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Sector Timing in Credit Using Value and Momentum Signals

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Restricted - External

Things to Consider...

Constructing a sector-level signal

- Aggregate issuer-level signals or treat the sector as one entity?
 - If the former, how to weight issuer-level signals?
- Adjust sector signals by sector-level dispersion?

Combining multiple sector-level signals

- Combine into one signal or double-sort?
 - If the former, what are the weights on each signal?

Evaluating efficacy

- Regression or portfolio analysis?

Outline

Overview of SPiDER (Value Signal)



Sector Timing Using SPiDER



Combining Sector Timing Strategies: Value (SPiDER) and Momentum (EMC)

Overview of SPiDER

What is SPiDER (Spread *P*er unit of *D*ebt to *E*arnings *R*atio)?

❖ Measure of 'value' in credit, similar to Shiller's CAPE. It represents the compensation demanded by the market given an issuer's debt level relative to its long-term earnings

❖ Key Characteristics

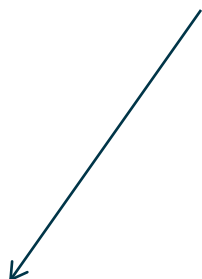
- Firm-level
- Model-free (no regression model)
- Annual or quarterly frequency
- Combines balance sheet, earning report, and market data
- Applies to IG and HY firms across all sectors ex. financials (currently)
- Identifies 'value' *cross-sectionally*

❖ First introduced in 2016: [*Finding Value in Credit Markets using SPiDER*](#) (Barclays Live)

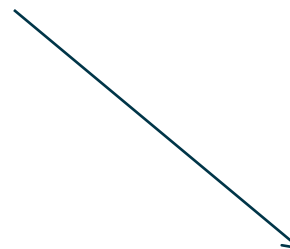
Calculating SPiDER Values

For company i at year t , SPiDER is defined as:

$$\text{SPiDER}_{i,t} = \text{OAS}_{i,t} / (\text{Total Debt}_{i,t} \text{ over Sustainable EBITDA}_i)$$



Market price of risk
(option-adjusted spread)



Fundamental measure of risk

- ❖ Sustainable EBITDA based on past 10 annual EBITDA figures (min. six years)
- ❖ Captures firm 'true' earnings over the long term and, hence, its ability to repay debt

Formation Rules for SPiDER-Based Strategy

- ❖ Quintile SPiDER portfolios are populated annually within industry
- ❖ IG and HY portfolios are formed in February using financial statements from October-December of prior year to capture lag in data reporting
- ❖ Issuers are EW at portfolio formation and held until the next rebalancing date irrespective of rating changes during the period
- ❖ 'Value' strategy is long issuers in Q₅ (highest SPiDER) and short Q₁ (lowest SPiDER)

Avg. OAS, Debt/EBITDA and SPiDER Ratios by Quintile at Formation (Feb 1993 – Feb 2016)

SPiDER Quintile	SPiDER		OAS (%)		Debt / Sustainable EBITDA	
	IG	HY	IG	HY	IG	HY
1 (Low SPiDER)	0.20	0.34	1.16	3.37	5.69	9.90
2	0.40	0.57	1.28	3.60	3.20	6.35
3	0.56	0.85	1.39	3.90	2.47	4.61
4	0.82	1.21	1.59	4.50	1.93	3.74
5 (High SPiDER)	1.48	2.16	1.93	5.85	1.30	2.71
Q5-Q1	1.28	1.82	0.77	2.48	-4.39	-7.19

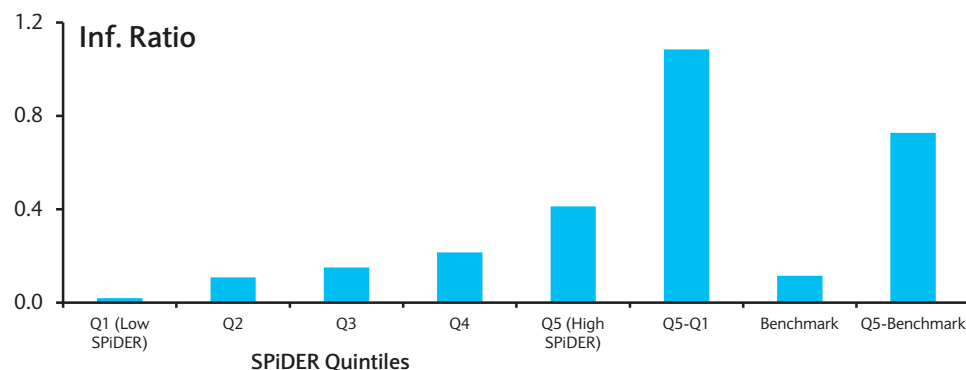
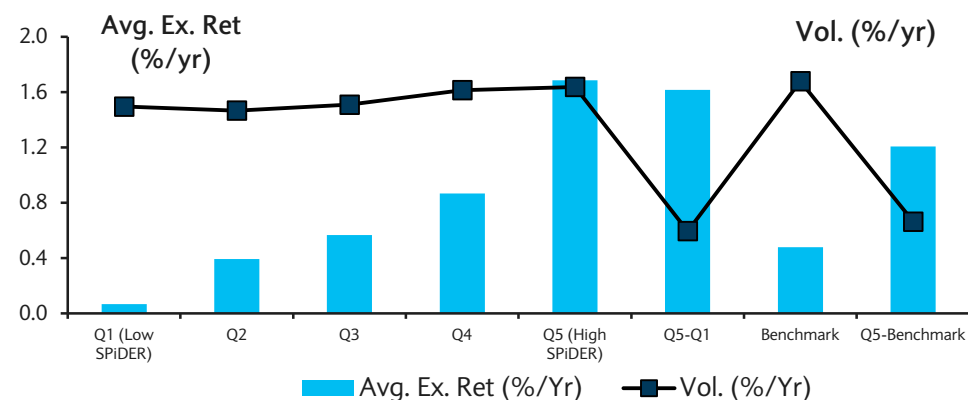
- ❖ Same IG and HY quintiles have similar SPiDER ratios, despite differences in OAS and Debt/EBITDA

Performance Dynamics across SPiDER Quintiles

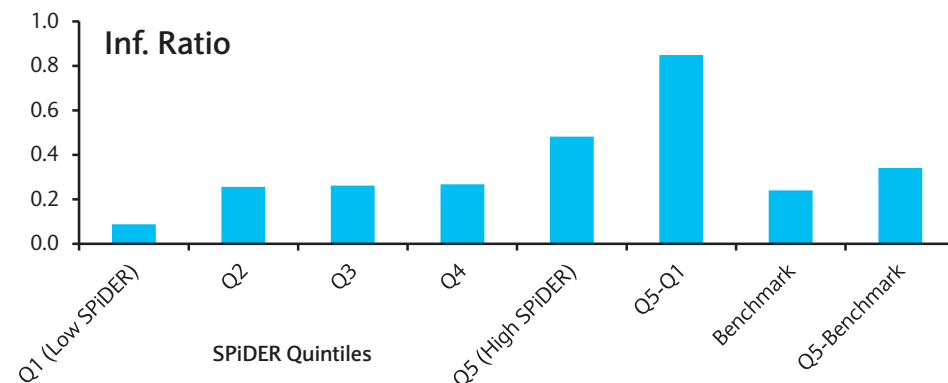
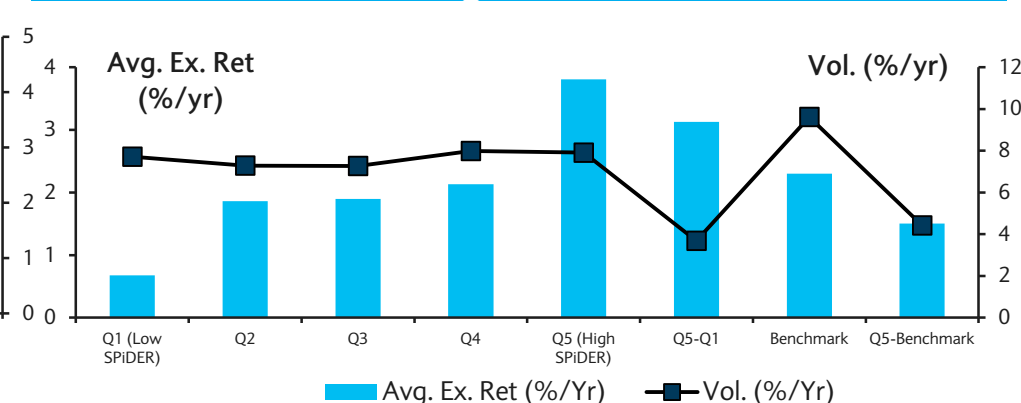
- ❖ Excess returns increase consistently from Q₁ to Q₅ for both IG and HY
- ❖ Vol is stable across quintiles. Consequently, the vol of the L/S portfolio (Q₅-Q₁) is low and its Information Ratio is high
- ❖ Q₅ vol is similar to benchmark for both IG and HY despite higher DTS

Return, Vol, and Information Ratio by Quintile (Mar 1993 – Aug 2016)

Investment Grade



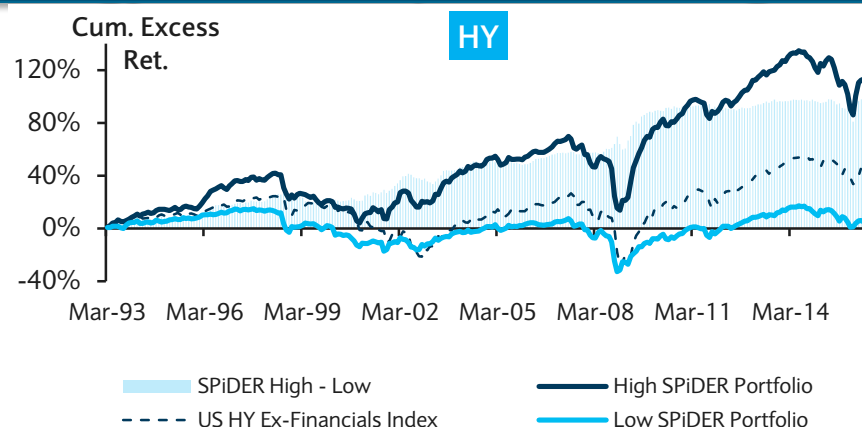
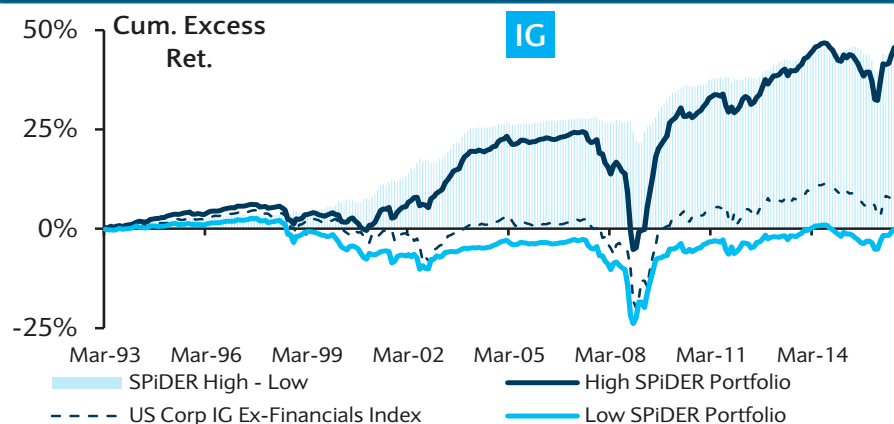
High Yield



Source: Bloomberg, Compustat, Barclays Research

High-SPiDER Issuers Outperformed Low-SPiDER Issuers

Cumulative Excess Return of SPiDER Strategy IG and HY (Mar 1993 – Aug 2016)



	Investment-Grade			High-Yield			Equity Value Factors	
	SPiDER Strategy	Benchmark (Bloomberg Barclays US IG Index ex. financials)	SPiDER Long - Benchmark	SPiDER Strategy	Benchmark (Bloomberg Barclays US HY Index ex. financials)	SPiDER Long - Benchmark	Book-to-Market (Q5-Q1)	Earnings-to-Price (Q5-Q1)
Avg. Ex. Ret (%/Yr)	1.62	0.48	1.21	3.13	2.30	1.50	9.70	4.04
Vol. (%/Yr)	1.49	4.20	1.66	3.68	9.62	4.42	12.62	8.88
Inf. Ratio (ann.)	1.09	0.11	0.73	0.85	0.24	0.34	0.77	0.45
Worst Monthly Ex. Ret. (%)	-2.02	-9.04	-2.55	-3.19	-17.20	-5.01	-15.41	-9.22
Max. Drawdown (%)	-5.26	-23.46	-6.55	-8.50	-43.36	-14.86	-31.20	-28.28
Corr. with Benchmark	0.07			-0.06				

- ❖ Strategy generates high Inf. Ratios for IG & HY, with consistent performance dynamics
- ❖ Significantly better Inf. Ratios compared with equity value strategies (using B/M or P/E)
- ❖ High Inf. Ratio of Q₅ vs IG benchmark. Lower in HY because universe return is lower than benchmark (inclusion of Ba & B only)

Source: Bloomberg, Compustat, Barclays Research

SPiDER Performance Not Driven by OAS, Industry, or Ratings

- ❖ SPiDER outperformance was **not driven by OAS** difference between Q5 and Q1
 - An OAS-neutral SPiDER strategy still produced outperformance, with an Information Ratio of 0.65 for IG and 0.71 for HY
- ❖ SPiDER performance is **consistent across all credit ratings**
- ❖ SPiDER strategy **holds across all industries**
- ❖ SPiDER outperformance is **insensitive to alternative definition of the debt/earning ratio** and weighting rules

Updating SPiDER Quarterly Improved Information Ratio

- ❖ Updating OAS quarterly improved SPiDER Inf. Ratio from 1.09 to 1.22 for IG and from 0.85 to 0.94 for HY
- ❖ Updating fundamental information quarterly had little effect
- ❖ Similar results in value-weighted SPiDER portfolios

Return Statistics, Annual vs. Quarterly Updating (EW, Mar. 1993 – Aug. 2016)										
		Original SPiDER (Annual OAS update)			SPiDER with Quarterly OAS update			SPiDER with Quarterly Financial Statement and OAS update		
		Avg. Ex. Ret (%/Yr)	Vol. (%/Yr)	Inf. Ratio (Ann.)	Avg. Ex. Ret (%/Yr)	Vol. (%/Yr)	Inf. Ratio (Ann.)	Avg. Ex. Ret (%/Yr)	Vol. (%/Yr)	Inf. Ratio (Ann.)
IG	Q1	0.07	3.74	0.02	-0.03	3.53	-0.01	-0.09	3.56	-0.03
	Q2	0.39	3.67	0.11	0.31	3.58	0.09	0.28	3.64	0.08
	Q3	0.57	3.77	0.15	0.49	3.76	0.13	0.59	3.76	0.16
	Q4	0.87	4.04	0.22	0.79	4.04	0.20	0.71	4.00	0.18
	Q5	1.68	4.09	0.41	1.87	4.18	0.45	2.01	4.25	0.47
	Q5-Q1	1.62	1.49	1.09	1.90	1.56	1.22	2.10	1.62	1.30
	Benchmark	0.48	4.20	0.11						
HY	Q1	0.68	7.71	0.09	0.83	7.43	0.11	0.82	7.27	0.11
	Q2	1.86	7.29	0.26	2.10	7.31	0.29	2.08	7.43	0.28
	Q3	1.90	7.27	0.26	1.93	7.27	0.27	2.40	7.12	0.34
	Q4	2.13	7.99	0.27	2.21	7.94	0.28	2.28	7.85	0.29
	Q5	3.80	7.91	0.48	4.43	8.37	0.53	4.08	8.47	0.48
	Q5-Q1	3.13	3.68	0.85	3.59	3.82	0.94	3.25	3.92	0.83
	Benchmark	2.30	9.62	0.24						

Source: Bloomberg, Compustat, Barclays Research

Performance Update since Introduction

❖ SPiDER outperformance persists in IG and HY with quarterly rebalancing

Return Statistics, Annual Updating (EW Sep 2016 – Nov 2019)								
IG					HY (Ba & B, Prc>=50)			Bloomberg Barclays HY ex- financial Index (Ba and B)
Equally-Weighted				Bloomberg Barclays Corporate ex- financials Index	Equally-Weighted			
L-S	L	S			L-S	L	S	
Avg. Ex. Ret (%/Yr)	1.44	3.39	2.07	2.09	-0.27	3.74	4.03	4.10
Vol. (%/Yr)	0.88	2.68	2.18	2.92	1.95	4.58	3.88	4.28
Inf. Ratio (ann.)	1.63	1.26	0.95	0.72	-0.14	0.82	1.04	0.96
Worst Month Ret (%)	-0.50	-1.42	-1.03	-1.64	-1.56	-3.57	-2.90	-3.27
Max. Drawdown (%)	-1.13	-4.22	-3.38	-4.31	-6.44	-6.54	-5.83	-5.78

Return Statistics, Quarterly OAS Updating (Sep 2016 – Nov 2019)								
IG					HY (Ba & B, Prc>=50)			Bloomberg Barclays HY ex- financial Index (Ba and B)
Equally-Weighted			Bloomberg Barclays Corporate ex-financials Index	Equally-Weighted				
L-S	L	S		L-S	L	S		
Avg. Ex. Ret (%/Yr)	1.13	2.88	1.75	2.09	0.95	4.30	3.35	4.10
Vol. (%/Yr)	0.89	2.72	2.15	2.92	1.95	4.82	3.73	4.28
Inf. Ratio (ann.)	1.28	1.06	0.81	0.72	0.49	0.89	0.90	0.96
Worst Month Ret (%)	-0.58	-1.61	-1.04	-1.64	-1.33	-3.84	-2.76	-3.27
Max. Drawdown (%)	-1.51	-4.49	-3.47	-4.31	-4.97	-6.55	-5.63	-5.78

Source: Bloomberg, Compustat, Barclays Research

Sector Timing Using SPiDER

Constructing Sector-Level Sample

❖ **Sector definition**

Fixed Income Level-3 Industry definition excluding financials (10 total)

❖ **Signal Frequency:** Quarterly

❖ **Sector Returns** are US IG and HY (Ba and B) Index excess returns by sector

❖ **Signal Coverage:** On average from 1992 to 2019, SPiDER signals covered 82% of IG and 70% of HY (Ba & B) ex-financial index market value

Note: following prior results on cross-sectional SPiDER, OAS were updated quarterly and D/E were updated annually in calculating quarterly SPiDER values.

Things to Consider in Constructing a Sector Signal...

1. Combining issuer-level signals or combining issuer-level data to create sector-level signal?

- The former is sensitive to extreme values such as negative SPiDER, but one may lose some information with the latter

2. If combining issuer-level signals, what weights to use?

- Duration contribution or market weights?
- The former takes into account the sensitivity of returns to the signal

3. Adjust by signal dispersion within the sector?

- Is uniformity of signal important?

Specification of Sector-Level SPiDER

- ❖ **Baseline Specification:** Weight issuer-level SPiDER signals by duration contribution and adjust by signal dispersion

$$\frac{\text{Weighted Avg. SPiDER (wt = Issuer Contribution to Duration)}}{\text{Within – Sector Issuer SPiDER Dispersion}}$$

- ❖ **Alternative 1:** Weight issuer-level SPiDER by issuer market value with dispersion adj.

$$\frac{\text{Weighted Avg. SPiDER (wt = **Issuer Market Value**)}}{\text{Within – Sector Issuer SPiDER Dispersion}}$$

- ❖ **Alternative 2:** Value SPiDER for the sector as one entity

$$\frac{\frac{\text{Sector VW OAS}}{\text{Sector Total Debt}}}{\text{Within – Sector Issuer SPiDER Dispersion}}$$

- ❖ **Alternative 3:** Not controlling for within-sector SPiDER dispersion

$$\text{Weighted Avg. SPiDER (wt = Issuer Contribution to Duration)}$$

Two Ways to Evaluate Efficacy...

Regression

Pros

Easy to identify marginal contribution of one factor in a multi-factor framework

Cons

Economic benefit of signal not clear

Portfolio Analysis

Pros

- Clear economic benefit
- Can tailor portfolio formation with customized constraints

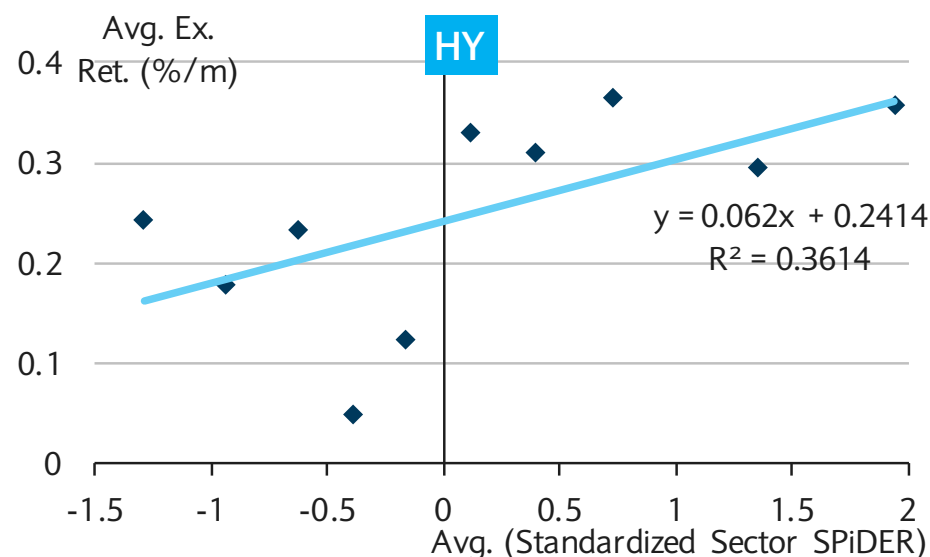
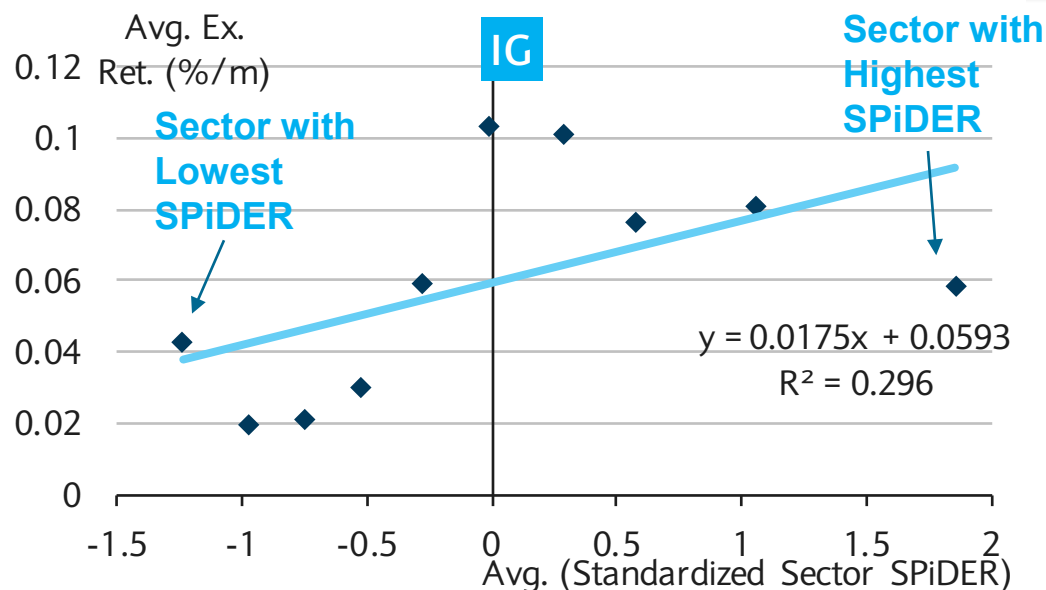
Cons

Difficult to tease out confounding factors

Sectors with Higher SPiDER Earned Larger Excess Return

- ❖ Each quarter, we rank all sectors on SPiDER. Then for the sector with lowest SPiDER, we calculate the time-series average of its subsequent month excess return (y-axis) and standardized SPiDER (x-axis), do the same for the sector with second lowest SPiDER, and so on...
- ❖ Sector average excess returns tend to increase with SPiDER score
- ❖ The relation is not monotonic, indicating high noise in the signal (common for sector-level signals) → A portfolio approach may be better

Sector-Level Avg. SPiDER vs Avg. Subsequent Month Excess Return (Mar 1993 – Nov 2019, IG and HY Ba & B)



Note: sector-level SPiDER value was standardized with mean and stdev calculated from all sector SPiDER values each quarter. All sectors were ranked quarterly on their SPiDER value. Sectors ranked in 1 in all months were aggregated together. We then calculated its time-series average of standardized SPiDER value and ex. return. Source: Bloomberg, Compustat, Barclays Research

High-SPiDER Sectors Outperformed Low-SPiDER Sectors

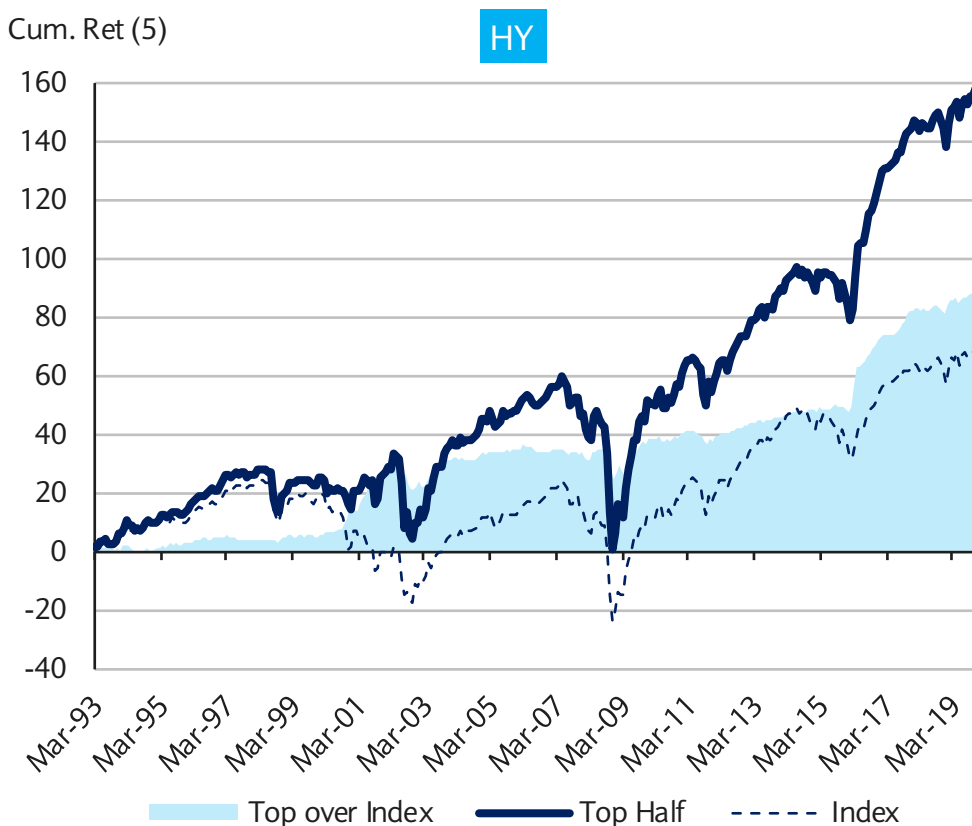
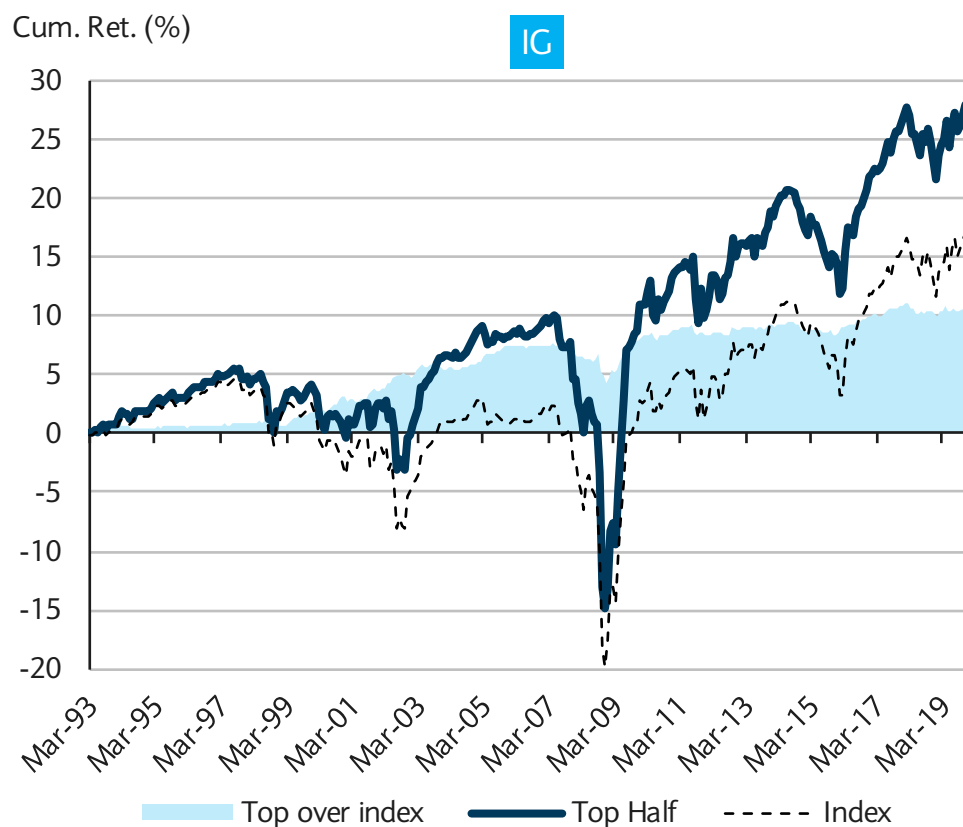
- ❖ Each quarter, all sectors were grouped into top-half and bottom-half portfolios based on their SPiDER signals (multiple sectors were included in each portfolio to reduce noise from an individual sector)
- ❖ EW SPiDER top-half portfolios outperformed bottom-half portfolios by 60bp (IG) and 195bp (HY) per year
- ❖ SPiDER outperformance was of similar magnitude with value weighting

Return Statistic of Top-Half – Bottom-Half SPiDER Sector Portfolios (Mar 1993 – Nov 2019 , IG and HY Ba & B)								
		EW			VW			Ex-Financial Index (IG and HY: Ba & B)
		Bottom Half	Top Half	Top over Bottom	Bottom Half	Top Half	Top over Bottom	
IG	Avg. Ex. Ret. (%/Yr)	0.41	1.01	0.60	0.44	0.95	0.51	0.67
	Vol. (%/Yr)	3.95	4.13	1.01	4.08	4.16	1.19	4.06
	Inf. Ratio (Ann.)	0.10	0.24	0.59	0.11	0.23	0.43	0.17
	Worst Monthly Ret (%)	-8.68	-9.98	-1.30	-8.72	-9.39	-1.92	-9.04
	Max. DD	-27.17	-22.68	-2.14	-26.81	-21.62	-4.43	-23.46
HY	Avg. Ex. Ret. (%/Yr)	1.97	3.93	1.95	1.21	3.72	2.51	2.31
	Vol. (%/Yr)	8.31	8.57	3.53	8.51	8.46	3.67	8.34
	Inf. Ratio (Ann.)	0.24	0.46	0.55	0.14	0.44	0.68	0.28
	Worst Monthly Ret (%)	-15.89	-14.93	-7.95	-15.75	-14.90	-5.46	-15.26
	Max. DD	-40.20	-37.07	-12.13	-48.23	-38.08	-8.14	-39.2

High SPiDER Sectors Delivered Persistent Outperformance over Time

❖ The top-half portfolio consistently delivered outperformance over the index

Cumulative Excess Return of Top SPiDER Sector Portfolios vs Index (EW, Mar 1993 – Nov 2019 , IG and HY Ba & B)

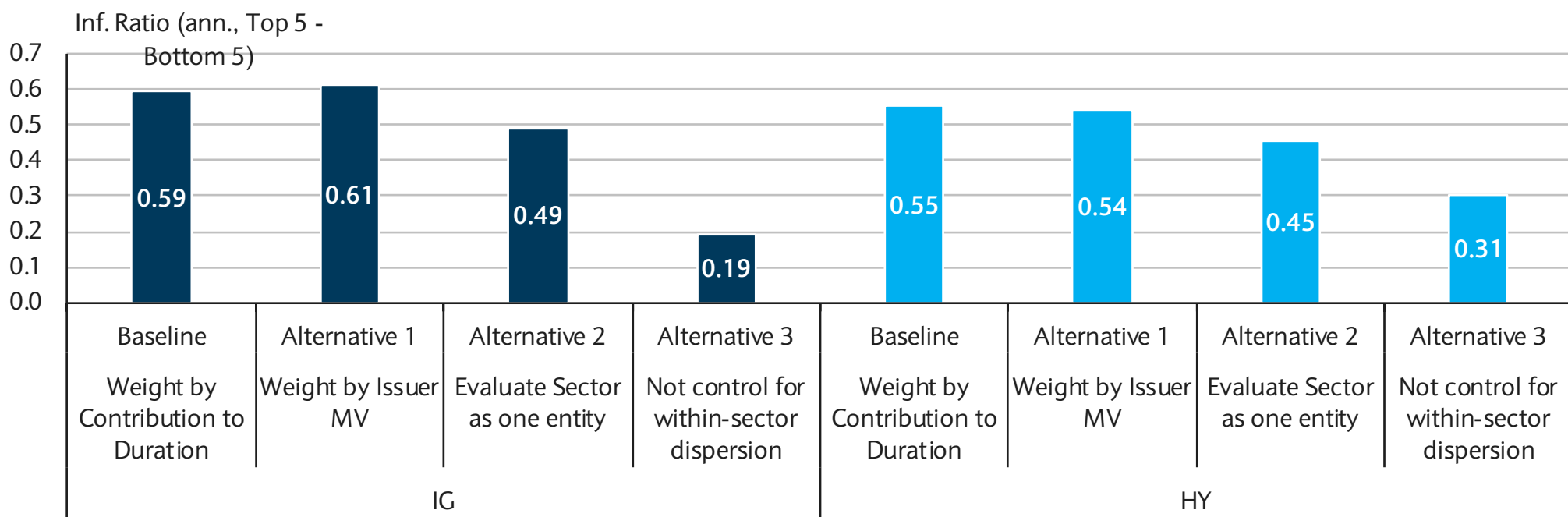


Source: Bloomberg, Compustat, Barclays Research

High SPiDER Sectors Outperformed with Additional Specifications

- ❖ Weighting individual SPiDER value by duration contribution of MV produced very similar results
- ❖ Evaluating the sector as one entity slightly reduces the performance
- ❖ Important to control for cross-sectional dispersion of SPiDER
- ❖ Patterns were similar with both EW and VW

Information Ratio of Top-Half – Bottom-Half SPiDER Sector Portfolios Using Alternative Specifications (EW, ann. Mar 1993 – Nov 2019, IG and HY Ba & B)

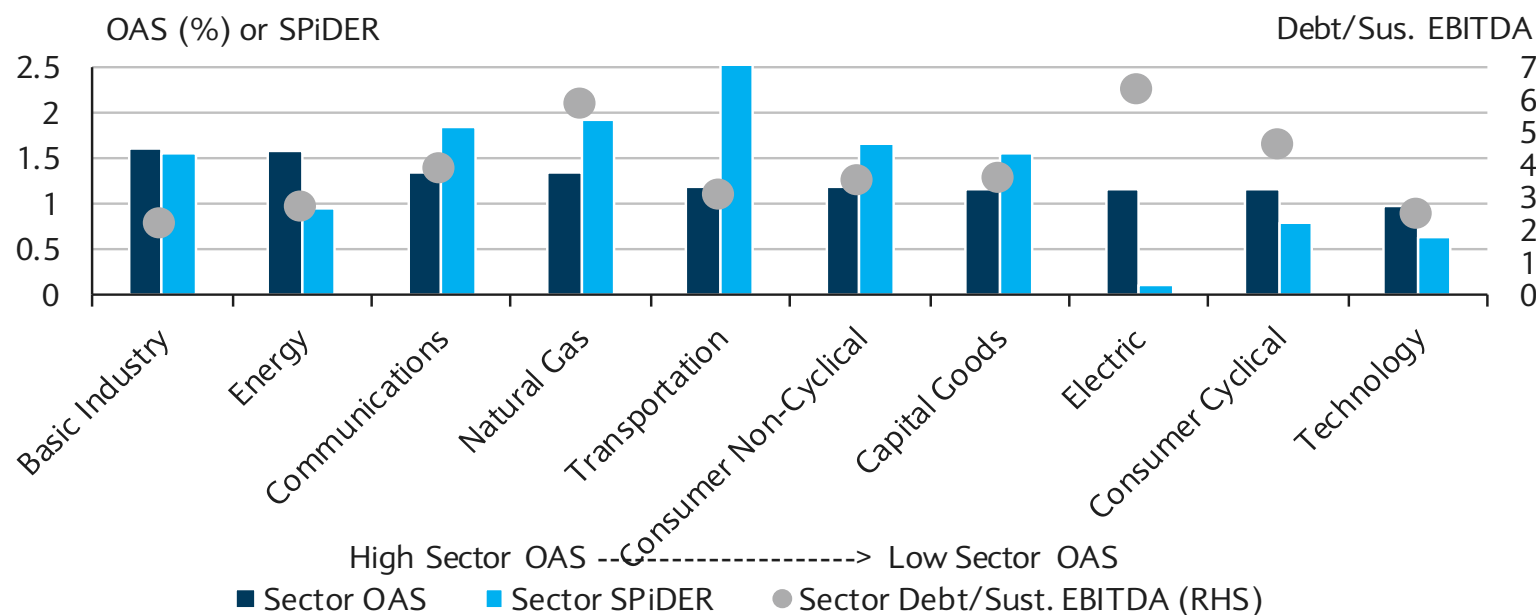


Source: Bloomberg, Compustat, Barclays Research

Was Sector-Level SPiDER Driven by OAS?

- ❖ Sector SPiDER captures different information than OAS or Debt/Sust. EBITDA alone
- ❖ For example, in August 2019, sectors with highest OAS did not necessarily have the highest SPiDER
- ❖ Overall, in only a fraction of the months was a top SPiDER sector also ranked as a top OAS sector (IG: 45% and HY: 58%)

Sector-Level SPiDER, OAS, and Debt/Sust. EBITDA Measure as of Aug 2019



Source: Bloomberg, Compustat, Barclays Research

Was High SPiDER Sectors' Outperformance Driven by Higher Carry?

- ❖ A similar L-S strategy that ranks sectors by OAS delivers lower average returns and higher volatility than the strategy that ranks sectors by SPiDER
- ❖ A similar L-S strategy ranking sectors on Debt/Sust. EBITDA also delivers a lower Information Ratio than the original strategy

Excess Return of Top-Half – Bottom-Half Sector Portfolios Ranked on SPiDER and Other Measures (Mar 1993 – Nov 2019, IG and HY Ba & B)

		EW			VW		
		Original SPiDER Measure	OAS	Debt/Sus. EBITDA	Original SPiDER Measure	OAS	Debt/Sus. EBITDA
IG	Avg. Ex. Ret. (%/Yr)	0.60	0.31	0.05	0.51	0.28	0.15
	Vol. (%/Yr)	1.01	1.97	1.20	1.19	2.29	1.36
	Inf. Ratio (Ann.)	0.59	0.16	0.04	0.43	0.12	0.11
HY	Avg. Ex. Ret. (%/Yr)	1.95	1.49	0.63	2.51	1.50	0.93
	Vol. (%/Yr)	3.53	3.61	3.00	3.67	4.47	4.14
	Inf. Ratio (Ann.)	0.55	0.41	0.21	0.68	0.34	0.23

Source: Bloomberg, Compustat, Barclays Research

Was High SPiDER Sectors' Outperformance Driven by Higher DTS?

- ❖ To adjust for the effect of sector DTS on returns, we calculated market-adjusted sector excess return as

$$\text{Mkt-Adj. Excess Ret} = \text{Excess Ret}_{\text{Sector}} - (\text{DTS}_{\text{Sector}} / \text{DTS}_{\text{Index}}) * \text{Excess Ret}_{\text{Index}}$$

- ❖ After adjusting for the effect of DTS, the outperf. of EW SPiDER top-half over bottom-half sector portfolios was smaller, but still positive, with Inf. Ratio of 0.56 (IG)/0.27(HY)

Market-Adjusted Excess Return of Top-Half – Bottom-Half SPiDER Sector Portfolios (Mar. 1993 – Nov. 2019 , IG and HY Ba & B)

		EW				VW				Ex-Financial
		Bottom Half	Top Half	Top over Bottom	Top over Bottom (unadj. ex. ret)	Bottom Half	Top Half	Top over Bottom	Top over Bottom (unadj. ex. ret)	Index (IG and HY: Ba & B)
IG	Avg. Ex. Ret. (%/Yr)	-0.36	0.15	0.51	0.60	-0.35	0.15	0.50	0.51	0.67
	Vol. (%/Yr)	1.25	1.37	0.92	1.01	1.19	1.29	1.07	1.19	4.06
	Inf. Ratio (Ann.)	-0.29	0.11	0.56	0.59	-0.30	0.12	0.47	0.43	0.17
	Worst Monthly Ret (%)	-3.24	-4.11	-0.87	-1.30	-3.29	-3.44	-1.97	-1.92	-9.04
	Max. DD	-9.36	-5.59	-1.90	-2.14	-9.40	-3.95	-4.59	-4.43	-23.46
HY	Avg. Ex. Ret. (%/Yr)	0.02	0.84	0.81	1.95	-0.68	0.78	1.46	2.51	2.31
	Vol. (%/Yr)	1.52	2.33	3.07	3.53	1.44	1.95	3.03	3.67	8.34
	Inf. Ratio (Ann.)	0.02	0.36	0.27	0.55	-0.47	0.40	0.48	0.68	0.28
	Worst Monthly Ret (%)	-1.92	-5.61	-7.14	-7.95	-1.93	-4.25	-5.89	-5.46	-15.26
	Max. DD	-10.87	-11.87	-17.17	-12.13	-17.27	-9.67	-13.32	-8.14	-39.2

Source: Bloomberg, Compustat, Barclays Research

Combining Sector Timing Strategies: Value (SPiDER) and Momentum (EMC)

Equity Momentum in Credit (EMC) Is Useful in Sector Timing

- ❖ Polbennikov and Desclee, Aug 2017 ([Equity Momentum in Credit](#), EMC), find that issuers with strong past equity price returns on average have higher returns in their corporate bonds in the subsequent month
- ❖ Furthermore, Polbennikov and Desclee, Nov 2017 ([Corporate sector timing using equity momentum](#)), finds that equity momentum signals have also been useful in timing allocation across corporate bond sectors

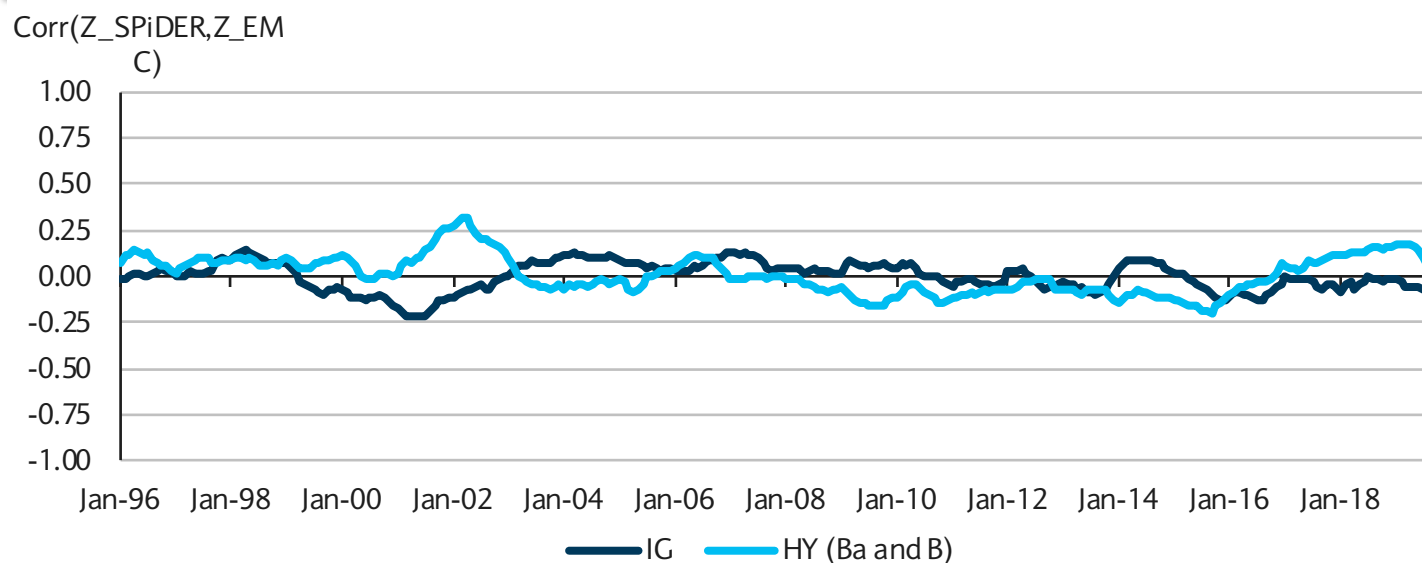
Excess Return of Top-Half – Bottom-Half EMC Sector Portfolios (Mar 1993 – Nov 2019, IG and HY Ba & B)							
		EW			VW		
		Bottom 5	Top 5	Top over Bottom	Bottom 5	Top 5	Top over Bottom
IG	Avg. Ex. Ret. (%/Yr)	-0.65	2.24	2.89	-0.77	2.22	2.98
	Vol. (%/Yr)	4.80	4.03	2.57	4.87	3.78	2.76
	Inf. Ratio (Ann.)	-0.13	0.56	1.13	-0.16	0.59	1.08
	Worst Monthly Ret (%)	-11.50	-6.83	-1.40	-11.85	-4.62	-2.25
	Max. DD	-38.58	-18.25	-2.05	-36.82	-16.45	-3.62
HY	Avg. Ex. Ret. (%/Yr)	0.71	6.25	5.54	-0.78	5.80	6.58
	Vol. (%/Yr)	10.65	8.69	5.59	10.46	9.00	6.07
	Inf. Ratio (Ann.)	0.07	0.72	0.99	-0.07	0.64	1.08
	Worst Monthly Ret (%)	-19.50	-14.54	-7.47	-20.94	-14.87	-5.46
	Max. DD	-65.21	-38.78	-11.11	-69.63	-40.07	-9.08

Note: Sector EMC signal was aggregated from issuer past equity momentum using duration contribution as weights. Source: Bloomberg, Compustat, Barclays Research

EMC and SPiDER Signals Had Low Correlations

- ❖ Assness, Moskowitz, and Pedersen (2013) find that value and momentum are negatively correlated within asset classes
- ❖ We find that SPiDER (value) and EMC (momentum) sector-level signals also have low correlation, on average -0.01 for IG and -0.001 for HY
- ❖ The low signal correlations suggest that there may be high diversification benefit in combining the strategies

Trailing 36m Correlation of Sector-Level SPiDER and EMC Signals (Mar 1993 – Nov 2019, IG and HY Ba & B)



Note: Each month, the sector-level SPiDER and EMC signals were standardized to have mean 0 and stdev of 1 respectively. We calculate the time-series correlation for each sector and then averaged across all sectors to obtain the average. Source: Bloomberg, Compustat, Barclays Research

Two ways to use multiple signals...

1. Double (Triple) sort

Pros	Cons
<ul style="list-style-type: none">• Non-parametric• Can capture non-linearity in signal structure	<ul style="list-style-type: none">• May result in unbalanced # of sectors in L and S buckets• In some months the L or S buckets may be unpopulated• Difficult to do with ≥ 3 signals on a limited # of assets

2. Combining multiple signals into a single signal

Pros	Cons
<ul style="list-style-type: none">• Can integrate multiple signals• Can customize weights on signals based on their efficacy and correlations	<ul style="list-style-type: none">• Requires calibration of weights

Independent Double Sort on EMC and SPiDER Improved IR in IG

- ❖ Double sort on EMC and SPiDER improved the strategy IR over EMC only in IG
- ❖ The double sort L-S strategy tends to have higher vol than each individual signal, possibly driven by smaller number of sectors in the L/S buckets

Portfolio Excess Returns from Double Sort on EMC-and-SPiDER (Jan. 2000 – Nov. 2019, IG and HY B and Ba)

EW							VW					
			Bottom EMC	Top EMC	Top EMC Top SPiDER - Bottom EMC and Bottom SPiDER	Top - Bottom EMC	Top - Bottom SPiDER	Bottom EMC	Top EMC	Top EMC Top SPiDER - Bottom EMC and Bottom SPiDER	Top - Bottom EMC	Top - Bottom SPiDER
IG	Bottom SPiDER	Avg. Ex. Ret (%/Yr)	-1.50	1.10	4.07	3.71	0.69	-1.48	1.16	3.94	3.79	0.62
		Vol. (%/Yr)	5.12	4.57	3.10	2.91	1.14	5.05	4.60	2.98	3.14	1.34
		Inf. Ratio (ann.)	-0.29	0.24	1.32	1.27	0.60	-0.29	0.25	1.32	1.21	0.47
	Top SPiDER	Avg. Ex. Ret (%/Yr)	-0.63	3.11				-0.87	3.13			
		Vol. (%/Yr)	5.98	4.53				6.21	4.32			
		Inf. Ratio (ann.)	-0.11	0.69				-0.14	0.72			
HY	Bottom SPiDER	Avg. Ex. Ret (%/Yr)	-2.76	5.36	8.87	6.59	2.31	-3.08	5.13	9.53	7.76	3.19
		Vol. (%/Yr)	12.06	8.74	9.54	6.30	3.95	11.78	8.71	8.97	6.86	4.09
		Inf. Ratio (ann.)	-0.23	0.61	0.93	1.05	0.58	-0.26	0.59	1.06	1.13	0.78
	Top SPiDER	Avg. Ex. Ret (%/Yr)	0.52	7.89				0.37	7.80			
		Vol. (%/Yr)	12.74	10.96				10.88	11.65			
		Inf. Ratio (ann.)	0.04	0.72				0.03	0.67			

Source: Bloomberg, Compustat, Barclays Research

EMC and SPiDER Signals Complemented Each Other

- ❖ To assess the significance of each signal in predicting future sector returns, we run the following logit regression

$$Ret_in_Top_Half_{i,t}^* = intercept + beta1 * EMC_{i,t} + beta2 * SPiDER_{i,t} + e_t$$

where *Ret_in_Top_Half* is a dummy variable which = 1 if subsequent month sector i's ret. in top half and 0 otherwise

EMC and *SPiDER*_{*t*} are the percentile ranking of the sector-level scores in month *t*

- ❖ Both coefficients are significantly positive at predicting whether a sector will have excess returns in the top half in the subsequent month

Increase in Probability of a Sector's Return Being Ranked in the Top Half When Its EMC or SPiDER Ranking Increases by 1

(Jan 1993 – Nov 2019, IG and HY B and Ba, based on multi-variate regression)

	EMC	SPiDER	Relative importance: SPiDER/EMC
IG	1.6%***	1.5%***	0.92
HY	2.4%***	0.5%*	0.22

Source: Bloomberg, Compustat, Barclays Research

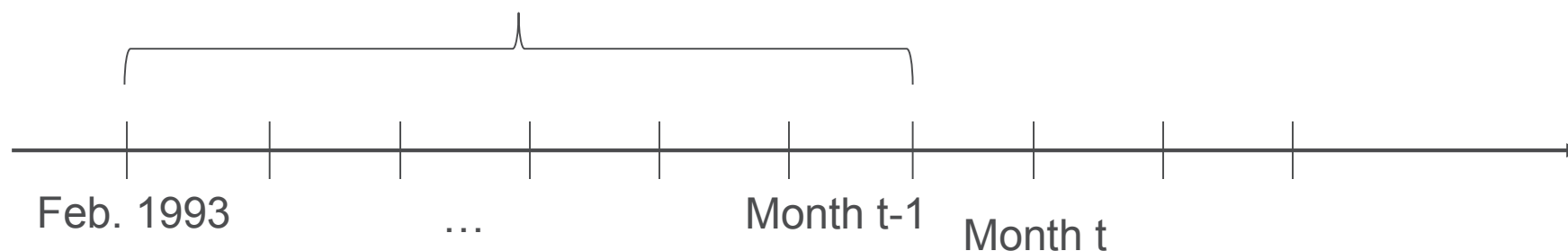
Combining EMC and SPiDER Signals in Real Time

- ❖ To avoid look-ahead bias, signals are combined based on weights calibrated using data available up to each point in time. Weights are updated monthly

Step 1: Calculate Coefficients

Estimate β_1 and β_2 using logit regression with an expanding window:

$$Ret_in_Top_Half_{i,s} = intercept + \beta_1 * EMC_{i,s} + \beta_2 * SPiDER_{i,s} + e_{i,s}$$



Step 2: Calculate Signal

$$Combined\ Signal_{i,t} = \beta_1 * EMC_{i,t} + \beta_2 * SPiDER_{i,t}$$

- ❖ Feb 1993 – Dec 1999 used for calibration. Real time signals start in Jan 2000

Source: Bloomberg, Compustat, Barclays Research

Combining EMC and SPiDER Signals Improved Inf. Ratio

- ❖ The strategy based on combined signal produced lower average return, lower vol, and higher Information Ratio than the EMC strategy
- ❖ The strategy based on the combined signal also had better tail risk measures

Excess Return of Top-5 – Bottom-5 Sector Portfolios Sorted on EMC-and-SPiDER Combined Signal (Jan. 2000 – Nov. 2019, IG and HY B and Ba)

EW					VW				
Signal	EMC	SPiDER	Combined Signal (regression)	Equal Combination (without regression)	EMC	SPiDER	Combined Signal (regression)	Equal Combination (without regression)	
IG	Avg. Ret. (%/Yr)	3.71	0.69	1.93	1.86	3.79	0.62	2.27	2.19
	Vol. (%/Yr)	2.91	1.14	1.32	1.33	3.14	1.34	1.63	1.60
	Inf. Ratio (ann.)	1.27	0.60	1.46	1.40	1.21	0.47	1.39	1.37
	Worst Monthly Ret	-1.40	-1.30	-0.81	-0.81	-2.25	-1.92	-1.27	-1.27
	Max Drawdown (%)	-2.05	-2.14	-1.20	-1.38	-3.62	-4.43	-1.72	-2.10
HY	Avg. Ret. (%/Yr)	6.59	2.31	5.11	3.96	7.76	3.19	5.89	4.88
	Vol. (%/Yr)	6.30	3.95	3.65	3.84	6.86	4.09	5.13	4.64
	Inf. Ratio (ann.)	1.05	0.58	1.40	1.03	1.13	0.78	1.15	1.05
	Worst Monthly Ret	-7.47	-7.95	-3.93	-5.75	-5.46	-5.46	-4.51	-3.32
	Max Drawdown (%)	-11.11	-12.13	-3.93	-6.17	-9.08	-8.14	-5.60	-4.42

Source: Bloomberg, Compustat, Barclays Research

Combining Signals Also Improved IR at Quarterly Rebalancing

- ❖ Combining EMC and SPiDER ratios improved IR at quarterly horizons as well
- ❖ Rebalancing at quarterly horizons also decreased turnover

Excess Return and Turnover of Top-5 – Bottom-5 Sector Portfolios Sorted on EMC-and-SPiDER Combined Signal with Monthly and Quarterly Rebalancing (EW, Jan 2000 – Nov 2019, IG and HY B and Ba)

		Monthly Rebalancing			Quarterly Rebalancing		
Signal		EMC	SPiDER	Combined Signal (regression)	EMC	SPiDER	Combined Signal (regression)
IG	Avg. Ret. (%/Yr)	3.71	0.69	1.93	2.08	0.68	1.39
	Vol. (%/Yr)	2.91	1.14	1.32	3.00	1.13	1.25
	Inf. Ratio (ann.)	1.27	0.60	1.46	0.69	0.60	1.11
	Worst Monthly Ret	-1.40	-1.30	-0.81	-4.31	-1.30	-1.03
	Max Drawdown (%)	-2.05	-2.14	-1.20	-5.76	-2.13	-1.78
	Turnover (%/Yr, one leg)	544%	46%	311%	225%	48%	126%
HY	Avg. Ret. (%/Yr)	6.59	2.31	5.11	3.49	2.18	2.59
	Vol. (%/Yr)	6.30	3.95	3.65	6.81	3.93	3.96
	Inf. Ratio (ann.)	1.05	0.58	1.40	0.51	0.55	0.65
	Worst Monthly Ret	-7.47	-7.95	-3.93	-8.25	-8.06	-5.53
	Max Drawdown (%)	-11.11	-12.13	-3.93	-28.01	-12.14	-8.00
	Turnover (%/Yr, one leg)	547%	95%	405%	225%	93%	151%

Source: Bloomberg, Compustat, Barclays Research

Key Takeaways

- ✓ IG and HY Issuers with high SPiDER ratios continued to outperform low-SPiDER issuers with quarterly holding horizons
- ✓ Sectors with high SPiDER outperformed sectors with low SPiDER
- ✓ Such outperformance was robust to how the sector-level SPiDER signals were constructed and was not driven by OAS differences in the top- and bottom-half portfolios
- ✓ Value (SPiDER) and momentum (EMC) sector-level signals are complementary. A strategy based on combining SPiDER and EMC sector-level signals produced lower vol, higher Inf. Ratio, and better tail risk measures than strategies based on individual signals
- ✓ Combining SPiDER and EMC signals improved Inf. Ratio at both monthly and quarterly horizons

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