

Persistence Scorecard: Does Past Performance Matter?

Contributor

Berlinda Liu, CFA
Director
Global Research & Design
berlinda.liu@spglobal.com

SUMMARY

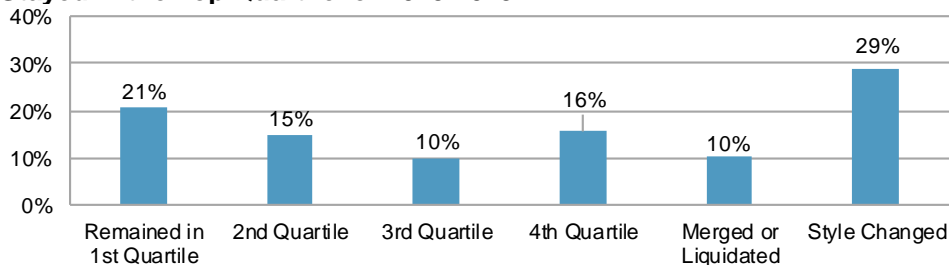
When an active manager beats a benchmark, how can we judge whether the result is a product of genuine skill or merely of good luck? **Genuine skill is likely to persist, while luck is random and soon dissipates.** Therefore one key measure of active management skill is the *consistency* of a fund's outperformance.

The Persistence Scorecard attempts to distinguish luck from skill by measuring the consistency of active managers' success. **This report shows that, regardless of asset class or style focus, few fund managers have consistently outperformed their peers.**

For example, only 3.84% of domestic equity funds in the top half of the distribution in 2015 maintained that status annually through 2019, significantly below what random chance would predict.¹ Similarly, just 0.18% of the 2015's top-quartile domestic equity funds maintained that performance over the next four years, again below random chance.²

Lengthening the horizon to consider performance over two consecutive five-year periods, Exhibit 1 shows that the top-quartile domestic equity funds of 2010-2014 had little luck maintaining their top-quartile status for the 2015-2019 period. In fact, **the most likely outcome for a top-quartile fund was liquidation or style change (39% together).**

Exhibit 1: Only One-Fifth of Top-Quartile Domestic Funds over 2010-2014 Stayed in the Top Quartile for 2015-2019



Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Chart is provided for illustrative purposes. Past performance is no guarantee of future results.

¹ The odds of a top-half fund in one year randomly staying in the top half over the next four years are $50\% * 50\% * 50\% * 50\% = 6.25\%$, or 1/16.

² $25\% * 25\% * 25\% * 25\% = 0.39\%$, or 1/256.

Compared with our previous reports, persistence appeared to improve over shorter investment horizons. Of the top-quartile domestic equity funds in 2017, 37.17% managed to stay in the top quartile annually through 2019. **However, this persistence was inconsistent and decayed over time.** For example, 61.34% of 2017's top-quartile domestic equity funds were ranked in the top quartile for 2018. Rewinding the clock two years, just 3.38% of 2015's top-quartile funds maintained that status in 2016.

There were few patterns to be found among equity funds' performance, as the random distribution of fund performance over various time frames covered large-, mid-, small-, and multi-cap focused funds. One notable observation came from small-cap funds in the three-year period, as just 1.67% of 2014-2016 top-quartile funds remained in the top quartile for 2017-2019.

Unsurprisingly, **the one pattern that did hold across equity funds was the tendency of the poorest funds to close.** Fourth-quartile funds were generally the most likely to merge or liquidate over the subsequent three- and five-year windows, with nearly 38% of the bottom-quartile multi-cap funds of 2010-2014 disappearing by 2019.

Perhaps more surprisingly, style changes did not appear to be correlated with fund performance. Top, middle, and bottom performers within a category all generally had similar chances of style drift over three- or five-year periods. Multi-cap funds had the highest percentage of style change, with 31% making a change over three years and 40% over five years.

Fixed income funds showed similar results to equities, with rare pockets of one-year persistence and little evidence for consistent annual outperformance over longer periods. **In 10 of the 13 categories considered, no top-quartile funds from 2015 maintained that status annually through 2019.**

Transition matrices showed slightly more evidence of fixed income fund persistence. Over the three-year horizon, the most likely outcome for top-quartile funds in 11 of the 13 categories was to remain in the top quartile. In 10 of the 13 categories, this outcome occurred for 50% or more of top-quartile funds. Similar results existed over the five-year window. However, in many fixed income fund categories, fewer than 20 funds qualified within each quartile, perhaps leading to small sample size effects.

ABOUT THE PERSISTENCE SCORECARD

The phrase “past performance is no guarantee of future results” (or some variation thereof) can be found in the fine print of most mutual fund literature. Yet many investors and advisors consider past performance and related metrics to be important factors in fund selection. So does past performance really matter?

To answer this question, the semiannual S&P Persistence Scorecard tracks the degree to which historical relative performance is predictive of future relative performance. As in our widely followed SPIVA® Scorecards, the University of Chicago’s Center for Research in Security Prices (CRSP) Survivorship Bias Free Mutual Fund Database serves as our underlying data source.

S&P Dow Jones Indices is one of the world’s leading index providers, maintaining a wide variety of investable and benchmark indices to meet an array of investor needs. Our Global Research & Design team is dedicated to conducting unbiased, in-depth analysis on a broad range of topics and issues facing investors in today’s marketplace. This scorecard highlights performance persistence over three and five consecutive 12-month periods and two non-overlapping three- and five-year periods.

Key features of the S&P Persistence Scorecard include:

- **Historical rankings without survivorship bias:** For anyone making an investment decision, all funds available at the time of that decision are part of the initial opportunity set. Ignoring funds that liquidate or merge during a period of study biases measurements of persistence. Using the CRSP database, the S&P Persistence Scorecard ranks all funds available at each point in time and tracks the top-quartile and top-half performers throughout the time period.
- **Clean universe:** The mutual fund universe used in these reports comprises actively managed domestic U.S. equity funds. Index funds, sector funds, and index-based dynamic (bull or bear) funds are excluded from the sample. To avoid double counting multiple share classes, only the share class with the highest previous period return of each fund is used.
- **Transition matrices:** Transition matrices show the movements between quartiles and halves over non-overlapping three- and five-year periods. They also track the percentage of funds that have merged or liquidated. In addition, we monitor movements across capitalization levels. This helps us capture, for example, the conversion of some large-cap funds to mid- and small-cap funds.
 - Starting with this Persistence Scorecard Year-End 2019, the style change calculation includes funds that changed fund categories at any point between the relevant start and end dates. Previously, this calculation only checked if the fund category remained identical at the endpoints.
- **Tracking reports of top performers:** The tracking reports show the percentages of funds that remain in the top-quartile or top-half rankings over consecutive three- and five-year periods.

REPORTS

Report 1: Performance Persistence of Domestic Equity Funds over Three Consecutive 12-Month Periods

FUND CATEGORY	FUND COUNT AT START (DECEMBER 2017)	PERCENTAGE REMAINING IN TOP QUARTILE	
		DECEMBER 2018	DECEMBER 2019
TOP QUARTILE			
All Domestic Funds	538	61.34	37.17
All Large-Cap Funds	197	64.97	40.61
All Mid-Cap Funds	66	53.03	30.30
All Small-Cap Funds	131	64.12	38.17
All Multi-Cap Funds	122	54.92	32.79
FUND CATEGORY	FUND COUNT AT START (DECEMBER 2017)	PERCENTAGE REMAINING IN TOP HALF	
		DECEMBER 2018	DECEMBER 2019
TOP HALF			
All Domestic Funds	1,072	73.51	55.97
All Large-Cap Funds	384	70.83	54.69
All Mid-Cap Funds	131	77.86	61.07
All Small-Cap Funds	261	69.35	51.34
All Multi-Cap Funds	242	68.60	49.17

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 2: Performance Persistence of Domestic Equity Funds over Five Consecutive 12-Month Periods

FUND CATEGORY	FUND COUNT AT START (DECEMBER 2015)	PERCENTAGE REMAINING IN TOP QUARTILE			
		DECEMBER 2016	DECEMBER 2017	DECEMBER 2018	DECEMBER 2019
TOP QUARTILE					
All Domestic Funds	562	3.38	0.36	0.18	0.18
All Large-Cap Funds	202	1.49	0.50	0.50	0.50
All Mid-Cap Funds	74	13.51	0.00	0.00	0.00
All Small-Cap Funds	130	9.23	1.54	0.77	0.77
All Multi-Cap Funds	117	5.98	0.00	0.00	0.00
FUND CATEGORY	FUND COUNT AT START (DECEMBER 2015)	PERCENTAGE REMAINING IN TOP HALF			
		DECEMBER 2016	DECEMBER 2017	DECEMBER 2018	DECEMBER 2019
TOP HALF					
All Domestic Funds	1,121	28.28	9.72	6.24	3.84
All Large-Cap Funds	414	24.88	11.84	5.80	2.66
All Mid-Cap Funds	146	33.56	9.59	6.85	4.79
All Small-Cap Funds	259	39.00	13.13	8.11	5.41
All Multi-Cap Funds	238	27.73	12.61	7.98	5.46

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 3: Three-Year Transition Matrix – Performance over Two Non-Overlapping Three-Year Periods (Based on Quartile)							
QUARTILE	FUND COUNT AT START (2014-2016)	THREE-YEAR PERCENTAGES AT END (2017-2019)					
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
ALL DOMESTIC FUNDS							
1st Quartile	508	12.80	18.31	18.50	22.44	7.28	20.67
2nd Quartile	508	17.13	18.11	16.93	12.99	11.42	23.43
3rd Quartile	508	18.31	16.93	15.55	13.19	15.94	20.08
4th Quartile	509	22.59	11.00	11.20	13.56	21.02	20.63
ALL LARGE-CAP FUNDS							
1st Quartile	194	14.95	27.84	17.53	17.01	5.15	17.53
2nd Quartile	193	20.73	18.65	17.10	15.54	9.84	18.13
3rd Quartile	194	23.20	10.31	12.89	19.59	14.95	19.07
4th Quartile	194	19.59	14.95	8.76	15.46	24.23	17.01
ALL MID-CAP FUNDS							
1st Quartile	68	10.29	13.24	26.47	23.53	10.29	16.18
2nd Quartile	67	14.93	7.46	22.39	13.43	8.96	32.84
3rd Quartile	67	19.40	23.88	13.43	8.96	17.91	16.42
4th Quartile	68	32.35	20.59	1.47	7.35	17.65	20.59
ALL SMALL-CAP FUNDS							
1st Quartile	120	1.67	20.83	28.33	25.83	6.67	16.67
2nd Quartile	120	11.67	19.17	16.67	17.50	12.50	22.50
3rd Quartile	120	25.00	16.67	16.67	15.83	13.33	12.50
4th Quartile	121	39.67	9.09	11.57	9.92	19.83	9.92
ALL MULTI-CAP FUNDS							
1st Quartile	127	11.02	15.75	14.17	15.75	12.60	30.71
2nd Quartile	127	16.54	14.96	14.17	11.81	11.81	30.71
3rd Quartile	127	11.81	12.60	18.11	9.45	18.90	29.13
4th Quartile	127	14.96	9.45	11.02	11.02	18.11	35.43

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 4: Three-Year Transition Matrix – Performance over Two Non-Overlapping Three-Year Periods (Based on Halves)					
HALF	FUND COUNT AT START (2014-2016)	THREE-YEAR PERCENTAGES AT END (2017-2019)			
		TOP HALF (%)	BOTTOM HALF (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
ALL DOMESTIC FUNDS					
Top Half	1,016	33.17	35.43	9.35	22.05
Bottom Half	1,017	34.41	26.75	18.49	20.35
ALL LARGE-CAP FUNDS					
Top Half	387	41.09	33.59	7.49	17.83
Bottom Half	388	34.02	28.35	19.59	18.04
ALL MID-CAP FUNDS					
Top Half	135	22.96	42.96	9.63	24.44
Bottom Half	135	48.15	15.56	17.78	18.52
ALL SMALL-CAP FUNDS					
Top Half	240	26.67	44.17	9.58	19.58
Bottom Half	241	45.23	26.97	16.60	11.20
ALL MULTI-CAP FUNDS					
Top Half	254	29.13	27.95	12.20	30.71
Bottom Half	254	24.41	24.80	18.50	32.28

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 5: Five-Year Transition Matrix – Performance over Two Non-Overlapping Five-Year Periods (Based on Quartile)							
QUARTILE	FUND COUNT AT START (2010-2014)	FIVE-YEAR PERCENTAGES AT END (2015-2019)					
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
ALL DOMESTIC FUNDS							
1st Quartile	482	20.54	14.94	9.96	15.56	10.17	28.84
2nd Quartile	482	17.22	14.73	13.90	9.96	17.63	26.56
3rd Quartile	482	15.56	14.32	15.15	7.47	21.16	26.35
4th Quartile	483	8.28	10.77	11.39	10.77	29.61	29.19
ALL LARGE-CAP FUNDS							
1st Quartile	183	28.96	15.85	15.85	6.56	8.74	24.04
2nd Quartile	183	20.77	17.49	8.20	10.38	22.40	20.77
3rd Quartile	183	12.57	18.03	13.11	15.30	20.22	20.77
4th Quartile	184	8.70	12.50	10.87	15.22	28.26	24.46
ALL MID-CAP FUNDS							
1st Quartile	73	30.14	8.22	10.96	15.07	5.48	30.14
2nd Quartile	72	18.06	9.72	4.17	9.72	16.67	41.67
3rd Quartile	72	8.33	15.28	16.67	8.33	23.61	27.78
4th Quartile	73	4.11	10.96	8.22	4.11	34.25	38.36
ALL SMALL-CAP FUNDS							
1st Quartile	113	24.78	18.58	15.93	10.62	14.16	15.93
2nd Quartile	112	14.29	17.86	16.07	23.21	13.39	15.18
3rd Quartile	112	12.50	15.18	10.71	10.71	26.79	24.11
4th Quartile	113	16.81	10.62	12.39	12.39	23.89	23.89
ALL MULTI-CAP FUNDS							
1st Quartile	114	16.67	9.65	11.40	8.77	7.89	45.61
2nd Quartile	114	13.16	19.30	14.91	3.51	13.16	35.96
3rd Quartile	114	7.89	11.40	10.53	7.89	17.54	44.74
4th Quartile	114	4.39	7.02	6.14	12.28	37.72	32.46

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 6: Five-Year Transition Matrix – Performance over Two Non-Overlapping Five-Year Periods (Based on Halves)					
HALF	FUND COUNT AT START (2010-2014)	FIVE-YEAR PERCENTAGES AT END (2015-2019)			
		TOP HALF (%)	BOTTOM HALF (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
ALL DOMESTIC FUNDS					
Top Half	964	33.71	24.69	13.90	27.70
Bottom Half	965	24.46	22.38	25.39	27.77
ALL LARGE-CAP FUNDS					
Top Half	366	41.53	20.49	15.57	22.40
Bottom Half	367	25.89	27.25	24.25	22.62
ALL MID-CAP FUNDS					
Top Half	145	33.10	20.00	11.03	35.86
Bottom Half	145	19.31	18.62	28.97	33.10
ALL SMALL-CAP FUNDS					
Top Half	225	37.78	32.89	13.78	15.56
Bottom Half	225	27.56	23.11	25.33	24.00
ALL MULTI-CAP FUNDS					
Top Half	228	29.39	19.30	10.53	40.79
Bottom Half	228	15.35	18.42	27.63	38.60

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 7: Performance Persistence of Domestic Fixed Income Funds over Three Consecutive 12-Month Periods			
FUND CATEGORY	FUND COUNT AT START (DECEMBER 2017)	PERCENTAGE REMAINING IN TOP QUARTILE	
		DECEMBER 2018	DECEMBER 2019
TOP QUARTILE			
Government Long Funds	13	15.38	7.69
Government Intermediate Funds	4	0.00	0.00
Government Short Funds	6	66.67	0.00
Investment-Grade Long Funds	21	0.00	0.00
Investment-Grade Intermediate Funds	50	8.00	4.00
Investment-Grade Short Funds	22	22.73	0.00
High Yield Funds	51	13.73	7.84
Mortgage-Backed Securities Funds	13	69.23	23.08
Global Income Funds	25	0.00	0.00
Emerging Markets Debt Funds	14	21.43	0.00
General Municipal Debt Funds	19	26.32	10.53
California Municipal Debt Funds	8	12.50	12.50
New York Municipal Debt Funds	6	16.67	0.00
FUND CATEGORY	FUND COUNT AT START (DECEMBER 2017)	PERCENTAGE REMAINING IN TOP HALF	
		DECEMBER 2018	DECEMBER 2019
TOP HALF			
Government Long Funds	26	38.46	30.77
Government Intermediate Funds	8	37.50	25.00
Government Short Funds	12	75.00	33.33
Investment-Grade Long Funds	42	9.52	2.38
Investment-Grade Intermediate Funds	99	25.25	15.15
Investment-Grade Short Funds	44	47.73	15.91
High Yield Funds	102	41.18	26.47
Mortgage-Backed Securities Funds	25	68.00	44.00
Global Income Funds	50	20.00	12.00
Emerging Markets Debt Funds	28	42.86	25.00
General Municipal Debt Funds	37	54.05	35.14
California Municipal Debt Funds	16	43.75	37.50
New York Municipal Debt Funds	12	33.33	16.67

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 8: Performance Persistence of Domestic Fixed Income Funds over Five Consecutive 12-Month Periods						
FUND CATEGORY	FUND COUNT AT START (DECEMBER 2015)	PERCENTAGE REMAINING IN TOP QUARTILE				
		DECEMBER 2016	DECEMBER 2017	DECEMBER 2018	DECEMBER 2019	
TOP QUARTILE						
Government Long Funds	14	21.43	14.29	7.14	7.14	
Government Intermediate Funds	4	50.00	0.00	0.00	0.00	
Government Short Funds	7	42.86	14.29	14.29	0.00	
Investment-Grade Long Funds	23	4.35	4.35	0.00	0.00	
Investment-Grade Intermediate Funds	46	10.87	6.52	0.00	0.00	
Investment-Grade Short Funds	19	36.84	26.32	0.00	0.00	
High Yield Funds	51	5.88	1.96	0.00	0.00	
Mortgage-Backed Securities Funds	12	33.33	25.00	25.00	0.00	
Global Income Funds	26	30.77	7.69	0.00	0.00	
Emerging Markets Debt Funds	14	28.57	0.00	0.00	0.00	
General Municipal Debt Funds	19	42.11	31.58	10.53	5.26	
California Municipal Debt Funds	9	66.67	33.33	11.11	11.11	
New York Municipal Debt Funds	7	57.14	42.86	14.29	0.00	
FUND CATEGORY	FUND COUNT AT START (DECEMBER 2015)	PERCENTAGE REMAINING IN TOP HALF				
		DECEMBER 2016	DECEMBER 2017	DECEMBER 2018	DECEMBER 2019	
TOP HALF						
Government Long Funds	27	62.96	37.04	22.22	18.52	
Government Intermediate Funds	9	66.67	44.44	22.22	22.22	
Government Short Funds	12	58.33	41.67	25.00	8.33	
Investment-Grade Long Funds	46	34.78	23.91	4.35	2.17	
Investment-Grade Intermediate Funds	91	34.07	21.98	6.59	2.20	
Investment-Grade Short Funds	40	62.50	50.00	20.00	7.50	
High Yield Funds	101	25.74	20.79	9.90	7.92	
Mortgage-Backed Securities Funds	25	64.00	48.00	32.00	20.00	
Global Income Funds	52	55.77	17.31	1.92	1.92	
Emerging Markets Debt Funds	28	46.43	28.57	10.71	3.57	
General Municipal Debt Funds	38	55.26	44.74	34.21	21.05	
California Municipal Debt Funds	18	66.67	50.00	38.89	33.33	
New York Municipal Debt Funds	13	53.85	30.77	15.38	7.69	

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 9: Three-Year Transition Matrix – Performance over Two Non-Overlapping Three-Year Periods (Based on Quartile)							
QUARTILE	FUND COUNT AT START (2014-2016)	THREE-YEAR PERCENTAGES AT END (2017-2019)					
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
GOVERNMENT LONG FUNDS							
1st Quartile	14	71.43	7.14	0.00	0.00	14.29	7.14
2nd Quartile	13	0.00	23.08	46.15	7.69	0.00	23.08
3rd Quartile	14	0.00	14.29	14.29	14.29	7.14	50.00
4th Quartile	14	0.00	0.00	0.00	50.00	35.71	14.29
GOVERNMENT INTERMEDIATE FUNDS							
1st Quartile	5	60.00	0.00	40.00	0.00	0.00	0.00
2nd Quartile	4	0.00	75.00	0.00	0.00	0.00	25.00
3rd Quartile	5	0.00	20.00	20.00	40.00	20.00	0.00
4th Quartile	5	0.00	0.00	20.00	60.00	20.00	0.00
GOVERNMENT SHORT FUNDS							
1st Quartile	6	66.67	33.33	0.00	0.00	0.00	0.00
2nd Quartile	6	16.67	33.33	33.33	0.00	16.67	0.00
3rd Quartile	6	16.67	16.67	0.00	50.00	0.00	16.67
4th Quartile	7	0.00	0.00	28.57	42.86	28.57	0.00
INVESTMENT-GRADE LONG FUNDS							
1st Quartile	21	57.14	28.57	9.52	0.00	4.76	0.00
2nd Quartile	21	14.29	47.62	9.52	19.05	9.52	0.00
3rd Quartile	21	19.05	9.52	42.86	9.52	9.52	9.52
4th Quartile	21	0.00	0.00	19.05	42.86	19.05	19.05
INVESTMENT-GRADE INTERMEDIATE FUNDS							
1st Quartile	46	50.00	26.09	6.52	8.70	6.52	2.17
2nd Quartile	45	22.22	33.33	26.67	4.44	11.11	2.22
3rd Quartile	46	10.87	26.09	36.96	10.87	10.87	4.35
4th Quartile	46	0.00	2.17	13.04	60.87	19.57	4.35
INVESTMENT-GRADE SHORT FUNDS							
1st Quartile	20	55.00	40.00	5.00	0.00	0.00	0.00
2nd Quartile	19	21.05	10.53	47.37	10.53	10.53	0.00
3rd Quartile	20	10.00	40.00	25.00	15.00	5.00	5.00
4th Quartile	20	5.00	0.00	10.00	50.00	15.00	20.00
HIGH YIELD FUNDS							
1st Quartile	46	41.30	21.74	13.04	10.87	0.00	13.04
2nd Quartile	45	20.00	15.56	17.78	11.11	11.11	24.44
3rd Quartile	45	8.89	15.56	28.89	11.11	17.78	17.78
4th Quartile	46	4.35	17.39	10.87	19.57	15.22	32.61

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 9: Three-Year Transition Matrix – Performance over Two Non-Overlapping Three-Year Periods (Based on Quartile) (cont.)								
QUARTILE	FUND COUNT AT START (2014-2016)	THREE-YEAR PERCENTAGES AT END (2017-2019)						
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)	
MORTGAGE-BACKED SECURITIES FUNDS								
1st Quartile	12	50.00	25.00	0.00	16.67	8.33	0.00	
2nd Quartile	12	16.67	25.00	25.00	16.67	8.33	8.33	
3rd Quartile	12	8.33	25.00	25.00	25.00	16.67	0.00	
4th Quartile	12	0.00	8.33	33.33	33.33	16.67	8.33	
GLOBAL INCOME FUNDS								
1st Quartile	24	16.67	8.33	29.17	4.17	8.33	33.33	
2nd Quartile	23	13.04	21.74	17.39	30.43	17.39	0.00	
3rd Quartile	24	12.50	33.33	8.33	33.33	4.17	8.33	
4th Quartile	24	12.50	20.83	20.83	8.33	25.00	12.50	
EMERGING MARKETS DEBT FUNDS								
1st Quartile	12	16.67	8.33	8.33	41.67	25.00	0.00	
2nd Quartile	12	41.67	25.00	16.67	8.33	8.33	0.00	
3rd Quartile	12	0.00	25.00	25.00	8.33	33.33	8.33	
4th Quartile	12	16.67	8.33	25.00	0.00	41.67	8.33	
GENERAL MUNICIPAL DEBT FUNDS								
1st Quartile	18	55.56	22.22	11.11	5.56	5.56	0.00	
2nd Quartile	18	16.67	44.44	27.78	11.11	0.00	0.00	
3rd Quartile	18	11.11	11.11	44.44	16.67	16.67	0.00	
4th Quartile	18	5.56	5.56	5.56	55.56	11.11	16.67	
CALIFORNIA MUNICIPAL DEBT FUNDS								
1st Quartile	9	55.56	44.44	0.00	0.00	0.00	0.00	
2nd Quartile	8	25.00	25.00	25.00	12.50	0.00	12.50	
3rd Quartile	9	11.11	0.00	55.56	33.33	0.00	0.00	
4th Quartile	9	0.00	11.11	11.11	55.56	22.22	0.00	
NEW YORK MUNICIPAL DEBT FUNDS								
1st Quartile	7	57.14	28.57	0.00	0.00	0.00	14.29	
2nd Quartile	6	16.67	33.33	16.67	16.67	16.67	0.00	
3rd Quartile	7	0.00	28.57	42.86	28.57	0.00	0.00	
4th Quartile	7	0.00	0.00	28.57	57.14	14.29	0.00	

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 10: Three-Year Transition Matrix – Performance over Two Non-Overlapping Three-Year Periods (Based on Halves)					
HALF	FUND COUNT AT START (2014-2016)	THREE-YEAR PERCENTAGES AT END (2017-2019)			
		TOP HALF (%)	BOTTOM HALF (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
GOVERNMENT LONG FUNDS					
Top Half	27	51.85	25.93	7.41	14.81
Bottom Half	28	7.14	39.29	21.43	32.14
GOVERNMENT INTERMEDIATE FUNDS					
Top Half	9	66.67	22.22	0.00	11.11
Bottom Half	10	10.00	70.00	20.00	0.00
GOVERNMENT SHORT FUNDS					
Top Half	12	75.00	16.67	8.33	0.00
Bottom Half	13	15.38	61.54	15.38	7.69
INVESTMENT-GRADE LONG FUNDS					
Top Half	42	73.81	19.05	7.14	0.00
Bottom Half	42	14.29	57.14	14.29	14.29
INVESTMENT-GRADE INTERMEDIATE FUNDS					
Top Half	91	65.93	23.08	8.79	2.20
Bottom Half	92	19.57	60.87	15.22	4.35
INVESTMENT-GRADE SHORT FUNDS					
Top Half	39	64.10	30.77	5.13	0.00
Bottom Half	40	27.50	50.00	10.00	12.50
HIGH YIELD FUNDS					
Top Half	91	49.45	26.37	5.49	18.68
Bottom Half	91	23.08	35.16	16.48	25.27
MORTGAGE-BACKED SECURITIES FUNDS					
Top Half	24	58.33	29.17	8.33	4.17
Bottom Half	24	20.83	58.33	16.67	4.17
GLOBAL INCOME FUNDS					
Top Half	47	29.79	40.43	12.77	17.02
Bottom Half	48	39.58	35.42	14.58	10.42
EMERGING MARKETS DEBT FUNDS					
Top Half	24	45.83	37.50	16.67	0.00
Bottom Half	24	25.00	29.17	37.50	8.33
GENERAL MUNICIPAL DEBT FUNDS					
Top Half	36	69.44	27.78	2.78	0.00
Bottom Half	36	16.67	61.11	13.89	8.33
CALIFORNIA MUNICIPAL DEBT FUNDS					
Top Half	17	76.47	17.65	0.00	5.88
Bottom Half	18	11.11	77.78	11.11	0.00
NEW YORK MUNICIPAL DEBT FUNDS					
Top Half	13	69.23	15.38	7.69	7.69
Bottom Half	14	14.29	78.57	7.14	0.00

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 11: Five-Year Transition Matrix – Performance over Two Non-Overlapping Five-Year Periods (Based on Quartile)							
QUARTILE	FUND COUNT AT START (2010-2014)	FIVE-YEAR PERCENTAGES AT END (2015-2019)					
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
GOVERNMENT LONG FUNDS							
1st Quartile	13	61.54	30.77	0.00	0.00	7.69	0.00
2nd Quartile	13	0.00	7.69	30.77	7.69	7.69	46.15
3rd Quartile	13	0.00	0.00	15.38	23.08	30.77	30.77
4th Quartile	13	0.00	0.00	0.00	53.85	38.46	7.69
GOVERNMENT INTERMEDIATE FUNDS							
1st Quartile	6	50.00	16.67	0.00	0.00	33.33	0.00
2nd Quartile	5	0.00	40.00	0.00	0.00	40.00	20.00
3rd Quartile	5	0.00	20.00	20.00	20.00	40.00	0.00
4th Quartile	6	0.00	0.00	50.00	50.00	0.00	0.00
GOVERNMENT SHORT FUNDS							
1st Quartile	7	42.86	14.29	28.57	14.29	0.00	0.00
2nd Quartile	6	16.67	50.00	0.00	0.00	33.33	0.00
3rd Quartile	7	0.00	0.00	28.57	14.29	42.86	14.29
4th Quartile	7	0.00	14.29	0.00	57.14	14.29	14.29
INVESTMENT-GRADE LONG FUNDS							
1st Quartile	20	60.00	25.00	0.00	0.00	0.00	15.00
2nd Quartile	20	25.00	25.00	20.00	5.00	15.00	10.00
3rd Quartile	20	5.00	5.00	35.00	30.00	15.00	10.00
4th Quartile	20	0.00	20.00	15.00	25.00	15.00	25.00
INVESTMENT-GRADE INTERMEDIATE FUNDS							
1st Quartile	41	41.46	29.27	4.88	7.32	12.20	4.88
2nd Quartile	40	25.00	27.50	25.00	2.50	15.00	5.00
3rd Quartile	40	5.00	17.50	27.50	15.00	25.00	10.00
4th Quartile	41	2.44	0.00	19.51	48.78	21.95	7.32
INVESTMENT-GRADE SHORT FUNDS							
1st Quartile	17	41.18	29.41	5.88	17.65	0.00	5.88
2nd Quartile	17	29.41	17.65	5.88	23.53	23.53	0.00
3rd Quartile	17	5.88	17.65	58.82	11.76	5.88	0.00
4th Quartile	17	5.88	17.65	5.88	23.53	35.29	11.76
HIGH YIELD FUNDS							
1st Quartile	37	37.84	18.92	13.51	5.41	10.81	13.51
2nd Quartile	37	18.92	18.92	18.92	10.81	16.22	16.22
3rd Quartile	37	18.92	18.92	24.32	16.22	8.11	13.51
4th Quartile	38	0.00	10.53	10.53	31.58	28.95	18.42

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 11: Five-Year Transition Matrix – Performance over Two Non-Overlapping Five-Year Periods (Based on Quartile) (cont.)							
QUARTILE	FUND COUNT AT START (2010-2014)	FIVE-YEAR PERCENTAGES AT END (2015-2019)					
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
MORTGAGE-BACKED SECURITIES FUNDS							
1st Quartile	11	63.64	27.27	0.00	0.00	9.09	0.00
2nd Quartile	11	0.00	27.27	45.45	18.18	9.09	0.00
3rd Quartile	11	0.00	18.18	18.18	27.27	27.27	9.09
4th Quartile	11	9.09	0.00	18.18	36.36	9.09	27.27
GLOBAL INCOME FUNDS							
1st Quartile	17	35.29	5.88	5.88	17.65	11.76	23.53
2nd Quartile	16	12.50	25.00	37.50	6.25	12.50	6.25
3rd Quartile	17	11.76	11.76	23.53	17.65	23.53	11.76
4th Quartile	17	0.00	11.76	11.76	29.41	23.53	23.53
EMERGING MARKETS DEBT FUNDS							
1st Quartile	4	25.00	0.00	50.00	25.00	0.00	0.00
2nd Quartile	3	0.00	33.33	33.33	0.00	33.33	0.00
3rd Quartile	3	33.33	0.00	0.00	33.33	33.33	0.00
4th Quartile	4	25.00	25.00	0.00	25.00	25.00	0.00
GENERAL MUNICIPAL DEBT FUNDS							
1st Quartile	17	52.94	35.29	5.88	5.88	0.00	0.00
2nd Quartile	16	25.00	31.25	25.00	6.25	6.25	6.25
3rd Quartile	17	0.00	17.65	41.18	17.65	17.65	5.88
4th Quartile	17	5.88	0.00	17.65	47.06	17.65	11.76
CALIFORNIA MUNICIPAL DEBT FUNDS							
1st Quartile	9	44.44	22.22	33.33	0.00	0.00	0.00
2nd Quartile	8	25.00	25.00	12.50	12.50	12.50	12.50
3rd Quartile	8	25.00	12.50	37.50	12.50	12.50	0.00
4th Quartile	9	0.00	11.11	0.00	66.67	22.22	0.00
NEW YORK MUNICIPAL DEBT FUNDS							
1st Quartile	7	42.86	14.29	14.29	0.00	14.29	14.29
2nd Quartile	6	16.67	50.00	33.33	0.00	0.00	0.00
3rd Quartile	6	0.00	16.67	33.33	0.00	50.00	0.00
4th Quartile	7	14.29	0.00	0.00	85.71	0.00	0.00

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Report 12: Five-Year Transition Matrix – Performance over Two Non-Overlapping Five-Year Periods (Based on Halves)					
HALF	FUND COUNT AT START (2010-2014)	FIVE-YEAR PERCENTAGES AT END (2015-2019)			
		TOP HALF (%)	BOTTOM HALF (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
GOVERNMENT LONG FUNDS					
Top Half	26	50.00	19.23	7.69	23.08
Bottom Half	26	0.00	46.15	34.62	19.23
GOVERNMENT INTERMEDIATE FUNDS					
Top Half	11	54.55	0.00	36.36	9.09
Bottom Half	11	9.09	72.73	18.18	0.00
GOVERNMENT SHORT FUNDS					
Top Half	13	61.54	23.08	15.38	0.00
Bottom Half	14	7.14	50.00	28.57	14.29
INVESTMENT-GRADE LONG FUNDS					
Top Half	40	67.50	12.50	7.50	12.50
Bottom Half	40	15.00	52.50	15.00	17.50
INVESTMENT-GRADE INTERMEDIATE FUNDS					
Top Half	81	61.73	19.75	13.58	4.94
Bottom Half	81	12.35	55.56	23.46	8.64
INVESTMENT-GRADE SHORT FUNDS					
Top Half	34	58.82	26.47	11.76	2.94
Bottom Half	34	23.53	50.00	20.59	5.88
HIGH YIELD FUNDS					
Top Half	74	47.30	24.32	13.51	14.86
Bottom Half	75	24.00	41.33	18.67	16.00
MORTGAGE-BACKED SECURITIES FUNDS					
Top Half	22	59.09	31.82	9.09	0.00
Bottom Half	22	13.64	50.00	18.18	18.18
GLOBAL INCOME FUNDS					
Top Half	33	39.39	33.33	12.12	15.15
Bottom Half	34	17.65	41.18	23.53	17.65
EMERGING MARKETS DEBT FUNDS					
Top Half	7	28.57	57.14	14.29	0.00
Bottom Half	7	42.86	28.57	28.57	0.00
GENERAL MUNICIPAL DEBT FUNDS					
Top Half	33	72.73	21.21	3.03	3.03
Bottom Half	34	11.76	61.76	17.65	8.82
CALIFORNIA MUNICIPAL DEBT FUNDS					
Top Half	17	58.82	29.41	5.88	5.88
Bottom Half	17	23.53	58.82	17.65	0.00
NEW YORK MUNICIPAL DEBT FUNDS					
Top Half	13	61.54	23.08	7.69	7.69
Bottom Half	13	15.38	61.54	23.08	0.00

Source: S&P Dow Jones Indices LLC, CRSP. Data as of Dec. 31, 2019. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

S&P DJI RESEARCH CONTRIBUTORS		
Sunjiv Mainie, CFA, CQF	Global Head	sunjiv.mainie@spglobal.com
Jake Vukelic	Business Manager	jake.vukelic@spglobal.com
GLOBAL RESEARCH & DESIGN		
AMERICAS		
Gaurav Sinha	Americas Head	gaurav.sinha@spglobal.com
Laura Assis	Analyst	laura.assis@spglobal.com
Cristopher Anguiano, FRM	Analyst	cristopher.anguiano@spglobal.com
Smita Chirputkar	Director	smita.chirputkar@spglobal.com
Rachel Du	Senior Analyst	rachel.du@spglobal.com
Bill Hao	Director	wenli.hao@spglobal.com
Qing Li	Director	qing.li@spglobal.com
Berlinda Liu, CFA	Director	berlinda.liu@spglobal.com
Lalit Ponnala, PhD	Director	lalit.ponnala@spglobal.com
Maria Sanchez, CIPM	Associate Director	maria.sanchez@spglobal.com
Hong Xie, CFA	Senior Director	hong.xie@spglobal.com
APAC		
Priscilla Luk	APAC Head	priscilla.luk@spglobal.com
Arpit Gupta	Senior Analyst	arpit.gupta1@spglobal.com
Akash Jain	Associate Director	akash.jain@spglobal.com
Anurag Kumar	Senior Analyst	anurag.kumar@spglobal.com
Xiaoya Qu	Senior Analyst	xiaoya.qu@spglobal.com
Yan Sun	Senior Analyst	yan.sun@spglobal.com
Tim Wang	Senior Analyst	tim.wang@spglobal.com
Liyu Zeng, CFA	Director	liyu.zeng@spglobal.com
EMEA		
Andrew Innes	EMEA Head	andrew.innes@spglobal.com
Leonardo Cabrer, PhD	Senior Analyst	leonardo.cabrer@spglobal.com
Andrew Cairns, CFA	Senior Analyst	andrew.cairns@spglobal.com
Jingwen Shi	Analyst	jingwen.shi@spglobal.com
INDEX INVESTMENT STRATEGY		
Craig J. Lazzara, CFA	Global Head	craig.lazzara@spglobal.com
Chris Bennett, CFA	Director	chris.bennett@spglobal.com
Fei Mei Chan	Director	feimei.chan@spglobal.com
Tim Edwards, PhD	Managing Director	tim.edwards@spglobal.com
Anu R. Ganti, CFA	Senior Director	anu.ganti@spglobal.com
Sherifa Issifu	Analyst	sherifa.issifu@spglobal.com

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