

QES US Energy Risk Model – Model Summary

Introduction

The Luo's QES team has been top-ranked in the Institutional Investor magazine's research surveys in the Quantitative Research, Portfolio Strategy, Economics, and Accounting & Tax Policy categories in the past decade. The QES risk model suite leverages our expertise in factor construction, our experience with risk model design, and our understanding of systematic drivers of equity risk. This US Energy model includes fundamental, technical, macro, positioning, and alternative data factors that explain systematic risks and return dispersion in the sector. Intended users include both fundamental and quantitative PMs, CIOs, risk managers, and traders.

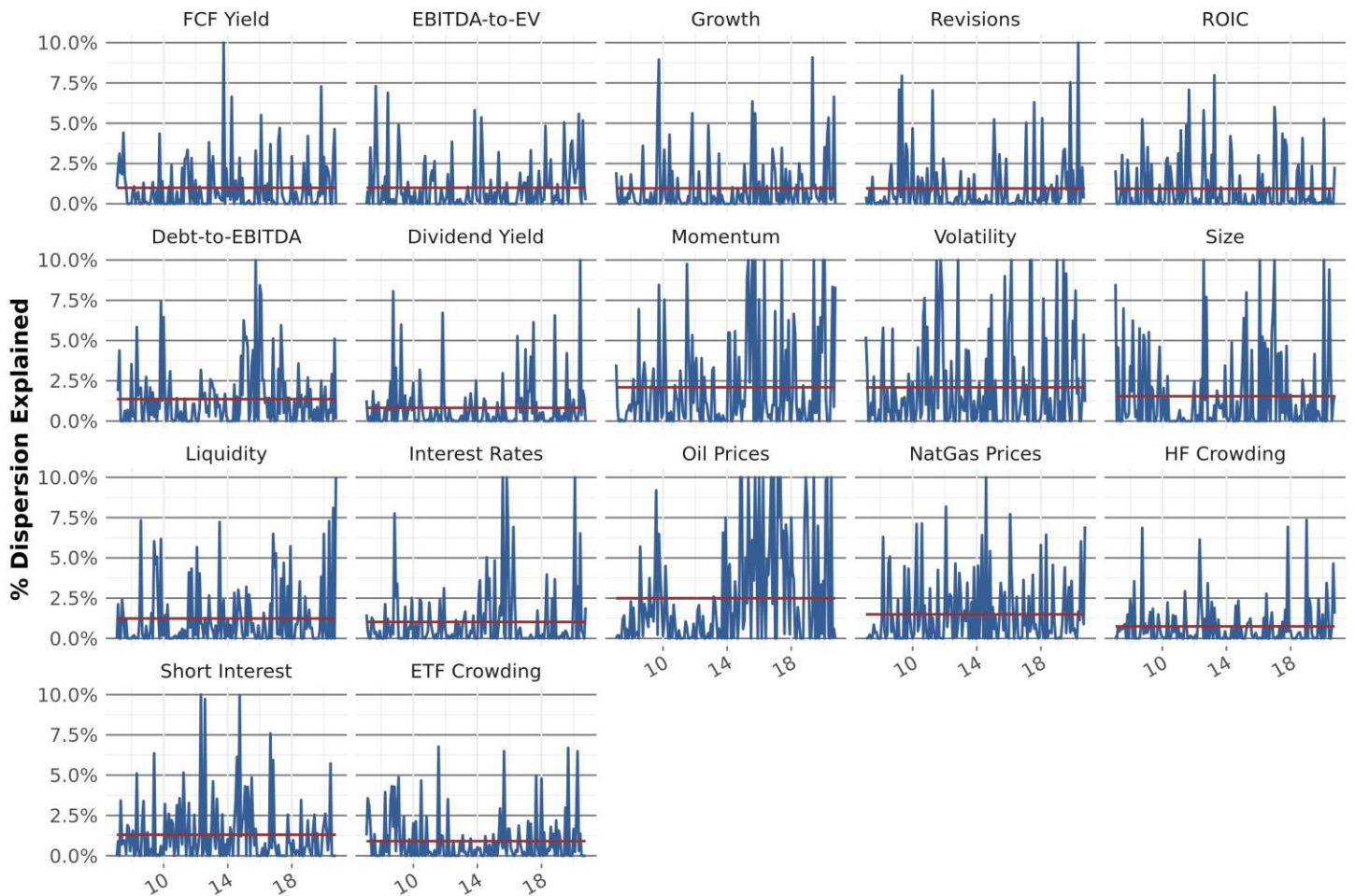
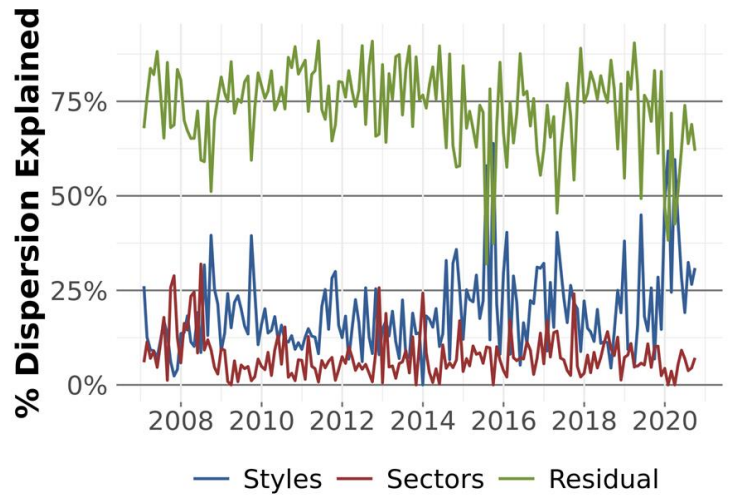
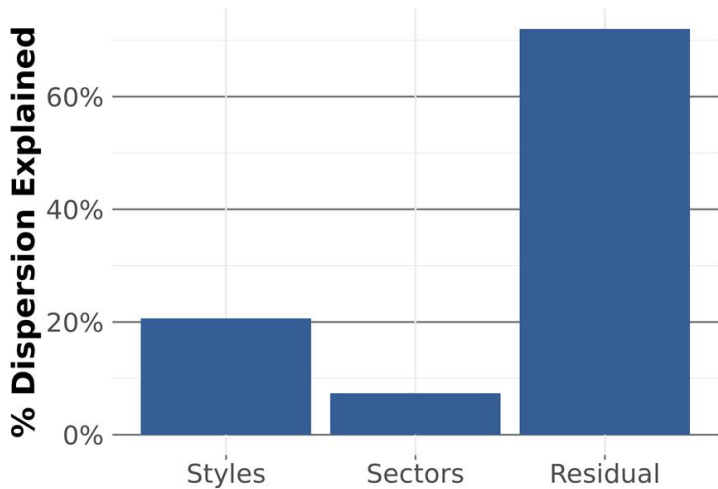
Coverage

- Risk Estimation Universe: US All-Cap Energy Equities
- Investment Horizon: Medium-term
- Securities Coverage: Global equities (~40,000) plus US-listed equity ETFs (~1,000)
- Model History: January 2007 to present

Factors & Descriptions

QES Factor Name	Signal Description
FCF Yield	Total unlevered free cash flows of last 12-months divided by market capitalization.
EBITDA-to-EV	Ratio of last 12-month EBITDA to sum of net debt, preferred shares, market cap, noncontrolling interest.
Growth	Median consensus growth in cash flow per share over the next 12-months.
Revisions	Ratio of next 12-month mean consensus EBITDA to this metric 3-months ago.
ROIC	Ratio of trailing 12-month income before extraordinary items to invested capital.
Debt-to-EBITDA	Ratio of total debt to last 12-month EBITDA.
Dividend Yield	Trailing 12-month dividend per share divided by current share price.
Momentum	Total return of the past 12-months excluding the most recent 1-month.
Volatility	Realized volatility, based on daily returns over the past 12-months.
Size	Market capitalization, common shares outstanding multiplied by the current share price.
Liquidity	Past 3-month average dollar volume divided by average market capitalization.
Interest Rates	Beta to interest rate changes for US Treasuries approximately equivalent to the 10Y.
Oil Prices	Beta to weekly returns of crude oil WTI Futures TR after controlling for market beta.
NatGas Prices	Beta to weekly returns of natural gas NG Future Commodity.
HF Crowding	Combination of hedge fund intensity (% of float) and level (market value) based on 13F filings.
Short Interest	Ratio of shares borrowed for shorting to inventory available for lending.
ETF Crowding	Ratio of gross flows from ETF creation/redemption to notional trading volume over trailing 3-months.
QES Industries	Binary one or zero values identifying each stock's QES Industry classification.

Explanatory Power for Opportunity Set



Factor Correlations

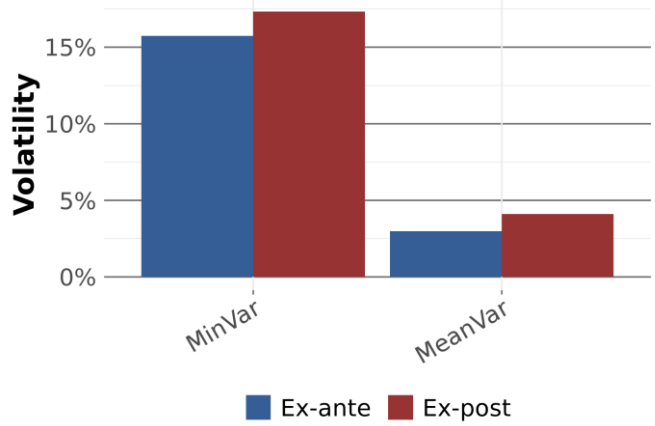
*Signal Rank (Upper) and FMPs Ex-Post (Lower)

	FCF Yield	EBITDA-to-EV	Growth	Revisions	ROIC	Debt-to-EBITDA	Dividend Yield	Momentum	Volatility	Size	Liquidity	Interest Rates	Oil Prices	NatGas Prices	HF Crowding	Short Interest	ETF Crowding
FCF Yield	30	-8	-4	33	27	22	20	-23	20	-4	-7	-17	-10	1	-23	3	
EBITDA-to-EV	33	-10	-16	30	10	-8	-8	4	13	3	4	5	1	-17	-1		
Growth	33	-16	16	8	-6	-6	19	-6	3	-10	-9	-2	-4	1	-5	2	
Revisions	33	39	22	-5	3	-4	21	-3	6	-3	-3	-2	-1	2	-5	1	
ROIC	15	37	9	35	22	19	24	29	0	-13	-5	0	5	-17	-1		
Debt-to-EBITDA	-9	37	-23	-22	10	-8	-15	21	-12	10	6	2	-3	5	21	-10	
Dividend Yield	-24	11	-8	-12	-5	19	6	33	1	-17	-20	-4	9	-6	-7		
Momentum	-4	-3	-1	-11	-9	-8	-17	-23	25	-8	-14	-10	1	10	-18	5	
Volatility	-25	28	1	-21	-8	15	24	-5	19	33	32	-3	-21	31	-7		
Size	19	-26	27	35	11	31	-28	0	15	19	-15	4	8	30	-29	-18	
Liquidity	-27	21	-23	30	-30	12	-1	8	5	-29	19	30	7	20	17	30	
Interest Rates	6	-9	3	7	-1	-3	-6	4	-14	-2	-12	35	-6	-4	11	-9	
Oil Prices	-14	20	-23	9	-6	33	26	-13	10	-16	-1	-6	18	5	7	-16	
NatGas Prices	-5	26	-22	-21	-18	21	1	16	-3	-22	18	3	7	10	-9	2	
HF Crowding	-27	25	-24	-28	-4	20	13	11	12	23	-9	9	14	-17	-15		
Short Interest	-5	25	-2	-28	-12	8	-15	5	-12	-1	8	5	-15	10	-1	-17	
ETF Crowding	-25	22	-16	-21	-19	12	18	13	14	-6	37	-4	24	14	21	17	

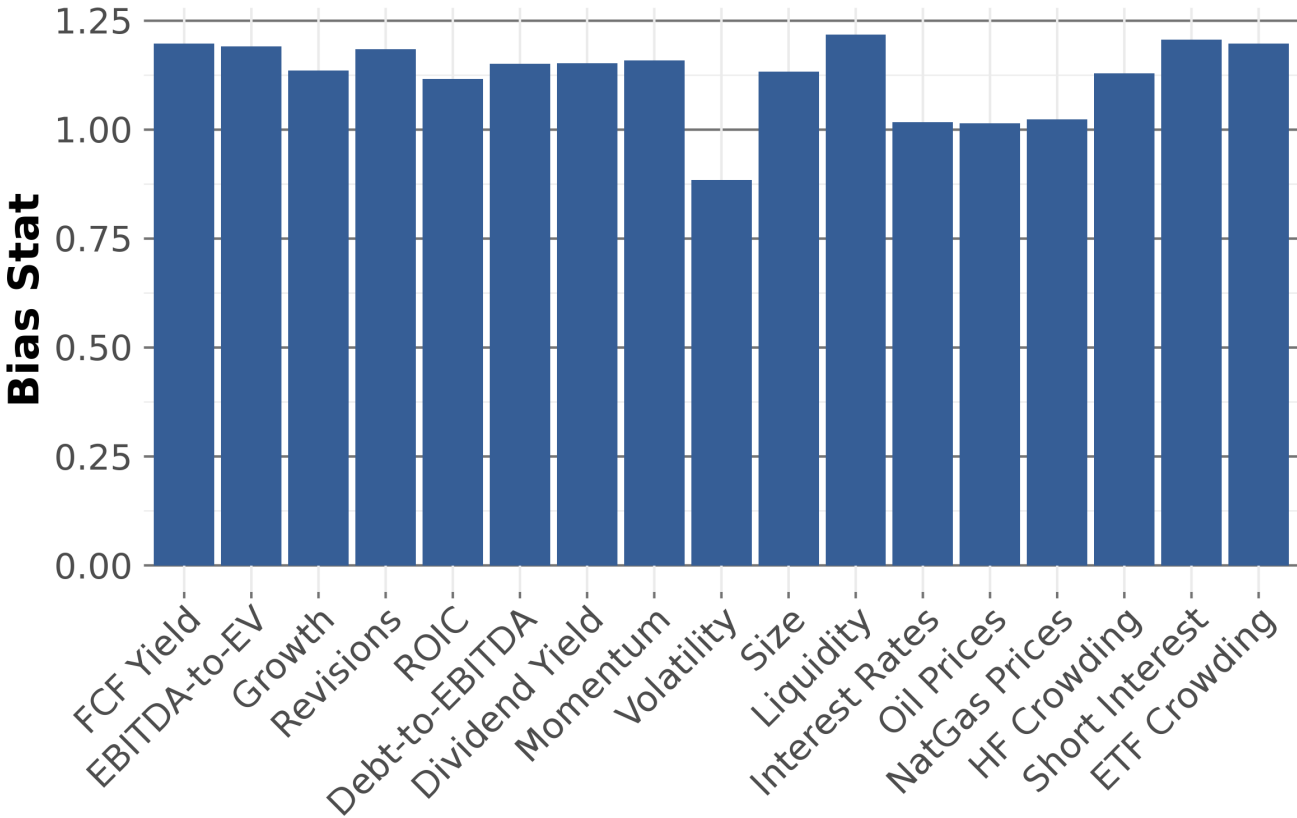
Portfolio Optimization Tests

*Minimum Variance

*Mean-Variance



Bias Statistics



DISCLOSURE SECTION

Other Disclosures:

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