microcap Index Fund	65	55

Top 10 $t(\alpha)$ (Vanguard basis)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Schwab Capital Trust: Schwab Total Stock Market Index Fund	102	9
2	T Rowe Price Index Trust; T Rowe Price Total Equity Market Index Fund	110	24
3	First Trust ETF: First Trust US IPO Index Fund	6	11
4	SPDR Series Trust: SPDR S&P 600 Small Cap ETF	39	43
5	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8
6	Vanguard Institutional Index Fund: Vanguard Institutional Total Stock Market Index Fund	116	45
7	SPDR Dow Jones Industrial Average ETF Trust	59	56
8	SPDR Series Trust: SPDR Dow Jones Mid Cap ETF	36	51
9	Rydex ETF Trust: Rydex S&P 500 Pure Value ETF	5	19
10	California Investment Trust: S&P 500 Index Fund	107	35

Bottom 10 $t(\alpha)$ (Vanguard basis)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	SPDR S&P 500 ETF Trust	77	108
2	Dreyfus Index Funds, Inc: Dreyfus S&P 500 Index Fund	89	112
3	Wells Fargo Funds Trust: Wells Fargo Advantage Equity Index Fund	96	107
4	USAA Mutual Funds Trust: S&P 500 Index Fund	69	55
5	iShares Trust: iShares S&P 500 Index Fund	68	82
6	DWS Institutional Funds: DWS Equity 500 Index Fund	88	109
7	Northern Institutional Funds: Equity Index Portfolio	85	87
8	Munder Series Trust: Munder Index 500 Fund	86	97
9	MassMutual Select Funds: MM S&P Index Fund	58	28
10	PowerShares ETF Trust: PowerShares Zacks Micro Cap Portfolio	4	10

Table IA.5: League Table - Ferson-Schadt benchmark

This table reports the top and bottom ten index funds based on alpha and $t(\alpha)$ as well as the average rank of each measure across six benchmarks: Excess of S&P 500, CAPM, Fama-French-Carhart, Vanguard Basis, Cremers-Petajisto-Zitzewitz 7-factor, and Ferson-Schadt. The ranks are out of the 237 funds.

Top 10 Alpha (Ferson-Schadt)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8
2	Rydex Series Funds: NASDAQ-100 Fund	24	51
3	Rydex ETF Trust: Rydex S&P 500 Pure Value ETF	5	19
4	PowerShares ETF Trust: Buyback Achievers Portfolio	10	14
5	First Trust ETF: First Trust US IPO Index Fund	6	11
6	First Trust ETF: First Trust Morningstar Dividend Leaders Index Fund	19	53
7	VALIC Company I: Nasdaq-100 Index Fund	20	63
8	Summit Mutual Funds, Inc: Apex Nasdaq 100 Index Fund	50	91
9	PowerShares QQQ Trust, Series 1	41	64
10	PowerShares ETF Trust: PowerShares Dynamic Large Cap Value Portfolio	37	42

Bottom 10 Alpha (Ferson-Schadt)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Rydex Series Funds: S&P SmallCap 600 Pure Value Fund	68	66
2	First Trust ETF: First Trust Value Line 100 ETF	2	12
3	PowerShares ETF Trust: PowerShares Zacks Micro Cap Portfolio	4	10
4	First Trust ETF: First Trust Value Line Equity Allocation Index Fund	6	21
5	Schwab Capital Trust: Schwab Institutional Select Small-Cap Value Index Fund	105	87
6	PowerShares ETF Trust: PowerShares Dynamic OTC Portfolio	4	11
7	First Trust ETF: First Trust Dow Jones Select MicroCap Index Fund	38	45
8	Federated Index Trust: Federated Mini-Cap Index Fund	44	28
9	Claymore ETF Trust: Guggenheim Insider Sentiment ETF	39	58
10	PowerShares ETF Trust: PowerShares Fundamental Pure Mid Growth	11	30

Top 10 $t(\alpha)$ (Ferson-Schadt)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Rydex Series Funds: NASDAQ-100 Fund	24	51
2	Claymore ETF Trust: Claymore/Beacon Spin-Off ETF	2	8
3	Rydex ETF Trust: Rydex S&P 500 Pure Value ETF	5	19
4	PowerShares ETF Trust: Buyback Achievers Portfolio	10	14
5	Schwab Investments: Schwab 1000 Index Fund	113	58
6	First Trust ETF: First Trust US IPO Index Fund	6	11
7	PowerShares QQQ Trust, Series 1	41	64
8	Columbia Funds Trust V: Columbia Large Company Index Fund	104	47
9	Schwab Capital Trust: Schwab Total Stock Market Index Fund	102	9
10	iShares Trust: iShares Russell Midcap Value Index Fund	74	60

Bottom 10 $t(\alpha)$ (Ferson-Schadt)

Rank	Fund	Avg Alpha Rank	Avg $t(\alpha)$ Rank
1	Federated Index Trust: Federated Mini-Cap Index Fund	44	28
2	PowerShares ETF Trust: PowerShares Zacks Micro Cap Portfolio	4	10
3	Northern Institutional Funds: Small Company Index Portfolio	73	71
4	First Trust ETF: First Trust Value Line 100 ETF	2	12
5	First Trust ETF: First Trust Value Line Equity Allocation Index Fund	6	21
6	PowerShares ETF Trust: PowerShares Dynamic OTC Portfolio	4	11
7	First American Investment Funds, Inc: Nuveen Small Cap Index Fund	98	93
8	Northern Funds: Small Cap Index Fund	85	76
9	Thrivent Mutual Funds: Thrivent Large Cap Index Fund	67	53
10	First Trust ETF: First Trust Dow Jones Select MicroCap Index Fund	38	45

Table IA.6: Quantile Regression Estimates: Gross Dollar Returns

This table presents quantile regression estimates from the cross-section of model-adjusted mutual fund dollar returns, as in Berk and van Binsbergen (2015). Model-adjusted dollar returns, d_i, are calculated as $\frac{1}{T_i}\sum_{t=1}^{T_i} q_{it-1} \cdot \alpha_{it}$ where q_{it-1} is lagged real assets under management and α_{it} is based on the various benchmark models. Conditional quantile estimates are found by solving:

$$Q_\tau(d_i|X_i) = \arg\min_{q(X)} E[\rho_\tau(d_i - q(X_i))],$$

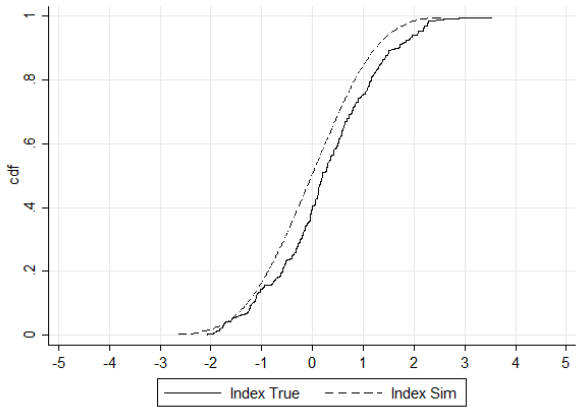
where $\rho_\tau(\mu) = (\tau - 1(\mu \leq 0))\mu$ for quantile τ. To test the difference in quantiles between index funds and active funds, $q(X_i)$ is estimated as: $q(X_i) = \beta_0 + \beta_1 * Index_i$ where $Index_i$ takes value of one if fund i is an index fund. The first column presents estimates for the 1st percentile of the distribution, with each subsequent column presenting estimates for the 5th, 25th, 50th, 75th, 95th, and 99th percentile, respectively. Standard errors are bootstrapped, t-statistics are in brackets, and significance is represented according to: $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

	Q01	Q05	Q25	Q50	Q75	Q95	Q99
Excess of S&P 500							
Index	12.713***	3.049***	0.244***	0.106***	0.169	4.851	12.855
	[3.17]	[6.26]	[8.20]	[2.69]	[0.77]	[1.12]	[1.37]
Constant	-14.677***	-3.636***	-0.236***	0.029***	0.547***	4.814***	17.198***
	[-5.69]	[-8.70]	[-8.09]	[4.07]	[9.51]	[9.10]	[4.27]
CAPM							
Index	-0.936	0.645	0.058	0.008	-0.059	0.480	-1.360
	[-0.13]	[0.31]	[0.82]	[0.55]	[-0.84]	[0.36]	[-0.22]
Constant	-13.850***	-3.598***	-0.348***	-0.019***	0.285***	3.597***	17.740***
	[-8.72]	[-7.53]	[-12.39]	[-3.57]	[11.42]	[9.14]	[3.85]
Fama-French-Carhart							
Index	4.349**	1.548***	0.215***	0.069***	0.178*	1.159	-8.197
	[1.99]	[2.77]	[5.39]	[3.56]	[1.91]	[0.93]	[-1.21]
Constant	-10.601***	-2.521***	-0.338***	-0.033***	0.174***	2.732***	15.956***
	[-10.23]	[-8.08]	[-11.72]	[-4.81]	[9.70]	[9.29]	[6.13]
Vanguard							
Index	5.490*	2.215***	0.342***	0.046***	-0.019	-1.039	-7.168
	[1.82]	[4.50]	[7.16]	[4.90]	[-0.40]	[-0.77]	[-0.82]
Constant	-10.850***	-2.992***	-0.433***	-0.040***	0.171***	2.711***	13.568***
	[-5.78]	[-8.06]	[-10.72]	[-7.61]	[8.05]	[7.62]	[5.08]
Cremers-Petajisto-Zitzewitz 7-Factor							
Index	10.173***	3.139***	0.389***	0.085***	0.230**	1.501	-2.932
	[4.86]	[7.08]	[13.68]	[5.22]	[2.35]	[0.99]	[-0.19]
Constant	-11.843***	-3.398***	-0.396***	-0.041***	0.130***	2.430***	13.404***
	[-13.33]	[-7.90]	[-14.21]	[-6.25]	[7.32]	[9.82]	[4.92]
Ferson-Schadt							
Index	6.285***	1.338*	0.235***	0.086***	0.171**	0.957	-2.837
	[2.63]	[1.71]	[5.03]	[3.61]	[2.33]	[1.13]	[-0.22]
Constant	-11.763***	-2.550***	-0.337***	-0.029***	0.228***	3.182***	16.639***
	[-8.61]	[-10.34]	[-13.82]	[-5.03]	[7.18]	[8.15]	[5.82]
Observations	2060	2060	2060	2060	2060	2060	2060

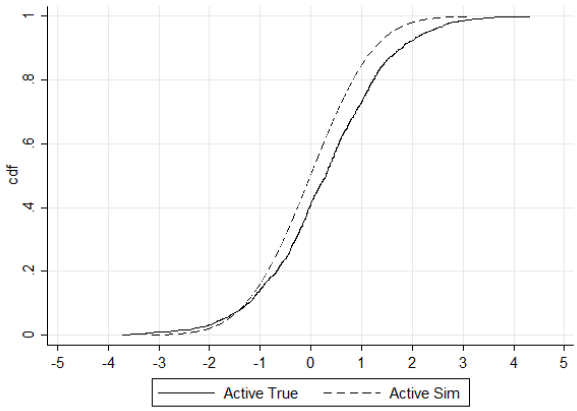
Figure IA.1: Cumulative distribution functions of actual and bootstrapped gross $t(\alpha)$

This figure plots the cumulative distribution function of t-statistics associated with the model-adjusted return, α, for index and active funds and the associated bootstrapped "zero alpha" distributions following Fama and French (2010). The *Sim* distribution is the average bootstrap value of $t(\alpha)$ at the various percentiles (averaged over 1,000 draws). The *True* distribution is the empirical distribution.

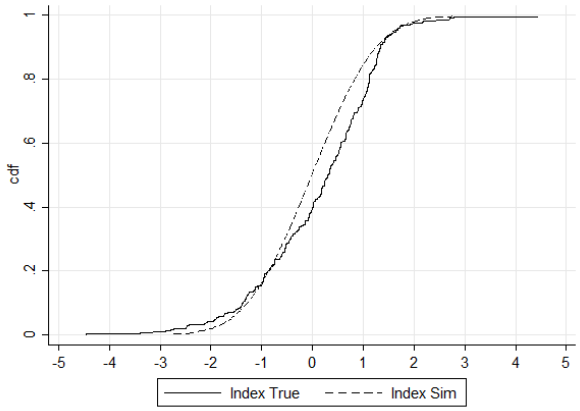
(a) Index Funds–CAPM



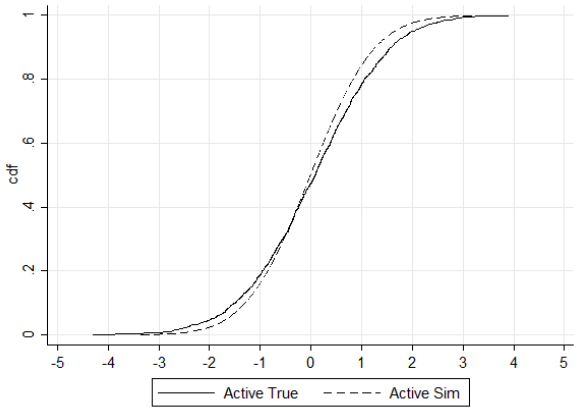
(b) Active Funds–CAPM



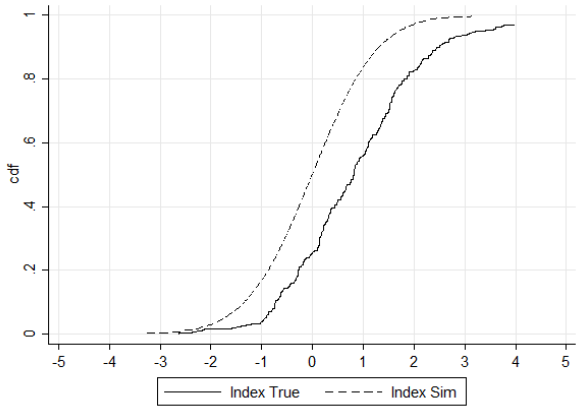
(c) Index Funds–FFC



(d) Active Funds–FFC



(e) Index Funds–CPZ7



(f) Active Funds–CPZ7

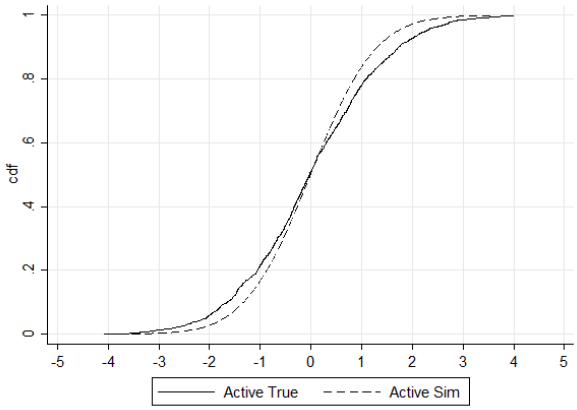
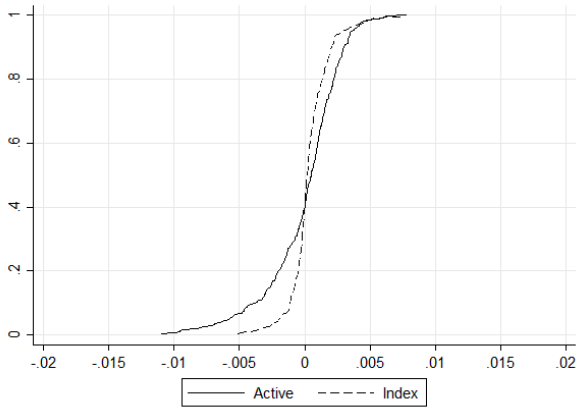


Figure IA.2: Cumulative distribution functions - "Active" Active Funds vs. Index Funds

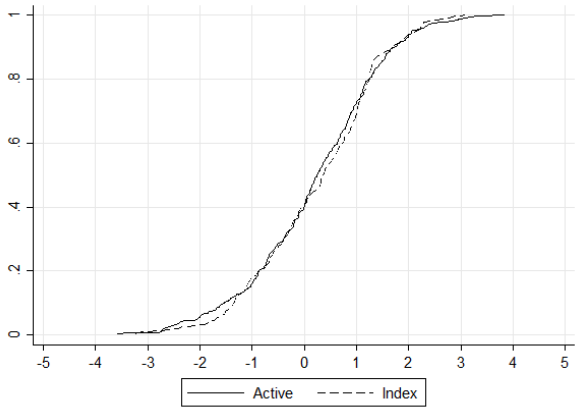
This figure plots the cumulative distribution function of the model-adjusted return, α, and its associated t-statistic for index and active funds using the Fama-French-Carhart model. The active fund distribution includes only funds in the top quartile of Active Share (Panel A) or Return Gap (Panel B) over the sample.

Panel A. Active Funds in Top Quartile of Active Share

(a) Gross α

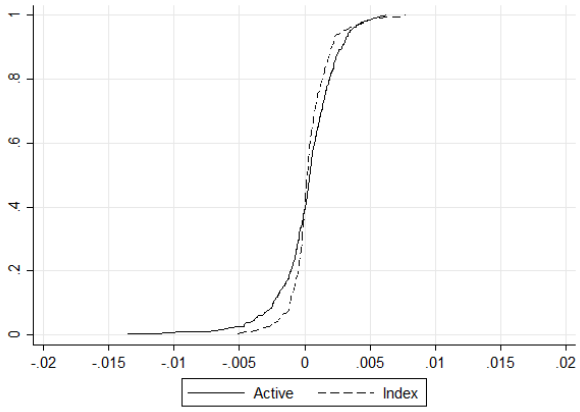


(b) Gross $t(\alpha)$



Panel B. Active Funds in Top Quartile of Return Gap

(a) Gross α



(b) Gross $t(\alpha)$