

CONTRIBUTORS

Aye M. Soe, CFA
Managing Director
Global Research & Design
aye.soe@spglobal.com

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

Does Past Performance Matter? The Persistence Scorecard

SUMMARY OF RESULTS

- When it comes to the active versus passive debate, one of the key measurements of successful active management lies in the ability of a manager or a strategy to deliver above-average returns consistently over multiple periods. Demonstrating the ability to outperform peers repeatedly is the one way to differentiate a manager's luck from skill.
- According to the S&P Persistence Scorecard, relatively few funds can consistently stay at the top. Out of 557 domestic equity funds that were in the top quartile as of March 2016, only 2.33% managed to stay in the top quartile at the end of March 2018. Furthermore, 0.93% of the large-cap funds, no mid-cap funds, and 3.85% of the small-cap funds remained in the top quartile.
- For the three-year period that ended in March 2018, persistence figures for funds in the top half were also unfavorable. Over three consecutive 12-month periods, 21.96% of large-cap funds, 7.59% of mid-cap funds, and 13.46% of small-cap funds maintained a top-half ranking.
- An inverse relationship generally exists between the measurement time horizon and the ability of top-performing funds to maintain their status. It is worth noting that only 0.45% of large-cap and no mid-cap or small-cap funds managed to remain in the top quartile at the end of the five-year measurement period. Furthermore, no mid-cap or small-cap funds were able to retain their status as of the end of the fourth 12-month period. This figure paints a negative picture regarding long-term persistence in mutual fund returns.
- Similarly, only 11.41% of large-cap funds, 1.2% of mid-cap funds, and 3.57% of small-cap funds maintained top-half performance over five consecutive 12-month periods. Random expectations would suggest a repeat rate of 6.25%.

- The transition matrices are designed to track the performance of top- and bottom-quintile performers over subsequent time periods. The data show a stronger likelihood for the best-performing funds to become the worst-performing funds than vice versa. Of 364 funds that were in the bottom quartile, 17.03% moved to the top quartile over the five-year horizon, while 25.82% of the 364 funds that were in the top quartile moved to the bottom quartile during the same period.
- Our research also suggests that there is consistency in the death rate of bottom-quartile funds. Across all market cap categories and all periods studied, fourth-quartile funds had a much higher rate of being merged or liquidated. The five-year transition matrix shows that 33.83% of large-cap funds, 33.96% of mid-cap funds, and 29.07% of small-cap funds in the fourth quartile disappeared.
- Compared with domestic equity funds, there was a higher level of performance persistence among the top-quartile fixed income funds over the three-year period ending March 2018. Government Intermediate, Global Income, and Emerging Markets funds were the only categories in which the results showed no performance persistence.
- Over the five-year measurement horizon, the results show a lack of persistence among nearly all the top-quartile fixed income categories, with a few exceptions. Funds investing in long-term government and investment-grade bonds, short-term investment-grade bonds, mortgage-backed securities, general municipal debt, and California municipal debt were the only groups in which a noticeable level of persistence was observed.

ABOUT THE PERSISTENCE SCORECARD

The phrase “past performance is not an indicator of future outcomes” (or some variation thereof) can be found in the fine print of most mutual fund literature. Yet, due to either force of habit or conviction, 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 on a continuous basis, the S&P Persistence Scorecard, released twice per year, tracks the consistency of top performers over yearly consecutive periods and measures performance persistence through transition matrices. 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-year consecutive 12-month periods and two non-overlapping three- and five-year periods.

Key features of the S&P Persistence Scorecard include the following.

- **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. Nevertheless, in their persistence calculations, analysts often limit their sample to funds that continue to exist over the complete time period examined, ranking only the survivors. If that happens, funds that liquidate or merge during a period of study are disregarded, biasing measurements of persistence. Using the University of Chicago's CRSP Survivorship Bias Free Mutual Fund 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. This approach accounts for all initially available funds.
- **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 two non-overlapping, three- and five-year periods. They also track the percentage of funds that have merged or liquidated. In addition, we monitor movements between capitalization levels. This helps us capture, for example, the conversion of some large-cap funds to mid- and small-cap funds.
- **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.

EXHIBITS

Exhibit 1: Performance Persistence of Domestic Equity Funds Over Three Consecutive 12-Month Periods				
MUTUAL FUND CATEGORY	FUND COUNT AT START (MARCH 2016)	PERCENTAGE REMAINING IN TOP QUARTILE		
		MARCH 2017		MARCH 2018
TOP QUARTILE				
All Domestic Funds	557	8.08		2.33
All Large-Cap Funds	214	5.61		0.93
All Mid-Cap Funds	79	16.46		0
All Small-Cap Funds	130	16.92		3.85
All Multi-Cap Funds	134	17.16		2.24
MUTUAL FUND CATEGORY	FUND COUNT AT START (MARCH 2016)	PERCENTAGE REMAINING IN TOP HALF		
		MARCH 2017		MARCH 2018
TOP HALF				
All Domestic Funds	1114	34.56		16.25
All Large-Cap Funds	428	38.32		21.96
All Mid-Cap Funds	158	42.41		7.59
All Small-Cap Funds	260	49.62		13.46
All Multi-Cap Funds	268	42.54		20.9

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 2: Performance Persistence of Domestic Equity Funds Over Five Consecutive 12-Month Periods					
MUTUAL FUND CATEGORY	FUND COUNT AT START (MARCH 2014)	PERCENTAGE REMAINING IN TOP QUARTILE			
		MARCH 2015	MARCH 2016	MARCH 2017	MARCH 2018
TOP QUARTILE					
All Domestic Funds	571	30.47	7.88	0.18	0.18
All Large-Cap Funds	223	41.7	8.07	0.45	0.45
All Mid-Cap Funds	83	22.89	3.61	0	0
All Small-Cap Funds	126	29.37	0	0	0
All Multi-Cap Funds	139	28.78	3.6	0.72	0.72
MUTUAL FUND CATEGORY	FUND COUNT AT START (MARCH 2014)	PERCENTAGE REMAINING IN TOP HALF			
		MARCH 2015	MARCH 2016	MARCH 2017	MARCH 2018
TOP HALF					
All Domestic Funds	1144	54.28	28.32	9.62	7.52
All Large-Cap Funds	447	56.38	31.32	14.09	11.41
All Mid-Cap Funds	167	49.1	23.95	5.99	1.2
All Small-Cap Funds	252	52.38	18.65	9.52	3.57
All Multi-Cap Funds	278	52.16	23.74	12.59	8.63

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 3: Three-Year Transition Matrix – Performance Over Two Non-Overlapping Three-Year Periods (Based on Quartile)							
ALL DOMESTIC FUNDS	FUND COUNT AT START (MARCH 2015)	THREE-YEAR PERCENTAGES AT END					
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
1st Quartile	526	30.23	18.25	22.43	23.57	5.51	0
2nd Quartile	525	21.52	28.19	20.95	17.9	11.24	0.19
3rd Quartile	526	19.77	20.91	23	17.3	17.68	1.33
4th Quartile	525	13.52	17.71	18.67	26.29	21.14	2.67
ALL LARGE-CAP FUNDS							
1st Quartile	201	33.83	20.9	20.4	6.47	6.47	11.94
2nd Quartile	201	18.41	24.38	17.41	19.9	11.44	8.46
3rd Quartile	200	17	17	21	22	18	5
4th Quartile	201	7.96	14.43	18.41	28.36	20.9	9.95
ALL MID-CAP FUNDS							
1st Quartile	78	21.79	12.82	21.79	21.79	3.85	17.95
2nd Quartile	77	22.08	18.18	20.78	19.48	7.79	11.69
3rd Quartile	78	11.54	21.79	16.67	12.82	16.67	20.51
4th Quartile	77	12.99	16.88	9.09	14.29	23.38	23.38
ALL SMALL-CAP FUNDS							
1st Quartile	123	23.58	23.58	22.76	22.76	5.69	1.63
2nd Quartile	123	19.51	27.64	23.58	12.2	15.45	1.63
3rd Quartile	122	20.49	18.85	22.95	19.67	13.93	4.1
4th Quartile	123	20.33	13.82	14.63	29.27	18.7	3.25
ALL MULTI-CAP FUNDS							
1st Quartile	125	20.8	18.4	16	21.6	5.6	17.6
2nd Quartile	124	21.77	20.97	15.32	14.52	9.68	17.74
3rd Quartile	125	13.6	16	18.4	9.6	16.8	25.6
4th Quartile	124	8.06	9.68	14.52	18.55	25.81	23.39

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 4: Three-Year Transition Matrix – Performance Over Two Non-Overlapping Three-Year Periods (Based on Halves)					
ALL DOMESTIC FUNDS	FUND COUNT AT START (MARCH 2015)	THREE-YEAR PERCENTAGES AT END			
		TOP HALF (%)	BOTTOM HALF (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
Top Half	1051	49.1	42.44	8.37	0.1
Bottom Half	1051	35.97	42.63	19.41	2
ALL LARGE-CAP FUNDS					
Top Half	402	48.76	32.09	8.96	10.2
Bottom Half	401	28.18	44.89	19.45	7.48
ALL MID-CAP FUNDS					
Top Half	155	37.42	41.94	5.81	14.84
Bottom Half	155	31.61	26.45	20	21.94
ALL SMALL-CAP FUNDS					
Top Half	246	47.15	40.65	10.57	1.63
Bottom Half	245	36.73	43.27	16.33	3.67
ALL MULTI-CAP FUNDS					
Top Half	249	40.96	33.73	7.63	17.67
Bottom Half	249	23.69	30.52	21.29	24.5

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 5: Five-Year Transition Matrix – Performance Over Two Non-Overlapping Five-Year Periods (Based on Quartile)								
ALL DOMESTIC FUNDS	FUND COUNT AT START (MARCH 2013)	FIVE-YEAR PERCENTAGES AT END						
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)	
1st Quartile	364	18.96	22.25	23.35	25.82	9.07	0.55	
2nd Quartile	364	24.18	19.51	22.53	19.23	14.29	0.27	
3rd Quartile	363	17.91	21.76	16.25	18.18	22.59	3.31	
4th Quartile	364	17.03	14.56	15.66	14.84	29.67	8.24	
ALL LARGE-CAP FUNDS								
1st Quartile	133	28.57	20.3	18.8	17.29	6.02	9.02	
2nd Quartile	133	15.04	18.8	16.54	18.8	18.05	12.78	
3rd Quartile	132	12.12	15.15	11.36	15.15	24.24	21.97	
4th Quartile	133	9.02	10.53	18.05	13.53	33.83	15.04	
ALL MID-CAP FUNDS								
1st Quartile	53	11.32	16.98	18.87	20.75	7.55	24.53	
2nd Quartile	53	18.87	13.21	20.75	15.09	15.09	16.98	
3rd Quartile	52	15.38	15.38	13.46	9.62	23.08	23.08	
4th Quartile	53	13.21	13.21	5.66	13.21	33.96	20.75	
ALL SMALL-CAP FUNDS								
1st Quartile	87	22.99	20.69	21.84	22.99	8.05	3.45	
2nd Quartile	86	23.26	23.26	15.12	22.09	15.12	1.16	
3rd Quartile	87	13.79	24.14	24.14	18.39	16.09	3.45	
4th Quartile	86	19.77	12.79	18.6	16.28	29.07	3.49	
ALL MULTI-CAP FUNDS								
1st Quartile	92	19.57	11.96	18.48	14.13	7.61	28.26	
2nd Quartile	92	15.22	19.57	16.3	11.96	14.13	22.83	
3rd Quartile	91	9.89	8.79	10.99	14.29	23.08	32.97	
4th Quartile	92	7.61	11.96	6.52	11.96	26.09	35.87	

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 6: Five-Year Transition Matrix – Performance Over Two Non-Overlapping Five-Year Periods (Based on Halves)					
ALL DOMESTIC FUNDS	FUND COUNT AT START (MARCH 2013)	FIVE-YEAR PERCENTAGES AT END			
		TOP HALF (%)	BOTTOM HALF (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
Top Half	728	42.45	45.47	11.68	0.41
Bottom Half	727	35.63	32.46	26.13	5.78
ALL LARGE-CAP FUNDS					
Top Half	266	41.35	35.71	12.03	10.9
Bottom Half	265	23.4	29.06	29.06	18.49
ALL MID-CAP FUNDS					
Top Half	106	30.19	37.74	11.32	20.75
Bottom Half	105	28.57	20.95	28.57	21.9
ALL SMALL-CAP FUNDS					
Top Half	173	45.09	41.04	11.56	2.31
Bottom Half	173	35.26	38.73	22.54	3.47
ALL MULTI-CAP FUNDS					
Top Half	184	33.15	30.43	10.87	25.54
Bottom Half	183	19.13	21.86	24.59	34.43

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 7: Performance Persistence of Domestic Fixed Income Funds Over Three Consecutive 12-Month Periods			
MUTUAL FUND CATEGORY	FUND COUNT AT START (MARCH 2016)	PERCENTAGE REMAINING IN TOP QUARTILE	
		MARCH 2017	MARCH 2018
TOP QUARTILE			
Government Long Funds	14	21.43	7.14
Government Intermediate Funds	5	20	0
Government Short Funds	6	16.67	16.67
Investment-Grade Long Funds	23	8.7	4.35
Investment-Grade Intermediate Funds	49	2.04	2.04
Investment-Grade Short Funds	21	23.81	19.05
High Yield Funds	51	1.96	1.96
Mortgage-Backed Securities Funds	13	7.69	7.69
Global Income Funds	26	7.69	0
Emerging Markets Debt Funds	15	40	0
General Municipal Debt Funds	20	40	25
California Municipal Debt Funds	9	22.22	11.11
New York Municipal Debt Funds	7	28.57	14.29
MUTUAL FUND CATEGORY	FUND COUNT AT START (MARCH 2016)	PERCENTAGE REMAINING IN TOP HALF	
		MARCH 2017	MARCH 2018
TOP HALF			
Government Long Funds	29	44.83	31.03
Government Intermediate Funds	10	40	30
Government Short Funds	12	58.33	25
Investment-Grade Long Funds	45	35.56	22.22
Investment-Grade Intermediate Funds	97	27.84	20.62
Investment-Grade Short Funds	42	50	42.86
High Yield Funds	102	28.43	20.59
Mortgage-Backed Securities Funds	26	50	26.92
Global Income Funds	53	24.53	9.43
Emerging Markets Debt Funds	29	55.17	31.03
General Municipal Debt Funds	40	55	42.5
California Municipal Debt Funds	18	61.11	55.56
New York Municipal Debt Funds	14	28.57	21.43

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 8: Performance Persistence of Domestic Fixed Income Funds Over Five Consecutive 12-Month Periods						
MUTUAL FUND CATEGORY	FUND COUNT AT START (MARCH 2014)	PERCENTAGE REMAINING IN TOP QUARTILE				
		MARCH 2015	MARCH 2016	MARCH 2017	MARCH 2018	
TOP QUARTILE						
Government Long Funds	15	6.67	6.67	6.67	6.67	
Government Intermediate Funds	6	0	0	0	0	
Government Short Funds	7	28.57	14.29	14.29	0	
Investment-Grade Long Funds	23	34.78	4.35	4.35	4.35	
Investment-Grade Intermediate Funds	52	26.92	1.92	0	0	
Investment-Grade Short Funds	15	53.33	20	6.67	6.67	
High Yield Funds	47	17.02	4.26	0	0	
Mortgage-Backed Securities Funds	14	35.71	7.14	7.14	7.14	
Global Income Funds	26	26.92	3.85	0	0	
Emerging Markets Debt Funds	9	44.44	11.11	0	0	
General Municipal Debt Funds	19	15.79	5.26	5.26	5.26	
California Municipal Debt Funds	9	33.33	22.22	11.11	11.11	
New York Municipal Debt Funds	7	0	0	0	0	
MUTUAL FUND CATEGORY	FUND COUNT AT START (MARCH 2014)	PERCENTAGE REMAINING IN TOP HALF				
		MARCH 2015	MARCH 2016	MARCH 2017	MARCH 2018	
TOP HALF						
Government Long Funds	29	44.83	24.14	13.79	10.34	
Government Intermediate Funds	11	36.36	27.27	18.18	9.09	
Government Short Funds	15	46.67	33.33	26.67	6.67	
Investment-Grade Long Funds	46	52.17	15.22	8.7	8.7	
Investment-Grade Intermediate Funds	103	39.81	16.5	10.68	9.71	
Investment-Grade Short Funds	31	61.29	41.94	29.03	25.81	
High Yield Funds	95	40	22.11	14.74	11.58	
Mortgage-Backed Securities Funds	28	60.71	35.71	32.14	25	
Global Income Funds	51	43.14	7.84	3.92	0	
Emerging Markets Debt Funds	19	63.16	47.37	15.79	0	
General Municipal Debt Funds	38	47.37	28.95	18.42	18.42	
California Municipal Debt Funds	18	50	38.89	27.78	27.78	
New York Municipal Debt Funds	14	42.86	35.71	28.57	28.57	

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 9: Three-Year Transition Matrix – Performance Over Two Non-Overlapping Three-Year Periods (Based on Quartile)							
GOVERNMENT LONG FUNDS	FUND COUNT AT START (MARCH 2015)	THREE-YEAR PERCENTAGES AT END					
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
1st Quartile	14	28.57	7.14	35.71	21.43	7.14	0
2nd Quartile	14	14.29	42.86	28.57	14.29	0	0
3rd Quartile	13	23.08	30.77	15.38	30.77	0	0
4th Quartile	14	21.43	14.29	7.14	21.43	35.71	0
GOVERNMENT INTERMEDIATE FUNDS							
1st Quartile	6	50	0	16.67	0	33.33	0
2nd Quartile	6	16.67	50	0	0	33.33	0
3rd Quartile	5	0	20	20	40	20	0
4th Quartile	6	0	16.67	33.33	33.33	16.67	0
GOVERNMENT SHORT FUNDS							
1st Quartile	6	33.33	66.67	0	0	0	0
2nd Quartile	7	42.86	28.57	28.57	0	0	0
3rd Quartile	6	0	0	50	16.67	33.33	0
4th Quartile	6	0	0	0	66.67	16.67	16.67
INVESTMENT-GRADE LONG FUNDS							
1st Quartile	22	36.36	22.73	18.18	4.55	4.55	13.64
2nd Quartile	21	23.81	33.33	19.05	9.52	4.76	9.52
3rd Quartile	22	18.18	22.73	31.82	18.18	4.55	4.55
4th Quartile	21	4.76	4.76	9.52	52.38	19.05	9.52
INVESTMENT-GRADE INTERMEDIATE FUNDS							
1st Quartile	43	41.86	23.26	13.95	9.3	9.3	2.33
2nd Quartile	43	25.58	27.91	18.6	20.93	6.98	0
3rd Quartile	42	11.9	23.81	28.57	21.43	11.9	2.38
4th Quartile	43	9.3	11.63	27.91	34.88	13.95	2.33
INVESTMENT-GRADE SHORT FUNDS							
1st Quartile	18	38.89	38.89	11.11	5.56	5.56	0
2nd Quartile	18	27.78	16.67	27.78	11.11	16.67	0
3rd Quartile	17	5.88	29.41	35.29	17.65	11.76	0
4th Quartile	18	11.11	5.56	11.11	50	22.22	0
HIGH YIELD FUNDS							
1st Quartile	43	37.21	27.91	20.93	4.65	6.98	2.33
2nd Quartile	43	18.6	34.88	20.93	23.26	2.33	0
3rd Quartile	42	19.05	16.67	23.81	23.81	16.67	0
4th Quartile	43	11.63	9.3	20.93	34.88	23.26	0

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 9: Three-Year Transition Matrix – Performance Over Two Non-Overlapping Three-Year Periods (Based on Quartile) (cont.)							
MORTGAGE- BACKED SECURITIES FUNDS	FUND COUNT AT START (MARCH 2015)	THREE-YEAR PERCENTAGES AT END					
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/ LIQUIDATED (%)	STYLE CHANGED (%)
1st Quartile	12	66.67	16.67	16.67	0	0	0
2nd Quartile	13	15.38	38.46	30.77	15.38	0	0
3rd Quartile	12	8.33	25	25	25	0	16.67
4th Quartile	12	0	16.67	16.67	50	8.33	8.33
GLOBAL INCOME FUNDS							
1st Quartile	21	4.76	23.81	28.57	28.57	9.52	4.76
2nd Quartile	20	25	25	15	30	5	0
3rd Quartile	21	28.57	19.05	19.05	23.81	9.52	0
4th Quartile	20	30	20	25	5	15	5
EMERGING MARKETS DEBT FUNDS							
1st Quartile	7	14.29	42.86	28.57	14.29	0	0
2nd Quartile	6	16.67	33.33	33.33	16.67	0	0
3rd Quartile	7	14.29	0	14.29	14.29	57.14	0
4th Quartile	6	50	0	16.67	33.33	0	0
GENERAL MUNICIPAL DEBT FUNDS							
1st Quartile	18	55.56	33.33	5.56	5.56	0	0
2nd Quartile	18	22.22	27.78	27.78	5.56	11.11	5.56
3rd Quartile	17	11.76	17.65	41.18	23.53	5.88	0
4th Quartile	18	0	11.11	16.67	55.56	5.56	11.11
CALIFORNIA MUNICIPAL DEBT FUNDS							
1st Quartile	9	55.56	22.22	0	11.11	11.11	0
2nd Quartile	8	12.5	50	25	12.5	0	0
3rd Quartile	9	22.22	22.22	22.22	22.22	11.11	0
4th Quartile	8	0	0	37.5	50	0	12.5
NEW YORK MUNICIPAL DEBT FUNDS							
1st Quartile	7	42.86	28.57	14.29	0	0	14.29
2nd Quartile	6	16.67	33.33	33.33	16.67	0	0
3rd Quartile	7	28.57	14.29	28.57	14.29	14.29	0
4th Quartile	6	0	16.67	16.67	66.67	0	0

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 10: Three-Year Transition Matrix – Performance Over Two Non-Overlapping Three-Year Periods (Based on Halves)					
GOVERNMENT LONG FUNDS	FUND COUNT AT START (MARCH 2015)	THREE-YEAR PERCENTAGES AT END			
		TOP HALF (%)	BOTTOM HALF (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
Top Half	28	46.43	50	3.57	0
Bottom Half	27	44.44	37.04	18.52	0
GOVERNMENT INTERMEDIATE FUNDS					
Top Half	12	58.33	8.33	33.33	0
Bottom Half	11	18.18	63.64	18.18	0
GOVERNMENT SHORT FUNDS					
Top Half	13	84.62	15.38	0	0
Bottom Half	12	0	66.67	25	8.33
INVESTMENT-GRADE LONG FUNDS					
Top Half	43	58.14	25.58	4.65	11.63
Bottom Half	43	25.58	55.81	11.63	6.98
Investment-Grade Intermediate Funds					
Top Half	86	59.3	31.4	8.14	1.16
Bottom Half	85	28.24	56.47	12.94	2.35
INVESTMENT-GRADE SHORT FUNDS					
Top Half	36	61.11	27.78	11.11	0
Bottom Half	35	25.71	57.14	17.14	0
HIGH YIELD FUNDS					
Top Half	86	59.3	34.88	4.65	1.16
Bottom Half	85	28.24	51.76	20	0
MORTGAGE-BACKED SECURITIES FUNDS					
Top Half	25	68	32	0	0
Bottom Half	24	25	58.33	4.17	12.5
GLOBAL INCOME FUNDS					
Top Half	41	39.02	51.22	7.32	2.44
Bottom Half	41	48.78	36.59	12.2	2.44
EMERGING MARKETS DEBT FUNDS					
Top Half	13	53.85	46.15	0	0
Bottom Half	13	30.77	38.46	30.77	0
GENERAL MUNICIPAL DEBT FUNDS					
Top Half	36	69.44	22.22	5.56	2.78
Bottom Half	35	20	68.57	5.71	5.71
CALIFORNIA MUNICIPAL DEBT FUNDS					
Top Half	17	70.59	23.53	5.88	0
Bottom Half	17	23.53	64.71	5.88	5.88
NEW YORK MUNICIPAL DEBT FUNDS					
Top Half	13	61.54	30.77	0	7.69
Bottom Half	13	30.77	61.54	7.69	0

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 11: Five-Year Transition Matrix – Performance Over Two Non-Overlapping Five-Year Periods (Based on Quartile)							
GOVERNMENT LONG FUNDS	FUND COUNT AT START (MARCH 2013)	FIVE-YEAR PERCENTAGES AT END					
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
1st Quartile	9	55.56	11.11	11.11	11.11	11.11	0
2nd Quartile	9	11.11	22.22	11.11	11.11	33.33	11.11
3rd Quartile	8	0	50	25	25	0	0
4th Quartile	9	11.11	0	22.22	33.33	33.33	0
GOVERNMENT INTERMEDIATE FUNDS							
1st Quartile	6	33.33	16.67	0	0	33.33	16.67
2nd Quartile	6	16.67	33.33	16.67	16.67	16.67	0
3rd Quartile	5	20	20	0	20	40	0
4th Quartile	6	0	0	50	33.33	16.67	0
GOVERNMENT SHORT FUNDS							
1st Quartile	7	28.57	28.57	14.29	0	28.57	0
2nd Quartile	7	14.29	28.57	42.86	0	14.29	0
3rd Quartile	6	33.33	0	16.67	0	33.33	16.67
4th Quartile	7	0	0	0	57.14	28.57	14.29
INVESTMENT-GRADE LONG FUNDS							
1st Quartile	16	37.5	25	6.25	0	6.25	25
2nd Quartile	15	20	13.33	26.67	13.33	13.33	13.33
3rd Quartile	16	0	12.5	25	37.5	0	25
4th Quartile	15	13.33	13.33	13.33	13.33	20	26.67
INVESTMENT-GRADE INTERMEDIATE FUNDS							
1st Quartile	38	18.42	15.79	10.53	5.26	15.79	34.21
2nd Quartile	37	18.92	24.32	18.92	0	13.51	24.32
3rd Quartile	38	18.42	15.79	21.05	10.53	21.05	13.16
4th Quartile	37	5.41	2.7	10.81	43.24	24.32	13.51
INVESTMENT-GRADE SHORT FUNDS							
1st Quartile	13	30.77	38.46	7.69	7.69	15.38	0
2nd Quartile	14	21.43	35.71	35.71	7.14	0	0
3rd Quartile	13	7.69	7.69	38.46	30.77	15.38	0
4th Quartile	13	23.08	0	0	38.46	23.08	15.38
HIGH YIELD FUNDS							
1st Quartile	25	40	20	20	8	12	0
2nd Quartile	26	23.08	23.08	7.69	34.62	11.54	0
3rd Quartile	25	16	16	40	4	24	0
4th Quartile	25	4	24	12	36	20	4

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 11: Five-Year Transition Matrix – Performance Over Two Non-Overlapping Five-Year Periods (Based on Quartile) (cont.)								
MORTGAGE-BACKED SECURITIES FUNDS	FUND COUNT AT START (MARCH 2013)	FIVE-YEAR PERCENTAGES AT END						
		1ST QUARTILE (%)	2ND QUARTILE (%)	3TH QUARTILE (%)	4TH QUARTILE (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)	
1st Quartile	10	60	10	30	0	0	0	
2nd Quartile	10	0	40	10	30	20	0	
3rd Quartile	10	20	30	20	20	0	10	
4th Quartile	10	10	0	30	30	20	10	
GLOBAL INCOME FUNDS								
1st Quartile	10	60	10	0	10	20	0	
2nd Quartile	10	10	50	20	0	20	0	
3rd Quartile	9	0	0	33.33	22.22	33.33	11.11	
4th Quartile	10	0	10	10	40	40	0	
EMERGING MARKETS DEBT FUNDS								
1st Quartile	4	50	50	0	0	0	0	
2nd Quartile	4	0	25	50	25	0	0	
3rd Quartile	3	33.33	33.33	0	33.33	0	0	
4th Quartile	4	0	0	25	25	50	0	
GENERAL MUNICIPAL DEBT FUNDS								
1st Quartile	17	47.06	17.65	23.53	11.76	0	0	
2nd Quartile	16	12.5	43.75	12.5	12.5	12.5	6.25	
3rd Quartile	17	17.65	11.76	41.18	17.65	11.76	0	
4th Quartile	16	6.25	12.5	0	43.75	18.75	18.75	
CALIFORNIA MUNICIPAL DEBT FUNDS								
1st Quartile	9	44.44	22.22	11.11	11.11	0	11.11	
2nd Quartile	8	12.5	37.5	37.5	12.5	0	0	
3rd Quartile	9	11.11	33.33	11.11	33.33	11.11	0	
4th Quartile	8	25	0	25	37.5	12.5	0	
NEW YORK MUNICIPAL DEBT FUNDS								
1st Quartile	7	42.86	42.86	14.29	0	0	0	
2nd Quartile	6	33.33	0	33.33	16.67	0	16.67	
3rd Quartile	7	14.29	28.57	14.29	28.57	14.29	0	
4th Quartile	6	0	0	33.33	33.33	33.33	0	

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

Exhibit 12: Five-Year Transition Matrix – Performance Over Two Non-Overlapping Five-Year Periods (Based on Halves)					
GOVERNMENT LONG FUNDS	FUND COUNT AT START (MARCH 2013)	FIVE-YEAR PERCENTAGES AT END			
		TOP HALF (%)	BOTTOM HALF (%)	MERGED/LIQUIDATED (%)	STYLE CHANGED (%)
Top Half	18	50	22.22	22.22	5.56
Bottom Half	17	29.41	52.94	17.65	0
GOVERNMENT INTERMEDIATE FUNDS					
Top Half	12	50	16.67	25	8.33
Bottom Half	11	18.18	54.55	27.27	0
GOVERNMENT SHORT FUNDS					
Top Half	14	50	28.57	21.43	0
Bottom Half	13	15.38	38.46	30.77	15.38
INVESTMENT-GRADE LONG FUNDS					
Top Half	31	48.39	22.58	9.68	19.35
Bottom Half	31	19.35	45.16	9.68	25.81
INVESTMENT-GRADE INTERMEDIATE FUNDS					
Top Half	75	38.67	17.33	14.67	29.33
Bottom Half	75	21.33	42.67	22.67	13.33
INVESTMENT-GRADE SHORT FUNDS					
Top Half	27	62.96	29.63	7.41	0
Bottom Half	26	19.23	53.85	19.23	7.69
HIGH YIELD FUNDS					
Top Half	51	52.94	35.29	11.76	0
Bottom Half	50	30	46	22	2
MORTGAGE-BACKED SECURITIES FUNDS					
Top Half	20	55	35	10	0
Bottom Half	20	30	50	10	10
GLOBAL INCOME FUNDS					
Top Half	20	65	15	20	0
Bottom Half	19	5.26	52.63	36.84	5.26
EMERGING MARKETS DEBT FUNDS					
Top Half	8	62.5	37.5	0	0
Bottom Half	7	28.57	42.86	28.57	0
GENERAL MUNICIPAL DEBT FUNDS					
Top Half	33	60.61	30.3	6.06	3.03
Bottom Half	33	24.24	51.52	15.15	9.09
CALIFORNIA MUNICIPAL DEBT FUNDS					
Top Half	17	58.82	35.29	0	5.88
Bottom Half	17	35.29	52.94	11.76	0
NEW YORK MUNICIPAL DEBT FUNDS					
Top Half	13	61.54	30.77	0	7.69
Bottom Half	13	23.08	53.85	23.08	0

Source: S&P Dow Jones Indices LLC, CRSP. Data as of March 31, 2018. Table is provided for illustrative purposes. Past performance is no guarantee of future results.

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