

APPENDICES

A Annual Returns for S&P Sectors

Exhibit 11: Annual Returns of S&P Sectors

Date	XLB	XLE	XLF	XLI	XLK	XLP	XLU	XLV	XLX
1999	23.0	18.0	2.6	21.8	65.1	-14.2	-4.4	19.5	19.5
2000	-16.2	24.4	25.9	6.7	-41.9	25.5	22.5	-11.8	-16.9
2001	2.1	-18.2	-9.4	-10.5	-23.3	-9.9	-13.0	-0.9	12.7
2002	-5.3	-14.7	-14.8	-24.6	-38.1	-20.1	-28.8	-0.7	-18.6
2003	37.4	25.8	30.5	31.9	38.6	11.2	26.6	14.9	37.2
2004	13.5	33.9	10.9	17.8	5.6	7.7	23.6	1.3	12.9
2005	4.1	40.2	6.2	2.8	-0.3	2.8	16.3	6.4	-6.6
2006	18.4	18.1	18.9	13.5	12.1	14.4	20.9	7.0	18.4
2007	22.1	36.9	-19.2	13.5	15.5	12.7	18.4	7.2	-13.7
2008	-44.1	-39.0	-54.9	-38.7	-41.5	-15.0	-28.9	-23.3	-33.0
2009	48.2	21.7	17.5	22.0	51.3	14.3	11.7	19.6	40.6
2010	20.5	21.8	12.0	27.8	11.4	13.8	5.3	3.3	27.5
2011	-10.9	2.8	-17.2	-1.1	2.7	14.1	19.6	12.4	6.0
2012	14.7	5.2	28.5	14.9	15.3	10.7	1.0	17.4	23.6
2013	26.0	26.3	35.5	40.6	26.2	26.3	13.0	41.4	42.7
2014	7.2	-8.7	15.0	10.4	17.9	15.7	28.7	25.1	9.4
2015	-8.7	-21.5	-1.8	-4.3	5.5	6.9	-4.9	6.8	9.9
2016	16.8	28.0	22.4	20.0	15.0	5.0	16.1	-2.8	6.0
2017	24.0	-0.9	22.0	24.0	34.3	13.0	12.1	21.8	22.8
2018	-14.9	-18.2	-13.0	-13.2	-1.7	-8.1	3.9	6.3	1.6
2019	24.1	11.7	31.9	29.1	49.9	27.4	25.9	20.5	28.4
2020	20.5	-32.7	-1.7	10.9	43.6	10.1	0.5	13.3	29.6
2021	27.4	53.3	34.8	21.1	34.7	17.2	17.7	26.0	27.9
2022	-12.3	64.3	-10.6	-5.6	-27.7	-0.8	1.5	-2.1	-36.3
2023	12.4	-0.6	12.0	18.1	56.0	-0.8	-7.2	2.1	39.6
2024	0.2	5.6	30.6	17.3	21.6	12.2	23.3	2.5	26.5
Summary Statistics									
Min	-44.1	-39.0	-54.9	-38.7	-41.5	-15.0	-28.9	-23.3	-33.0
Max	48.2	64.3	35.5	40.6	65.1	27.4	28.7	41.4	42.7
Median	14.1	14.9	12.0	14.2	15.1	10.9	12.5	6.9	15.6
Mean	9.6	10.9	8.3	10.2	13.4	7.4	8.5	9	12.2
Std Dev	19.8	25.7	21.6	18.1	29.9	12.6	15.9	13.3	22.0

B Strategy Components (Annual Rebalancing)

Exhibit 12: Members - S&P (Alphabetical Order)

Year	Winners			Median			Losers		
2000	XLI	XLB	XLK	XLE	XLY	XLV	XLP	XLU	XLF
2001	XLE	XLP	XLF	XLU	XLI	XLV	XLB	XLK	XLY
2002	XLB	XLV	XLY	XLF	XLI	XLP	XLE	XLK	XLU
2003	XLB	XLE	XLV	XLF	XLP	XLY	XLI	XLK	XLU
2004	XLB	XLK	XLY	XLF	XLI	XLU	XLE	XLP	XLV
2005	XLE	XLI	XLU	XLB	XLF	XLY	XLK	XLP	XLV
2006	XLE	XLU	XLV	XLB	XLF	XLP	XLI	XLK	XLY
2007	XLF	XLU	XLY	XLB	XLE	XLP	XLI	XLK	XLV
2008	XLB	XLE	XLU	XLI	XLK	XLP	XLF	XLV	XLY
2009	XLP	XLU	XLV	XLE	XLI	XLY	XLB	XLF	XLK
2010	XLB	XLK	XLY	XLE	XLI	XLV	XLF	XLP	XLU
2011	XLE	XLI	XLY	XLB	XLF	XLP	XLK	XLU	XLV
2012	XLP	XLU	XLV	XLE	XLK	XLY	XLB	XLF	XLI
2013	XLF	XLV	XLY	XLB	XLI	XLK	XLE	XLP	XLU
2014	XLI	XLV	XLY	XLE	XLF	XLP	XLB	XLK	XLU
2015	XLK	XLU	XLV	XLF	XLI	XLP	XLB	XLE	XLY
2016	XLP	XLV	XLY	XLF	XLI	XLK	XLB	XLE	XLU
2017	XLE	XLF	XLI	XLB	XLK	XLU	XLP	XLV	XLY
2018	XLB	XLI	XLK	XLF	XLV	XLY	XLE	XLP	XLU
2019	XLU	XLV	XLY	XLF	XLK	XLP	XLB	XLE	XLI
2020	XLF	XLI	XLK	XLP	XLU	XLY	XLB	XLE	XLV
2021	XLB	XLK	XLY	XLI	XLP	XLV	XLE	XLF	XLU
2022	XLE	XLF	XLK	XLB	XLV	XLY	XLI	XLP	XLU
2023	XLE	XLP	XLU	XLF	XLI	XLV	XLB	XLK	XLY
2024	XLI	XLK	XLY	XLB	XLF	XLV	XLE	XLP	XLU
2025*	XLU	XLY	XLF	XLI	XLP	XLK	XLB	XLE	XLV

C Results for Different Rotation Frequencies

C.1 Annual Rotation

Exhibit 13: Growth and Annual Returns with Annual Sector Rotation

Year	Growth				Annualized Return			
	B&H	W	M	L	B&H	W	M	L
2000	90	83	99	125	-9.7	-17.1	-1.4	24.6
2001	80	73	91	121	-11.8	-12.5	-8.1	-2.8
2002	62	67	73	88	-21.6	-8.2	-19.8	-27.2
2003	80	84	92	117	28.2	26.0	26.3	32.4
2004	89	93	108	133	10.7	10.7	17.4	14.3
2005	93	111	109	137	4.8	19.8	1.2	3.0
2006	108	128	128	158	15.8	15.3	17.2	14.7
2007	113	122	158	176	5.1	-4.8	23.9	12.0
2008	72	77	108	111	-36.8	-37.3	-31.7	-37.1
2009	90	88	138	154	26.3	15.2	28.1	39.0
2010	104	106	163	170	15.1	19.8	17.6	10.4
2011	106	108	155	190	1.9	2.6	-4.7	11.6
2012	123	119	178	227	16.0	9.7	14.7	19.4
2013	163	166	233	277	32.3	39.9	30.9	21.9
2014	184	191	250	326	13.5	15.0	7.4	17.9
2015	187	196	251	304	1.2	2.5	0.2	-6.8
2016	209	201	299	366	12.0	2.7	19.1	20.3
2017	255	231	369	436	21.7	15.0	23.4	19.2
2018	243	208	363	404	-4.6	-9.9	-1.7	-7.5
2019	319	260	494	491	31.2	24.9	36.4	21.7
2020	377	306	561	493	18.3	17.6	13.4	0.4
2021	486	398	681	666	28.7	30.0	21.4	35.3
2022	397	433	566	655	-18.2	8.7	-16.9	-1.6
2023	501	420	627	892	26.2	-2.9	10.7	36.0
2024	626	512	696	1,014	24.9	21.8	11.1	13.7
Summary Statistics								
min	62	67	73	88	-36.8	-37.3	-31.7	-37.1
max	626	512	696	1,014	32.3	39.9	36.4	39.0
median	123	128	178	227	13.5	10.7	13.4	14.3
mean	206	191	280	329	9.3	8.2	9.5	11.4
std	158	129	206	252	18.2	17.0	16.9	18.4

Exhibit 14: Volatility, Sharpe Ratio, and Maximum Drawdown with Annual Sector Rotation

Year	Volatility				Sharpe Ratio				MDD			
	B&H	W	M	L	B&H	W	M	L	B&H	W	M	L
2000	23.9	24.9	20.2	20.3	-0.4	-0.7	-0.1	1.2	-17.1	-22.4	-15.8	-15.5
2001	22.1	17.1	18.9	28.8	-0.5	-0.7	-0.4	-0.1	-28.8	-21.1	-24.2	-31.6
2002	26.5	24.9	23.7	28.9	-0.8	-0.3	-0.8	-0.9	-33.0	-25.6	-30.2	-41.3
2003	16.5	14.4	16.7	17.4	1.7	1.8	1.6	1.9	-13.7	-10.2	-14.5	-15.8
2004	11.1	14.0	10.6	10.3	1.0	0.8	1.6	1.4	-7.5	-10.4	-7.5	-6.4
2005	10.3	14.2	12.2	9.2	0.5	1.4	0.1	0.3	-7.0	-9.9	-10.2	-5.4
2006	10.0	11.9	10.9	11.7	1.6	1.3	1.6	1.3	-7.6	-6.3	-8.5	-11.2
2007	15.9	17.5	17.5	13.7	0.3	-0.3	1.4	0.9	-9.9	-14.6	-10.8	-7.8
2008	41.3	45.0	32.4	44.5	-0.9	-0.8	-1.0	-0.8	-47.6	-49.4	-41.0	-50.3
2009	26.6	16.9	31.3	38.2	1.0	0.9	0.9	1.0	-27.1	-21.1	-30.9	-32.2
2010	17.9	20.3	19.0	16.1	0.8	1.0	0.9	0.6	-15.7	-18.0	-16.1	-11.8
2011	23.0	26.6	25.1	18.5	0.1	0.1	-0.2	0.6	-18.6	-23.8	-22.5	-13.5
2012	12.7	8.6	14.4	15.9	1.3	1.1	1.0	1.2	-9.7	-7.0	-11.2	-13.1
2013	11.1	12.1	11.9	10.8	2.9	3.3	2.6	2.0	-5.6	-5.5	-6.2	-6.9
2014	11.2	12.6	11.3	10.7	1.2	1.2	0.7	1.7	-7.3	-7.5	-8.3	-5.9
2015	15.4	15.0	15.0	17.9	0.1	0.2	0.0	-0.4	-11.9	-10.2	-10.7	-18.7
2016	13.1	11.7	14.8	15.1	0.9	0.2	1.3	1.3	-10.3	-8.9	-11.8	-9.6
2017	6.7	9.5	6.9	6.0	3.2	1.6	3.4	3.2	-2.6	-6.0	-2.9	-2.4
2018	17.0	19.2	17.3	13.1	-0.3	-0.5	-0.1	-0.6	-19.4	-22.5	-19.1	-15.1
2019	12.5	10.0	12.7	15.0	2.5	2.5	2.9	1.4	-6.6	-4.8	-6.6	-10.4
2020	33.4	39.4	31.1	39.6	0.5	0.4	0.4	0.0	-33.7	-38.7	-31.2	-42.7
2021	13.0	15.5	10.7	16.4	2.2	1.9	2.0	2.2	-5.1	-6.1	-6.3	-7.7
2022	24.2	25.3	23.6	18.1	-0.7	0.3	-0.7	-0.1	-24.5	-17.8	-22.8	-16.4
2023	13.1	13.0	12.5	16.2	2.0	-0.2	0.9	2.2	-10.0	-9.9	-10.8	-12.3
2024	12.6	16.1	10.8	10.6	2.0	1.4	1.0	1.3	-8.4	-11.2	-8.4	-8.8
Summary Statistics												
min	6.7	8.6	6.9	6.0	-0.9	-0.8	-1.0	-0.9	-47.6	-49.4	-41.0	-50.3
max	41.3	45.0	32.4	44.5	3.2	3.3	3.4	3.2	-2.6	-4.8	-2.9	-2.4
median	15.4	15.5	15.0	16.1	0.9	0.8	0.9	1.2	-10.3	-10.4	-11.2	-12.3
mean	17.7	18.2	17.3	18.5	0.9	0.7	0.8	0.9	-15.5	-15.6	-15.5	-16.5
std	8.2	8.8	7.1	9.9	1.2	1.1	1.2	1.0	11.2	10.9	9.8	12.8

C.2 Semi-Annual Rotation

Exhibit 15: Growth and Annual Returns with Semi-Annual Sector Rotation

Year	Growth				Annualized Return			
	B&H	W	M	L	B&H	W	M	L
2000	90	108	92	105	-9.7	8.2	-7.6	4.9
2001	80	98	83	100	-11.8	-9.4	-9.7	-4.7
2002	62	86	70	74	-21.6	-12.1	-16.3	-26.4
2003	80	108	86	100	28.2	25.7	23.7	35.6
2004	89	122	100	114	10.7	12.6	15.7	13.9
2005	93	142	102	120	4.8	16.6	1.7	5.3
2006	108	163	119	138	15.8	14.9	17.2	15.3
2007	113	188	134	140	5.1	15.0	12.6	1.6
2008	72	116	97	84	-36.8	-38.4	-27.6	-40.1
2009	90	152	119	107	26.3	31.2	22.6	27.5
2010	104	180	124	135	15.1	18.5	4.2	25.9
2011	106	195	130	130	1.9	8.0	4.5	-3.6
2012	123	229	146	148	16.0	17.6	12.5	13.6
2013	163	311	190	186	32.3	36.1	30.3	26.4
2014	184	327	224	221	13.5	5.0	17.6	18.4
2015	187	342	219	207	1.2	4.5	-1.9	-6.4
2016	209	384	247	243	12.0	12.3	12.7	17.8
2017	255	471	278	299	21.7	22.9	12.3	22.7
2018	243	408	286	274	-4.6	-13.4	3.1	-8.1
2019	319	507	376	349	31.2	24.2	31.4	27.1
2020	377	598	404	366	18.3	18.0	7.3	4.8
2021	486	751	507	499	28.7	25.6	25.5	36.3
2022	397	665	494	496	-18.2	-11.4	-2.4	-0.4
2023	501	729	532	621	26.2	9.6	7.6	25.2
2024	626	862	584	737	24.9	18.3	9.9	18.7
Summary Statistics								
min	62	86	70	74	-36.8	-38.4	-27.6	-40.1
max	626	862	584	737	32.3	36.1	31.4	36.3
median	123	229	146	148	13.5	14.9	9.9	13.9
mean	206	330	230	240	9.3	10.4	8.3	10.0
std	158	236	161	179	18.2	16.6	14.2	18.5

Exhibit 16: Volatility, Sharpe Ratio, and MDD with Semi-Annual Sector Rotation Strategy

Year	Volatility				Sharpe Ratio				MDD			
	B&H	W	M	L	B&H	W	M	L	B&H	W	M	L
2000	23.9	21.8	22.1	23.1	-0.4	0.4	-0.3	0.2	-17.1	-14.6	-18.7	-16.7
2001	22.1	20.9	19.5	26.3	-0.5	-0.5	-0.5	-0.2	-28.8	-28.3	-26.6	-26.2
2002	26.5	24.3	24.7	29.2	-0.8	-0.5	-0.7	-0.9	-33.0	-29.1	-27.3	-42.1
2003	16.5	16.7	17.3	14.5	1.7	1.5	1.4	2.5	-13.7	-13.0	-16.3	-11.5
2004	11.1	13.0	11.3	11.1	1.0	1.3	1.3	1.3	-7.5	-9.1	-7.1	-10.4
2005	10.3	14.9	10.7	10.5	0.5	1.1	0.2	0.5	-7.0	-10.2	-9.2	-9.0
2006	10.0	15.4	9.3	10.1	1.6	1.0	1.9	1.5	-7.6	-12.8	-7.6	-7.0
2007	15.9	18.8	14.1	16.1	0.3	0.8	0.9	0.1	-9.9	-12.5	-7.1	-13.1
2008	41.3	43.6	34.3	43.6	-0.9	-0.9	-0.8	-0.9	-47.6	-48.7	-41.1	-50.1
2009	26.6	22.9	23.6	39.5	1.0	1.4	1.0	0.7	-27.1	-22.6	-27.0	-34.4
2010	17.9	20.2	19.9	16.2	0.8	0.9	0.2	1.6	-15.7	-18.7	-18.2	-9.6
2011	23.0	22.6	21.3	26.8	0.1	0.4	0.2	-0.1	-18.6	-16.8	-17.5	-23.5
2012	12.7	11.1	12.3	15.2	1.3	1.6	1.0	0.9	-9.7	-8.1	-9.7	-13.1
2013	11.1	12.7	11.6	10.3	2.9	2.8	2.6	2.6	-5.6	-5.9	-5.7	-6.8
2014	11.2	12.9	11.3	10.9	1.2	0.4	1.6	1.7	-7.3	-8.1	-6.7	-7.6
2015	15.4	16.0	15.4	16.4	0.1	0.3	-0.1	-0.4	-11.9	-12.0	-13.3	-15.4
2016	13.1	12.0	14.6	16.0	0.9	1.0	0.9	1.1	-10.3	-6.2	-12.7	-11.6
2017	6.7	8.7	7.9	6.5	3.2	2.6	1.5	3.5	-2.6	-4.7	-3.0	-3.3
2018	17.0	19.9	15.4	14.1	-0.3	-0.7	0.2	-0.6	-19.4	-24.9	-12.6	-19.0
2019	12.5	12.2	12.9	13.4	2.5	2.0	2.4	2.0	-6.6	-7.3	-7.7	-10.5
2020	33.4	36.2	33.2	42.4	0.5	0.5	0.2	0.1	-33.7	-34.1	-34.2	-43.7
2021	13.0	18.0	13.5	12.1	2.2	1.4	1.9	3.0	-5.1	-10.6	-7.2	-5.1
2022	24.2	23.3	19.9	24.9	-0.7	-0.5	-0.1	0.0	-24.5	-24.6	-16.9	-19.1
2023	13.1	16.0	11.6	14.1	2.0	0.6	0.7	1.8	-10.0	-13.0	-11.5	-8.3
2024	12.6	13.4	10.6	12.8	2.0	1.4	0.9	1.5	-8.4	-9.2	-7.6	-7.7
Summary Statistics												
min	6.7	8.7	7.9	6.5	-0.9	-0.9	-0.8	-0.9	-47.6	-48.7	-41.1	-50.1
max	41.3	43.6	34.3	43.6	3.2	2.8	2.6	3.5	-2.6	-4.7	-3.0	-3.3
median	15.4	16.7	14.6	15.2	0.9	0.9	0.9	0.9	-10.3	-12.8	-12.6	-11.6
mean	17.7	18.7	16.7	19.0	0.9	0.8	0.7	0.9	-15.5	-16.2	-14.9	-17.0
std	8.2	7.8	6.9	10.4	1.2	1.0	0.9	1.2	11.2	10.5	9.7	12.8

C.3 Quarterly Rotation

Exhibit 17: Growth and Annual Returns with Quarterly Sector Rotation

Year	Growth				Annualized Return			
	B&H	W	M	L	B&H	W	M	L
2000	90	111	108	86	-9.7	11.1	7.9	-13.8
2001	80	87	100	94	-11.8	-21.3	-7.6	8.4
2002	62	71	83	74	-21.6	-19.0	-16.3	-20.7
2003	80	91	115	88	28.2	28.5	37.4	19.0
2004	89	107	121	105	10.7	18.0	5.1	19.3
2005	93	105	137	119	4.8	-2.1	13.2	13.1
2006	108	121	150	146	15.8	15.5	9.9	22.7
2007	113	145	167	144	5.1	19.6	11.5	-1.7
2008	72	83	120	94	-36.8	-42.9	-28.1	-34.9
2009	90	107	157	115	26.3	29.4	30.7	22.7
2010	104	128	173	137	15.1	18.9	10.0	19.3
2011	106	146	177	127	1.9	14.2	2.6	-7.2
2012	123	153	215	151	16.0	4.8	21.0	19.0
2013	163	197	295	190	32.3	29.3	37.6	25.7
2014	184	220	347	212	13.5	11.3	17.5	11.4
2015	187	218	346	205	1.2	-0.8	-0.2	-3.1
2016	209	251	392	233	12.0	15.1	13.3	13.8
2017	255	294	482	274	21.7	17.1	23.0	17.2
2018	243	280	438	260	-4.6	-4.7	-9.1	-4.9
2019	319	338	559	350	31.2	20.8	27.5	34.8
2020	377	374	523	454	18.3	10.7	-6.4	29.4
2021	486	529	673	533	28.7	41.3	28.6	17.4
2022	397	493	607	537	-18.2	-6.9	-9.9	0.8
2023	501	548	645	669	26.2	11.2	6.2	24.6
2024	626	644	738	769	24.9	17.6	14.5	14.9
Summary Statistics								
min	62	71	83	74	-36.8	-42.9	-28.1	-34.9
max	626	644	738	769	32.3	41.3	37.6	34.8
median	123	153	215	151	13.5	14.2	10.0	14.9
mean	206	234	315	247	9.3	9.5	9.6	9.9
std	158	166	211	195	18.2	18.3	16.7	16.7

Exhibit 18: Volatility, Sharpe Ratio, and MDD with Quarterly Sector Rotation

Year	Volatility				Sharpe Ratio				MDD			
	B&H	W	M	L	B&H	W	M	L	B&H	W	M	L
2000	23.9	20.9	21.0	24.6	-0.4	0.5	0.4	-0.6	-17.1	-11.3	-18.5	-25.6
2001	22.1	19.0	23.6	23.9	-0.5	-1.1	-0.3	0.4	-28.8	-30.0	-29.3	-21.2
2002	26.5	24.6	25.7	27.8	-0.8	-0.8	-0.6	-0.7	-33.0	-28.7	-31.0	-39.6
2003	16.5	18.3	15.3	15.1	1.7	1.6	2.4	1.3	-13.7	-17.3	-10.1	-13.1
2004	11.1	12.7	11.8	11.4	1.0	1.4	0.4	1.7	-7.5	-6.6	-11.8	-7.9
2005	10.3	13.9	10.4	11.3	0.5	-0.2	1.3	1.2	-7.0	-11.1	-6.4	-7.6
2006	10.0	13.1	11.3	11.2	1.6	1.2	0.9	2.0	-7.6	-13.5	-9.3	-5.7
2007	15.9	18.0	15.2	16.0	0.3	1.1	0.8	-0.1	-9.9	-10.1	-11.2	-13.3
2008	41.3	36.8	36.6	48.1	-0.9	-1.2	-0.8	-0.7	-47.6	-52.3	-43.0	-43.4
2009	26.6	23.4	28.3	36.4	1.0	1.3	1.1	0.6	-27.1	-21.1	-29.1	-34.4
2010	17.9	19.9	17.2	19.0	0.8	1.0	0.6	1.0	-15.7	-17.6	-15.5	-15.0
2011	23.0	18.5	23.9	29.2	0.1	0.8	0.1	-0.2	-18.6	-13.6	-19.3	-27.9
2012	12.7	14.0	13.7	11.2	1.3	0.3	1.5	1.7	-9.7	-12.7	-9.6	-7.7
2013	11.1	12.0	11.6	11.6	2.9	2.4	3.3	2.2	-5.6	-7.1	-5.9	-6.2
2014	11.2	12.0	11.5	11.9	1.2	0.9	1.5	1.0	-7.3	-9.0	-6.6	-7.6
2015	15.4	15.2	15.9	16.8	0.1	-0.1	0.0	-0.2	-11.9	-12.3	-14.1	-15.8
2016	13.1	13.7	14.0	14.2	0.9	1.1	1.0	1.0	-10.3	-10.6	-9.5	-8.0
2017	6.7	8.7	7.5	7.3	3.2	2.0	3.1	2.3	-2.6	-5.3	-3.1	-3.5
2018	17.0	18.9	15.9	14.3	-0.3	-0.2	-0.6	-0.3	-19.4	-20.8	-19.7	-18.5
2019	12.5	12.9	12.2	13.2	2.5	1.6	2.3	2.6	-6.6	-10.5	-5.9	-5.9
2020	33.4	35.2	38.9	38.4	0.5	0.3	-0.2	0.8	-33.7	-34.1	-46.7	-31.2
2021	13.0	16.7	14.9	12.9	2.2	2.5	1.9	1.4	-5.1	-8.5	-6.1	-7.3
2022	24.2	23.7	20.2	25.3	-0.7	-0.3	-0.5	0.0	-24.5	-17.1	-21.9	-22.5
2023	13.1	15.1	12.4	14.2	2.0	0.7	0.5	1.7	-10.0	-13.0	-11.4	-7.9
2024	12.6	12.2	11.7	11.6	2.0	1.4	1.2	1.3	-8.4	-8.3	-6.8	-7.6
Summary Statistics												
min	6.7	8.7	7.5	7.3	-0.9	-1.2	-0.8	-0.7	-47.6	-52.3	-46.7	-43.4
max	41.3	36.8	38.9	48.1	3.2	2.5	3.3	2.6	-2.6	-5.3	-3.1	-3.5
median	15.4	16.7	15.2	14.3	0.9	0.9	0.8	1.0	-10.3	-12.7	-11.4	-13.1
mean	17.7	18.0	17.6	19.1	0.9	0.7	0.8	0.8	-15.5	-16.1	-16.1	-16.2
std	8.2	6.8	8.0	10.2	1.2	1.0	1.1	1.0	11.2	10.6	11.7	11.6

C.4 Monthly Rotation

Exhibit 19: Growth and Annual Returns with Monthly Sector Rotation

Year	Growth				Annualized Return			
	B&H	W	M	L	B&H	W	M	L
2000	90	93	122	89	-9.7	-6.7	21.9	-10.7
2001	80	73	125	88	-11.8	-21.6	2.8	-1.0
2002	62	60	96	76	-21.6	-18.3	-23.0	-14.2
2003	80	71	123	105	28.2	19.5	27.9	38.3
2004	89	78	146	121	10.7	8.8	18.3	15.2
2005	93	84	165	123	4.8	8.5	13.2	1.7
2006	108	98	191	143	15.8	16.0	15.7	16.4
2007	113	110	231	138	5.1	12.4	20.7	-3.5
2008	72	69	153	88	-36.8	-37.5	-33.5	-36.2
2009	90	92	200	105	26.3	34.0	30.7	18.8
2010	104	106	248	115	15.1	14.8	23.8	9.6
2011	106	118	252	110	1.9	11.5	1.5	-4.0
2012	123	126	304	128	16.0	7.4	20.6	16.1
2013	163	164	421	160	32.3	29.3	38.7	24.7
2014	184	180	489	182	13.5	9.8	16.1	13.8
2015	187	164	470	198	1.2	-8.9	-3.9	9.3
2016	209	179	533	238	12.0	9.4	13.4	20.1
2017	255	197	634	307	21.7	10.2	18.9	29.0
2018	243	179	632	279	-4.6	-9.2	-0.3	-9.3
2019	319	224	784	373	31.2	25.2	24.1	33.8
2020	377	273	909	347	18.3	21.7	16.0	-7.0
2021	486	358	1,152	452	28.7	31.3	26.7	30.1
2022	397	343	1,101	417	-18.2	-4.1	-4.3	-7.7
2023	501	398	1,196	485	26.2	16.0	8.6	16.4
2024	626	469	1,435	529	24.9	17.9	19.9	9.1
Summary Statistics								
min	62	60	96	76	-36.8	-37.5	-33.5	-36.2
max	626	469	1,435	529	32.3	34.0	38.7	38.3
median	123	126	304	143	13.5	10.2	16.1	9.6
mean	206	172	485	216	9.3	7.9	12.6	8.4
std	158	113	398	141	18.2	17.3	16.4	17.5

Exhibit 20: Volatility, Sharpe Ratio, and MDD with Monthly Sector Rotation Strategies

Year	Volatility				Sharpe Ratio				MDD			
	B&H	W	M	L	B&H	W	M	L	B&H	W	M	L
2000	23.9	19.4	20.3	24.8	-0.4	-0.3	1.1	-0.4	-17.1	-21.3	-12.0	-16.2
2001	22.1	21.4	19.6	25.5	-0.5	-1.0	0.1	0.0	-28.8	-30.8	-18.6	-29.5
2002	26.5	24.8	27.3	27.0	-0.8	-0.7	-0.8	-0.5	-33.0	-28.2	-36.0	-36.0
2003	16.5	16.1	15.9	16.9	1.7	1.2	1.8	2.3	-15.6	-11.1	-14.2	-13.7
2004	11.1	11.5	11.5	12.2	1.0	0.8	1.6	1.2	-7.5	-6.3	-7.8	-8.6
2005	10.3	13.0	11.0	11.9	0.5	0.7	1.2	0.1	-7.0	-10.0	-7.3	-9.1
2006	10.0	12.0	10.7	12.5	1.6	1.3	1.5	1.3	-7.6	-8.7	-8.0	-8.1
2007	15.9	16.1	15.2	17.7	0.3	0.8	1.4	-0.2	-9.9	-10.1	-8.9	-14.8
2008	41.3	33.6	36.7	50.8	-0.9	-1.1	-0.9	-0.7	-47.6	-42.1	-45.9	-53.5
2009	26.6	30.1	27.3	30.4	1.0	1.1	1.1	0.6	-27.1	-26.7	-25.1	-31.5
2010	17.9	18.5	19.2	18.8	0.8	0.8	1.2	0.5	-15.7	-14.2	-17.1	-15.2
2011	23.0	21.7	23.0	27.0	0.1	0.5	0.1	-0.1	-18.6	-14.2	-17.8	-27.3
2012	12.7	12.3	12.8	14.3	1.3	0.6	1.6	1.1	-9.7	-8.4	-10.8	-11.8
2013	11.1	11.9	11.5	11.8	2.9	2.5	3.4	2.1	-5.6	-8.0	-6.0	-5.5
2014	11.2	10.8	12.3	12.7	1.2	0.9	1.3	1.1	-7.3	-5.4	-9.4	-8.7
2015	15.4	15.1	16.7	16.3	0.1	-0.6	-0.2	0.6	-11.9	-13.1	-15.4	-14.4
2016	13.1	12.9	13.0	16.0	0.9	0.7	1.0	1.3	-10.3	-7.3	-11.2	-12.3
2017	6.7	7.0	7.1	8.4	3.2	1.5	2.7	3.4	-2.6	-4.0	-2.6	-3.5
2018	17.0	16.9	16.7	15.9	-0.3	-0.5	0.0	-0.6	-19.4	-21.9	-16.6	-18.6
2019	12.5	12.5	12.9	12.4	2.5	2.0	1.9	2.7	-6.6	-7.9	-7.2	-8.3
2020	33.4	34.4	33.9	43.0	0.5	0.6	0.5	-0.2	-33.7	-31.6	-33.7	-46.4
2021	13.0	16.3	13.4	14.3	2.2	1.9	2.0	2.1	-5.1	-8.7	-6.2	-5.0
2022	24.2	20.7	21.9	25.9	-0.7	-0.2	-0.2	-0.3	-24.5	-20.6	-20.2	-19.7
2023	13.1	13.2	13.8	14.1	2.0	1.2	0.6	1.2	-10.0	-8.8	-12.4	-10.2
2024	12.6	11.9	11.6	12.6	2.0	1.5	1.7	0.7	-8.4	-7.5	-5.8	-10.6
Summary Statistics												
min	6.7	7.0	7.1	8.4	-0.9	-1.1	-0.9	-0.7	-47.6	-42.1	-45.9	-53.5
max	41.3	34.4	36.7	50.8	3.2	2.5	3.4	3.4	-2.6	-4.0	-2.6	-3.5
median	15.4	16.1	15.2	16.0	0.9	0.8	1.2	0.6	-10.3	-10.1	-11.2	-14.4
mean	17.7	17.4	17.4	19.7	0.9	0.6	1.0	0.8	-15.5	-15.3	-14.9	-17.6
std	8.2	7.1	7.4	10.2	1.2	1.0	1.0	1.1	11.2	10.0	10.5	12.9

C.5 Weekly Rotation

Exhibit 21: Growth and Annual Returns with Weekly Sector Rotation

Year	Growth				Annualized Return			
	B&H	W	M	L	B&H	W	M	L
2000	90	87	95	124	-9.7	-13.0	-5.0	24.0
2001	80	69	90	131	-11.8	-20.3	-5.6	5.8
2002	62	56	79	99	-21.6	-18.7	-11.9	-24.2
2003	80	71	102	129	28.2	25.7	29.1	30.2
2004	89	82	120	142	10.7	15.0	18.0	9.4
2005	93	87	126	158	4.8	7.0	4.5	11.5
2006	108	103	151	175	15.8	17.6	19.9	11.0
2007	113	119	153	194	5.1	16.1	1.8	10.8
2008	72	76	87	145	-36.8	-36.5	-43.1	-25.5
2009	90	88	118	194	26.3	15.9	35.4	34.3
2010	104	102	132	235	15.1	16.1	11.2	20.8
2011	106	110	129	240	1.9	8.4	-1.7	2.5
2012	123	128	145	278	16.0	15.7	12.1	15.8
2013	163	165	198	351	32.3	29.6	36.8	26.0
2014	184	165	231	438	13.5	-0.1	16.4	24.8
2015	187	160	228	438	1.2	-3.2	-1.3	0.1
2016	209	191	275	451	12.0	19.5	21.0	2.9
2017	255	228	328	535	21.7	19.5	19.3	18.6
2018	243	211	303	515	-4.6	-7.6	-7.7	-3.7
2019	319	262	385	680	31.2	24.3	26.9	32.0
2020	377	258	463	756	18.3	-1.8	20.2	11.2
2021	486	346	656	856	28.7	34.5	41.8	13.3
2022	397	323	637	801	-18.2	-6.7	-2.9	-6.5
2023	501	378	682	937	26.2	17.1	7.0	17.1
2024	626	427	793	1,104	24.9	12.9	16.3	17.8
Summary Statistics								
min	62	56	79	99	-36.8	-36.5	-43.1	-25.5
max	626	427	793	1,104	32.3	34.5	41.8	34.3
median	123	128	153	278	13.5	15.0	12.1	11.5
mean	206	172	268	404	9.3	7.5	10.3	11.2
std	158	107	214	296	18.2	17.3	18.5	15.3

Exhibit 22: Weekly Strategy with Annual Returns: Volatility, Sharpe Ratio, and MDD

Year	Volatility				Sharpe Ratio				MDD			
	B&H	W	M	L	B&H	W	M	L	B&H	W	M	L
2000	23.9	20.9	20.8	25.5	-0.4	-0.6	-0.2	0.9	-17.1	-17.4	-19.8	-22.9
2001	22.1	20.7	20.9	25.6	-0.5	-1.0	-0.3	0.2	-28.8	-35.6	-23.9	-23.9
2002	26.5	25.1	25.1	28.5	-0.8	-0.7	-0.5	-0.9	-33.0	-33.7	-28.7	-35.8
2003	16.5	16.7	16.9	15.7	1.7	1.5	1.7	1.9	-13.7	-13.6	-15.5	-11.7
2004	11.1	11.4	11.9	12.0	1.0	1.3	1.5	0.8	-7.5	-6.2	-7.1	-9.4
2005	10.3	12.4	10.8	12.7	0.5	0.6	0.4	0.9	-7.0	-11.8	-7.3	-7.5
2006	10.0	11.7	10.6	12.5	1.6	1.5	1.9	0.9	-7.6	-5.9	-9.1	-10.4
2007	15.9	16.4	16.1	17.0	0.3	1.0	0.1	0.6	-9.9	-7.7	-12.2	-9.3
2008	41.3	38.5	38.9	44.8	-0.9	-0.9	-1.1	-0.6	-47.6	-42.4	-50.9	-46.9
2009	26.6	30.1	26.2	32.1	1.0	0.5	1.4	1.1	-27.1	-30.8	-22.7	-30.4
2010	17.9	17.4	18.9	19.9	0.8	0.9	0.6	1.0	-15.7	-16.1	-14.3	-15.4
2011	23.0	21.9	23.7	26.0	0.1	0.4	-0.1	0.1	-18.6	-15.3	-23.8	-22.4
2012	12.7	13.1	12.8	13.4	1.3	1.2	0.9	1.2	-9.7	-7.9	-10.8	-10.1
2013	11.1	11.9	11.4	11.9	2.9	2.5	3.2	2.2	-5.6	-8.3	-4.7	-6.1
2014	11.2	11.3	12.2	12.0	1.2	0.0	1.3	2.1	-7.3	-8.9	-7.3	-10.0
2015	15.4	15.1	16.0	16.8	0.1	-0.2	-0.1	0.0	-11.9	-11.9	-13.8	-14.8
2016	13.1	13.6	14.3	14.6	0.9	1.4	1.5	0.2	-10.3	-6.6	-9.6	-13.0
2017	6.7	7.1	7.3	8.7	3.2	2.7	2.7	2.1	-2.6	-2.7	-3.7	-3.3
2018	17.0	14.6	16.9	18.3	-0.3	-0.5	-0.5	-0.2	-19.4	-20.1	-20.0	-18.3
2019	12.5	12.1	12.7	13.1	2.5	2.0	2.1	2.4	-6.6	-7.0	-6.7	-9.0
2020	33.4	34.2	36.3	41.1	0.5	-0.1	0.6	0.3	-33.7	-32.3	-34.0	-45.3
2021	13.0	14.8	13.0	16.2	2.2	2.3	3.2	0.8	-5.1	-7.9	-5.3	-8.6
2022	24.2	22.2	21.9	24.5	-0.7	-0.3	-0.1	-0.3	-24.5	-23.0	-17.7	-18.3
2023	13.1	14.0	13.3	14.4	2.0	1.2	0.5	1.2	-10.0	-14.6	-12.8	-11.1
2024	12.6	11.9	11.3	12.9	2.0	1.1	1.4	1.4	-8.4	-5.7	-8.3	-9.5
Summary Statistics												
min	6.7	7.1	7.3	8.7	-0.9	-1.0	-1.1	-0.9	-47.6	-42.4	-50.9	-46.9
max	41.3	38.5	38.9	44.8	3.2	2.7	3.2	2.4	-2.6	-2.7	-3.7	-3.3
median	15.4	14.8	16.0	16.2	0.9	0.9	0.6	0.9	-10.3	-11.9	-12.8	-11.7
mean	17.7	17.6	17.6	19.6	0.9	0.7	0.9	0.8	-15.5	-15.7	-15.6	-17.0
std	8.2	7.7	7.8	9.3	1.2	1.1	1.2	0.9	11.2	11.1	10.8	11.7

D Additional Details for Monthly Re-balancing

Exhibit 23: Annualized Volatility and Tracking Errors with Monthly Re-balancing

Year	Annualized Volatility						
	B&H	Winners	Tr. Err.	Median	Tr. Err.	Losers	Tr. Err.
2000	23.9	19.0	−4.9	19.8	−4.1	24.5	−0.6
2001	22.1	21.4	0.7	19.6	−2.5	25.5	3.4
2002	26.5	24.8	1.7	27.3	−0.9	27.0	−0.5
2003	16.5	16.1	0.4	15.9	0.6	16.9	−0.3
2004	11.1	11.5	−0.3	11.5	−0.4	12.2	−1.0
2005	10.3	13.0	−2.6	11.0	−0.7	11.9	−1.5
2006	10.0	12.0	−2.0	10.7	−0.7	12.5	−2.5
2007	15.9	16.1	−0.2	15.2	0.7	17.7	−1.8
2008	41.3	33.6	7.7	36.7	4.6	50.8	−9.5
2009	26.6	30.1	−3.5	27.3	−0.7	30.4	−3.7
2010	17.9	18.5	−0.6	19.2	−1.3	18.8	−0.8
2011	23.0	21.7	1.4	23.0	0.0	27.0	−3.9
2012	12.7	12.3	0.4	12.8	0.0	14.3	−1.5
2013	11.1	11.9	−0.8	11.5	−0.4	11.8	−0.7
2014	11.2	10.8	0.4	12.3	−1.0	12.7	−1.4
2015	15.4	15.1	0.3	16.7	−1.2	16.3	−0.8
2016	13.1	12.9	0.2	13.0	0.1	16.0	−2.9
2017	6.7	7.0	−0.2	−0.2	7.1	−0.3	8.4
2018	17.0	16.9	0.2	16.7	0.4	15.9	1.1
2019	12.5	12.5	0.0	12.9	−0.4	12.4	0.0
2020	33.4	34.4	−1.0	33.9	−0.5	43.0	−9.5
2021	13.0	16.3	−3.3	13.4	−0.4	14.3	−1.3
2022	24.2	20.7	3.6	21.9	2.4	25.9	−1.6
2023	13.1	13.2	−0.1	13.8	−0.7	14.1	−1.0
2024	12.6	11.9	0.7	11.6	1.0	12.6	0.01
Summary Statistics							
min	6.7	7.0	−3.5	7.1	−1.3	8.4	−9.5
max	41.3	34.4	7.7	36.7	4.6	50.8	1.2
med	15.4	16.1	0.0	15.2	−0.4	16.0	−1.5
mean	17.6	17.5	0.1	17.5	0.1	19.8	−2.2
std	8.4	7.3	2.3	7.7	1.4	10.4	2.6

Exhibit 24: Sharpe Ratio and Maximum Drawdowns with Monthly Rebalancing

Year	Sharpe Ratio				MDD			
	B&H	Winners	Median	Losers	B&H	Winners	Median	Losers
2000	-0.41	-0.35	1.11	-0.44	-17.1	-21.3	-12.0	-16.2
2001	-0.53	-1.01	0.14	-0.04	-28.8	-30.8	-18.6	-29.5
2002	-0.82	-0.74	-0.84	-0.53	-33.0	-28.2	-36.0	-36.0
2003	1.71	1.22	1.75	2.27	-13.7	-14.2	-11.1	-15.6
2004	0.96	0.77	1.59	1.24	-7.5	-6.3	-7.8	-8.6
2005	0.47	0.66	1.20	0.15	-7.5	-10.0	-7.3	-9.1
2006	1.58	1.33	1.47	1.31	-7.6	-8.7	-8.0	-8.1
2007	0.32	0.77	1.36	-0.20	-9.9	-10.1	-8.9	-14.8
2008	-0.89	-1.12	-0.91	-0.71	-47.6	-42.1	-45.9	-53.5
2009	0.99	1.13	1.12	0.62	-27.1	-26.7	-25.1	-31.5
2010	0.84	0.80	1.24	0.51	-15.7	-14.2	-17.1	-15.2
2011	0.08	0.53	0.07	-0.15	-18.6	-16.7	-17.8	-27.3
2012	1.26	0.60	1.61	1.13	-9.7	-8.4	-10.8	-11.8
2013	2.92	2.48	3.38	2.09	-5.6	-8.0	-6.0	-5.5
2014	1.20	0.91	1.31	1.09	-7.3	-5.4	-9.4	-8.7
2015	0.08	-0.59	-0.23	0.57	-11.9	-13.1	-15.4	-14.4
2016	0.92	0.73	1.03	1.26	-10.3	-7.3	-11.2	-12.3
2017	3.22	1.46	2.68	3.45	-2.6	-4.0	-2.6	-3.5
2018	-0.27	-0.54	-0.02	-0.58	-19.4	-21.9	-16.6	-18.6
2019	2.50	2.01	1.86	2.72	-6.6	-7.9	-7.2	-8.3
2020	0.55	0.63	0.47	-0.16	-33.7	-31.6	-33.7	-46.6
2021	2.21	1.92	1.99	2.10	-0.05	-0.09	-0.06	-0.05
2022	-0.75	-0.20	-0.20	-0.30	-24.5	-20.6	-20.2	-19.7
2023	2.00	1.22	0.62	1.16	-10.0	-8.8	-12.4	-10.2
2024	1.98	1.50	1.72	0.72	-8.4	-7.5	-5.8	-10.6
Summary Statistics								
min	-0.89	-1.12	-0.91	-0.71	-47.6	-42.1	-45.9	-53.5
max	3.22	2.48	3.38	3.45	-2.6	-4.0	-2.6	-3.5
median	0.92	0.77	1.20	0.62	-10.3	-10.1	-11.2	-14.4
mean	0.88	0.64	1.02	0.77	-0.16	-0.15	-0.15	-0.18
std	1.18	0.96	1.03	1.12	11.2	10.0	10.5	-12.9

E Impact of Transaction Costs on Growth and Returns

Exhibit 25: Transaction cost for Monthly Rebalancing

Year	P_Value x Turnover			Annual Return Loss		
	Winners	Median	Losers	Winners	Median	Losers
1999	100	100	100	0.015	0.015	0.015
2000	747	767	671	0.11	0.12	0.10
2001	655	817	772	0.10	0.12	0.12
2002	595	1,042	722	0.09	0.16	0.11
2003	629	1,053	780	0.09	0.16	0.12
2004	682	1,051	780	0.09	0.16	0.12
2005	698	1,479	1,085	0.10	0.22	0.17
2006	731	1,338	1,107	0.11	0.20	0.17
2007	795	1,462	884	0.12	0.22	0.13
2008	676	1,414	890	0.10	0.21	0.13
2009	640	1,243	664	0.10	0.19	0.10
2010	836	1,782	770	0.13	0.27	0.12
2011	768	2,222	870	0.12	0.33	0.13
2012	1,071	2,588	1,102	0.16	0.39	0.17
2013	1,264	2,839	871	0.19	0.43	0.13
2014	1,521	3,618	1,465	0.23	0.54	0.22
2015	1,518	4,453	1,952	0.23	0.67	0.29
2016	1,321	4,181	2,293	0.20	0.63	0.34
2017	1,810	4,159	2,338	0.27	0.62	0.35
2018	1,728	4,662	2,423	0.26	0.70	0.36
2019	1,481	3,816	2,845	0.22	0.57	0.43
2020	1,350	5,922	2,250	0.20	0.80	0.34
2021	2,343	8,950	3,243	0.35	1.34	0.48
2022	2,765	7,163	2,986	0.41	1.07	0.45
2023	2,741	8,089	3,405	0.41	1.21	0.51
2024	3,035	8,812	3,355	0.46	1.32	0.50
Total	—	—	—	4.88	12.76	6.11