Deutsche Bank

6 April 2011

QCD Stock Selection
QCD model update

Research summary
Every month, we provide our readers with a review of broad quant factor performance, our QCD model recommendations, and our model performance. Please contact us to be added to our spreadsheet distribution list.

April 2011 update

Broad quantitative alpha factor performance
Most quant factors performed well in March. Sentiment, momentum, growth, quality, and technical factors continued to add value, only value factors underperformed.

Model recommendations
For April 2011, our model suggests allocating more weight to value, growth, sentiment, and quality factors, and less weight to momentum, and technical factors.
In the large cap space, i.e., Russell 1000 index, our model suggests overweighting the energy and info tech sectors; and underweighting the utilities and telecommunication services sectors.

Within small-cap universe, i.e., Russell 2000 index, our model suggests the industrials and energy are likely to outperform, while the financials and staples sectors are likely to underperform.

The QCD model performance
Our QCD model underperformed in March, with a sector-neutral rank information coefficient (IC) of -2.08%.

Our five model portfolio performance
Last month, the five model portfolios (large-cap core, large-cap value, large-cap growth, small-cap, and market neutral) produced after-cost active returns of 0.47%, 0.44%, 0.48%, -0.14%, and 1.56%, respectively.

An in-depth description of our model methodology can be found in our *DB Quant Handbook*, July 22, 2010. QCD model scores for all stocks in our universe and the exact holdings in our five model portfolios are available in two separate spreadsheets. Please contact us to be added to the spreadsheet distribution list.

Please note that all our research is distributed from DBEQS.Americas@db.com. A list of our recent publications can be found in the Appendix.

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Factor performance review

Every month, we review the performance of about 80 factors from our factor library (Figure 1). Please note that this is only a small fraction of our factor library, which includes over 1,200 factors for the US market. We choose these 80 factors to provide a balanced view for each broad factor category – they are not necessarily the best 80 factors or the factors in our QCD model.

We measure factor performance in five standard analyses: long/short hedged portfolio, Pearson information coefficient, Spearman rank IC, sector-neutral IC, and risk-adjusted IC. For simplicity, we present only Spearman rank IC in this report.

Due to space limitation, we will present the results for only the broad investable universe, i.e., the union of Russell 3000, S&P 1500, and MSCI USA indices. We perform standard factor backtesting for more sub-universes on a daily basis, e.g., all major Russell and S&P index families, GICS sectors/industry groups, etc. Please contact us for customized factor backtesting.

Most quant factors performed well in March. Sentiment, momentum, growth, quality, and technical factors continued to add value, only value factors underperformed.

Figure 1: Broad factor performance review, Spearman rank IC

Factor Name	Direction[1]	Current # of Stocks	Average (%) Last M	Average (%) 12M Avg	Average (%) 3Y Avg	Since Inception Avg	Std Dev	Max	Min	p-value[2]	# of Months	Avg # of Stocks	%Positive	Avg in Up Mkt (%)	Avg in Dn Mkt (%)	Serial Corr (%)[3]
1. Value																
1 Dividend yield, trailing 12M	Ascending	2,500	(3.73)	(1.31)	(0.73)	2.58	14.89	42.94	(32.82)	0.00	279	2,754	54.12	(2.66)	11.96	99.30
2 Expected dividend yield	Ascending	2,500	(2.89)	(0.94)	(0.50)	2.82	15.23	43.93	(33.33)	0.00	279	2,754	53.41	(2.63)	12.59	99.31
3 Price-to-operating EPS, trailing 12M, Basic	Descending	2,033	(5.70)	0.25	1.67	2.99	10.92	32.04	(31.04)	0.00	194	2,325	58.25	0.94	6.70	95.05
4 Operating earnings yield, trailing 12M, Basic	Ascending	2,491	1.56	2.35	2.04	4.68	13.65	46.16	(33.51)	0.00	194	2,806	58.76	(0.32)	13.73	96.15
5 Earnings yield, forecast FY1 mean	Ascending	2,359	1.53	3.02	1.25	4.37	12.63	47.84	(34.42)	0.00	279	2,471	62.37	0.93	10.53	94.92
6 Earnings yield, forecast FY2 mean	Ascending	2,342	0.43	4.01	2.21	4.06	12.10	46.02	(33.88)	0.00	279	2,366	64.87	1.80	8.10	94.13
7 Earnings yield x IBES 5Y growth	Ascending	1,597	0.17	2.46	1.81	1.95	10.49	41.21	(27.73)	0.01	194	1,925	60.82	4.24	(2.19)	93.44
8 Sector-rel Operating earnings yield, trailing 12M, Basic	Ascending	2,491	1.34	2.64	2.19	3.99	8.67	28.35	(15.75)	0.00	194	2,806	66.49	1.14	9.14	95.66
9 Hist-rel Operating earnings yield, trailing 12M, Basic	Ascending	2,467	(6.57)	0.34	0.67	0.79	7.06	17.08	(17.43)	0.16	159	2,476	53.46	0.49	1.26	93.24
10 Operating cash flow yield (income stmt def)	Ascending	2,492	3.39	3.27	1.79	4.08	11.43	46.14	(32.97)	0.00	279	2,712	64.52	0.98	9.62	95.66
11 Cash flow yield, FY1 mean	Ascending	1,378	5.35	2.63	1.54	1.70	13.78	35.60	(48.02)	0.08	201	815	56.72	1.06	2.87	96.28
13 Price-to-sales, trailing 12M	Descending	2,475	2.33	0.57	2.39	2.06	11.18	41.42	(29.59)	0.00	279	2,691	57.71	1.79	2.55	99.06
14 Price-to-book	Descending	2,421	(12.46)	(2.03)	0.32	1.07	11.08	36.30	(26.40)	0.11	279	2,674	50.54	(0.01)	3.00	97.49
16 Price-to-book adj for ROE, sector adj	Descending	2,285	(6.27)	(0.64)	1.53	0.74	8.92	33.82	(22.87)	0.17	279	2,399	51.25	1.18	(0.07)	95.31
2. Growth																
17 Hist 5Y operating EPS growth	Descending	2,477	6.72	1.07	(0.00)	0.46	7.61	20.53	(20.84)	0.41	187	2,590	52.94	(1.32)	3.49	97.10
18 Hist 5Y operating EPS acceleration	Ascending	2,477	(4.95)	(1.35)	(0.86)	1.08	6.43	14.27	(19.25)	0.02	187	2,590	60.96	0.21	2.58	94.27
19 IBES 5Y EPS growth	Ascending	1,751	4.05	1.84	0.35	0.59	8.88	23.07	(30.99)	0.27	279	1,871	53.41	1.92	(1.79)	98.22
20 IBES 5Y EPS growth/stability	Ascending	1,751	4.76	1.72	0.49	1.06	8.13	23.44	(20.85)	0.03	279	1,871	55.20	0.90	1.34	98.60
21 IBES LTG EPS mean	Descending	1,824	(9.87)	(3.89)	(1.49)	1.78	16.38	52.32	(37.37)	0.07	279	2,115	48.75	(3.88)	11.90	97.97
22 IBES FY2 mean DPS growth	Ascending	1,704	0.01	0.18	0.35	0.66	8.65	23.79	(20.93)	0.44	106	1,296	50.94	(2.99)	7.46	87.85
23 IBES FY1 mean EPS growth	Ascending	1,817	(0.38)	1.76	(1.25)	0.83	8.57	23.40	(30.24)	0.11	279	2,103	59.86	2.24	(1.70)	88.73
24 Year-over-year quarterly EPS growth	Ascending	2,497	2.69	2.60	0.38	2.38	7.34	24.43	(22.94)	0.00	194	2,813	68.56	2.37	2.40	81.20
25 IBES FY1 mean CFPS growth	Descending	852	1.07	(2.18)	1.37	0.18	11.07	41.86	(27.64)	0.84	151	511	52.32	(0.22)	0.91	92.55
26 IBES SUE, amortized	Ascending	2,219	1.40	1.28	(0.46)	1.25	6.26	19.90	(15.73)	0.00	217	2,214	59.45	1.96	(0.02)	73.35
3. Price momentum and reversal																
27 Total return, 1D	Descending	2,500	7.79	2.34	2.59	5.06	7.27	34.12	(16.76)	0.00	279	2,710	78.14	5.04	5.09	1.66
28 Total return, 21D (1M)	Descending	2,500	3.01	2.51	1.19	2.20	10.87	41.89	(27.52)	0.00	279	2,709	59.86	3.84	(0.75)	0.16
29 Maximum daily return in last 1M (lottery factor)	Descending	2,495	(2.03)	0.32	1.38	4.86	15.10	55.37	(38.40)	0.00	279	2,585	63.44	(1.21)	15.71	52.04
30 21D volatility of volume/price	Descending	2,495	(3.88)	0.91	0.53	0.32	7.00	19.37	(24.70)	0.45	279	2,585	51.61	1.13	(1.13)	55.42
31 Total return, 252D (12M)	Ascending	2,494	10.64	0.40	(2.22)	2.75	14.21	38.82	(55.94)	0.00	279	2,647	60.57	1.27	5.40	89.09
32 12M-1M total return	Ascending	2,494	11.76	1.21	(1.44)	3.67	13.37	37.32	(48.50)	0.00	279	2,647	64.52	2.73	5.37	87.64
33 Price-to-52 week high	Ascending	2,492	1.96	(1.25)	(2.75)	2.94	16.61	48.51	(58.32)	0.00	279	2,660	62.01	(2.52)	12.72	82.82
34 Total return, 1260D (60M)	Ascending	2,444	12.55	3.07	(1.55)	0.68	10.75	24.18	(34.08)	0.30	267	2,129	54.68	0.22	1.49	97.17
4. Sentiment																
35 IBES LTG Mean EPS Revision, 3M	Ascending	1,752	0.98	0.90	(0.74)	0.84	4.00	12.12	(12.34)	0.00	279	2,044	61.65	0.65	1.19	59.16
36 IBES FY1 Mean EPS Revision, 3M	Ascending	2,327	3.72	0.80	(0.69)	2.80	8.74	27.47	(32.91)	0.00	279	2,414	65.59	2.49	3.34	76.15
37 IBES FY1 EPS up/down ratio, 3M	Ascending	2,144	5.03	0.41	(0.27)	3.02	8.00	24.20	(24.72)	0.00	279	2,271	65.59	3.34	2.45	79.68
38 Expectation gap, short-term - long-term	Ascending	1,814	(2.79)	0.92	(1.27)	1.29	5.26	15.94	(23.71)	0.00	279	2,102	66.31	1.34	1.18	87.30
39 IBES FY1 Mean CFPS Revision, 3M	Ascending	1,271	4.72	0.50	(0.74)	0.79	10.48	29.51	(37.12)	0.30	193	753	61.14	(0.12)	2.42	65.19
40 IBES FY1 Mean SAL Revision, 3M	Ascending	2,310	3.94	1.51	(0.58)	0.96	8.06	27.84	(24.26)	0.12	177	2,048	58.76	0.52	1.68	71.25
41 IBES FY1 Mean FFO Revision, 3M	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
42 IBES FY1 Mean DPS Revision, 3M	Ascending	1,002	3.22	0.87	0.23	0.44	5.50	15.98	(16.42)	0.42	103	932	55.34	0.29	0.74	61.16
43 IBES FY1 Mean ROE Revision, 3M	Ascending	1,733	3.38	0.94	0.50	0.61	7.15	23.49	(21.20)	0.39	103	1,584	56.31	(0.03)	1.84	66.27
44 Recommendation, mean	Descending	1,824	10.04	3.70	1.01	0.87	8.56	21.79	(23.43)	0.15	208	2,221	55.77	2.63	(2.34)	94.22
45 Mean recommendation revision, 3M	Descending	1,754	(1.84)	(0.20)	0.21	1.25	4.30	11.94	(19.64)	0.00	205	2,149	60.49	1.06	1.60	59.97
46 Target price implied return	Ascending	1,814	8.01	4.52	3.72	1.15	16.78	61.55	(38.23)	0.41	144	2,010	55.56	8.87	(10.30)	78.29
47 Mean target price revision, 3M	Ascending	1,748	7.04	(1.96)	(1.70)	1.76	13.86	30.54	(43.72)	0.13	141	1,928	62.41	(0.79)	5.51	75.47
5. Quality																
48 ROE, trailing 12M	Ascending	2,413	9.37	3.01	1.75	4.02	11.36	35.75	(31.88)	0.00	194	2,740	64.43	0.17	10.99	97.91
49 Return on invested capital (ROIC)	Ascending	2,479	9.44	3.04	2.10	3.87	10.40	31.84	(29.71)	0.00	194	2,798	63.40	0.44	10.08	98.11
50 Sales to total assets (asset turnover)	Ascending	2,492	14.12	3.40	3.84	1.60	9.07	22.73	(22.31)	0.00	279	2,710	57.35	2.51	(0.03)	99.45
51 Operating profit margin	Ascending	2,464	(2.06)	0.14	0.39	0.99	5.37	16.03	(14.20)	0.00	279	2,546	59.14	0.60	1.69	98.42
52 Current ratio	Descending	1,983	(1.55)	0.14	(0.72)	1.88	10.63	38.65	(31.28)	0.00	279	2,183	54.12	(1.06)	7.13	97.88
53 Long-term debt/equity	Ascending	2,397	(4.25)	(0.01)	(0.70)	0.62	9.82	35.23	(27.70)	0.29	279	2,651	47.67	(1.28)	4.02	98.50
54 Altman's z-score	Descending	1,966	(5.29)	0.07	(0.03)	0.04	9.37	30.09	(31.80)	0.95	279	2,116	51.61	(0.66)	1.28	98.23
55 Merton's distance to default	Ascending	1,887	5.98	1.23	0.73	2.91	11.65	31.03	(43.26)	0.00	279	2,092	64.16	(0.93)	9.79	94.74
56 Ohlson default model	Descending	1,969	(0.92)	1.14	0.75	2.02	6.25	16.04	(16.36)	0.00	242	2,063	64.88	1.44	3.09	98.09
57 Campbell, Hilscher, and Szilagyi model	Descending	2,284	9.79	2.57	1.10	2.38	11.98	27.39	(36.79)	0.01	195	2,483	56.92	(1.22)	8.95	96.98
58 Accruals (Sloan 1996 def)	Descending	1,335	2.22	(0.14)	(0.19)	0.56	4.47	13.92	(11.24)	0.04	279	1,369	57.35	0.62	0.46	89.09
59 Firm-specific discretionary accruals	Descending	1,268	(5.23)	(0.02)	0.67	0.47	4.29	13.70	(11.76)	0.13	186	1,298	51.61	0.09	1.13	98.65
60 Hist 5Y operating EPS stability, coef of determination	Ascending	2,477	1.70	(2.04)	(0.85)	0.48	5.02	13.24	(12.76)	0.19	187	2,590	51.34	0.30	0.78	96.60
61 IBES 5Y EPS stability	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
62 IBES FY1 EPS dispersion	Descending	2,178	10.76	2.78	0.60	2.13	10.47	26.31	(37.76)	0.00	279	2,252	60.57	(0.78)	7.35	84.75
63 Payout on trailing operating EPS	Ascending	1,969	(4.91)	(2.69)	(1.52)	0.58	13.85	39.04	(30.71)	0.49	279	2,162	49.82	(4.23)	9.19	99.22
64 YoY change in # of shares outstanding	Descending	2,494	6.37	1.07	1.50	2.50	9.05	45.71	(18.78)	0.00	279	2,668	58.78	(0.87)	8.54	93.87
65 YoY change in debt outstanding	Descending	1,946	(0.05)	(1.10)	(0.24)	0.33	4.17	10.41	(12.91)	0.19	279	2,142	57.35	1.07	(1.00)	89.67
67 Piotroski's F-score	Ascending	1,916	1.24	1.33	(0.82)	2.96	11.14	36.09	(30.81)	0.00	194	2,101	59.28	(1.32)	10.70	90.31
68 Mohanram's G-score	Ascending	499	5.15	(0.19)	0.95	1.95	8.95	24.95	(28.73)	0.00	194	433	57.22	(0.21)	5.87	94.86
6. Technicals																
69 # of days to cover short	Descending	2,500	(4.60)	0.76	2.07	2.56	9.99	26.04	(34.20)	0.01	96	2,719	55.21	3.35	0.92	93.29
70 CAPM beta, 5Y monthly	Descending	2,406	5.23	(3.33)	(3.34)	0.64	17.26	47.46	(46.63)	0.59	219	2,257	46.12	(7.49)	15.32	98.67
71 CAPM idosyncratic vol, 1Y daily	Descending	2,463	1.50	1.01	1.25	4.60	18.05	57.95	(39.76)	0.00	279	2,617	59.50	(2.05)	16.50	99.14
72 Realized vol, 1Y daily	Descending	2,474	2.52	(0.51)	0.63	4.46	18.67	59.25	(40.19)	0.00	279	2,617	59.86	(2.75)	17.37	99.08
73 Skewness, 1Y daily	Descending	2,474	(1.10)	0.67	1.00	1.16	5.46	20.19	(14.35)	0.00	279	2,617	56.99	0.57	2.22	89.60
74 Kurtosis, 1Y daily	Descending	2,474	1.01	1.80	0.59	1.35	5.75	16.79	(15.25)	0.00	279	2,617	63.08	0.97	2.04	91.27
75 Idiosyncratic vol surprise	Descending	2,462	(3.53)	0.97	0.58	2.66	7.48	26.30	(26.95)	0.00	278	2,605	65.47	0.83	5.91	86.98
76 Normalized abnormal volume	Ascending	2,497	1.43	2.28	0.95	1.02	6.95	20.07	(20.69)	0.02	279	2,748	58.78	2.42	(1.49)	81.49
77 Float turnover, 12M	Descending	2,500	7.58	(0.30)	(1.59)	1.98	16.16	55.09	(36.72)	0.04	279	2,758	49.82	(5.07)	14.61	99.21
78 Moving average crossover, 15W-36W	Ascending	2,469	8.74	(2.05)	(1.65)	2.02	13.37	44.28	(52.90)	0.01	279	2,346	59.14	0.65	4.47	90.76
79 Log float-adj capitalization	Ascending	2,500	(0.50)	1.45	1.42	2.90	11.16	27.90	(38.48)	0.00	279	2,754	59.86	2.50	3.61	99.36
80 # of month in the database	Ascending	2,500	0.91	(0.10)	1.23	2.58	8.72	35.28	(21.03)	0.00	219	2,758	58.90	(0.28)	7.74	98.09
81 DB composite options factor	Ascending	1,358	(0.97)	1.51	0.91	1.75	4.95	15.38	(20.55)	0.00	116	1,414	65.52	0.70	3.54	2.16

Note

1 Direction indicates how the factor scores are sorted. Ascending order means higher factor scores are likely to be associated with higher subsequent stock returns, and vice versa for descending order.
2 P-value indicates the statistical significance of a factor's performance. A smaller p-value suggests that it is more likely the factor's performance is different from zero.
3 This is the autocorrelation of a factor's scores over time. Higher serial correlation is likely to have lower portfolio turnover based on the factor.

Source: Compustat, Bloomberg Finance LP, IBES, Russell, S&P, Thomson Reuters, and Deutsche Bank

Model recommendations

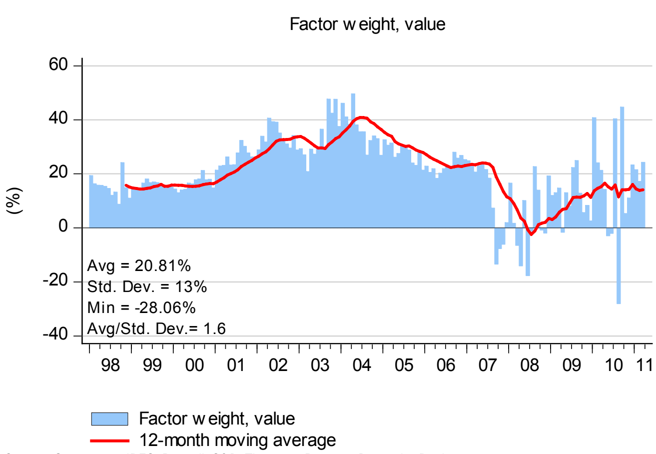
Our QCD model is primarily designed as a stock-selection tool. However, as a side benefit, it also gives us style and sector views.

Style outlook

Figure 2 to Figure 7 show the weightings of the six style factors in our QCD model. Please note that this is based on our style rotation model, i.e., our predicted factor performance for the six style factors.

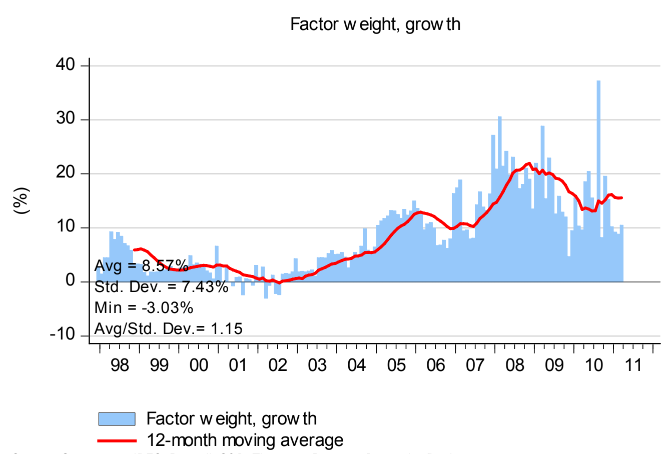
For April 2011, our model suggests allocating more weight to value, growth, sentiment, and quality, and less weight to momentum, and technical factors.

Figure 2: Factor weight, value



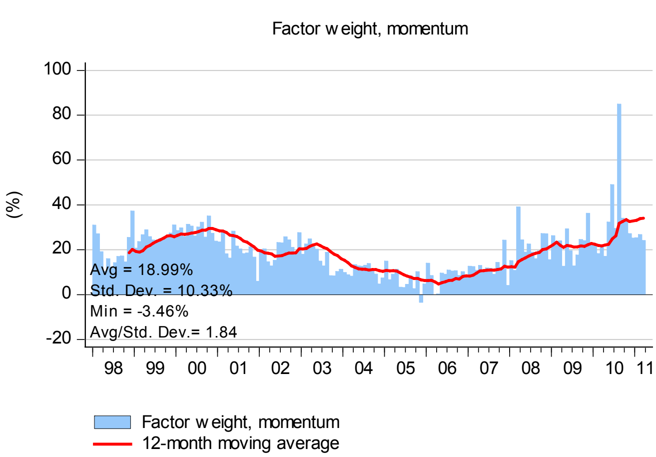
Source: Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Figure 3: Factor weight, growth



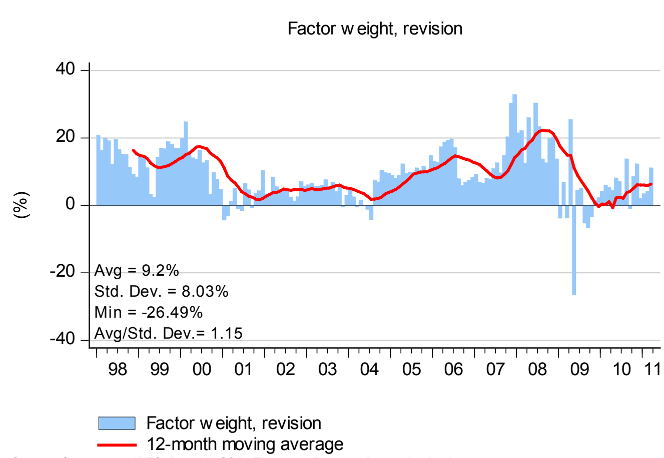
Source: Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Figure 4: Factor weight, momentum/reversal



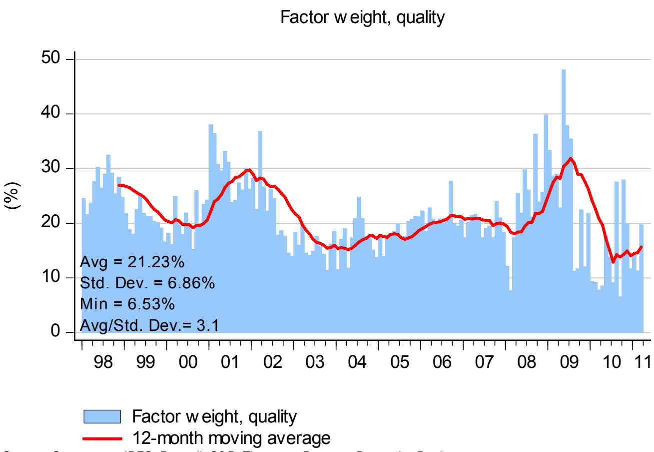
Source: Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Figure 5: Factor weight, sentiment



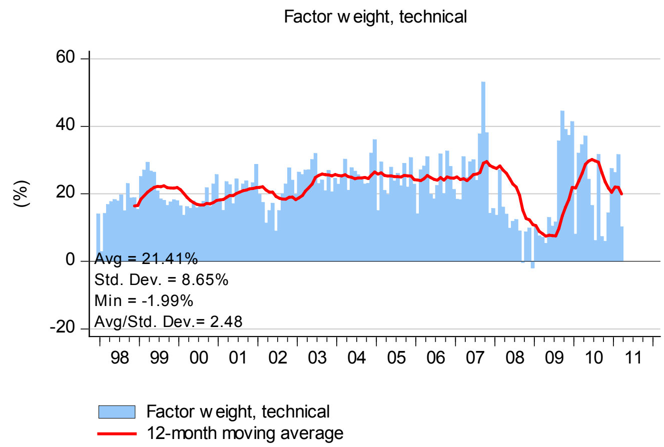
Source: Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Figure 6: Factor weight, quality



Source: Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Figure 7: Factor weight, technical

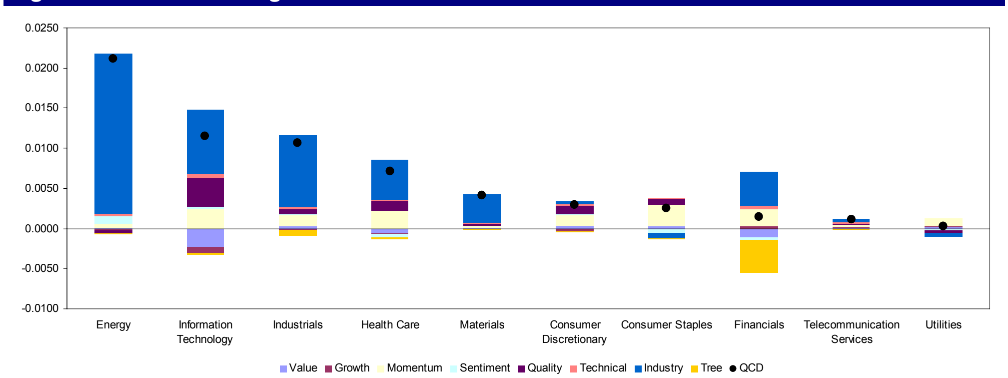


Source: Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Sector outlook

In the large cap space, i.e., Russell 1000 index, our model suggests overweighting the energy and info tech sectors; and underweighting the utilities and telecommunication services sectors (Figure 8).

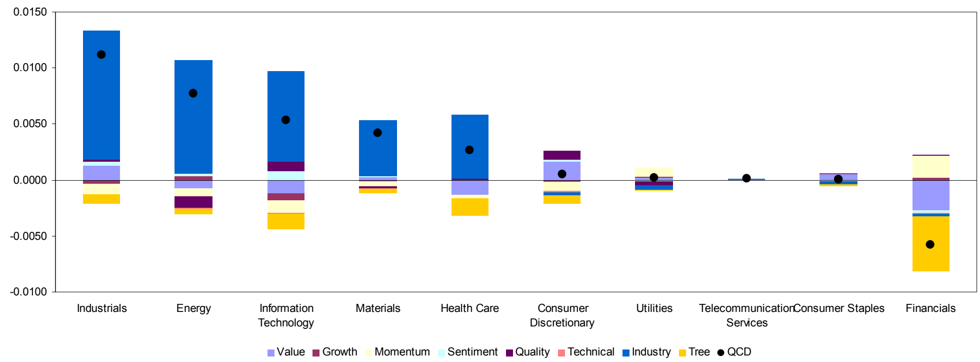
Figure 8: Sector ranking – Russell 1000 universe



Source: Compustat, IBES, Russell, S&P, Thomson Reuters, and Deutsche Bank

Within small-cap universe, i.e., Russell 2000 index, our model suggests industrials and energy are likely to outperform, while the financials and the staples sectors are likely to underperform (Figure 9).

Figure 9: Sector ranking – Russell 2000 universe



Source: Compustat, IBES, Russell, S&P, Thomson Reuters, and Deutsche Bank

Stock recommendations

Due to space limitation, we do not present detailed stock rankings in the report. Detailed rankings are available in our monthly spreadsheet. Please contact us to be added to the spreadsheet distribution list.

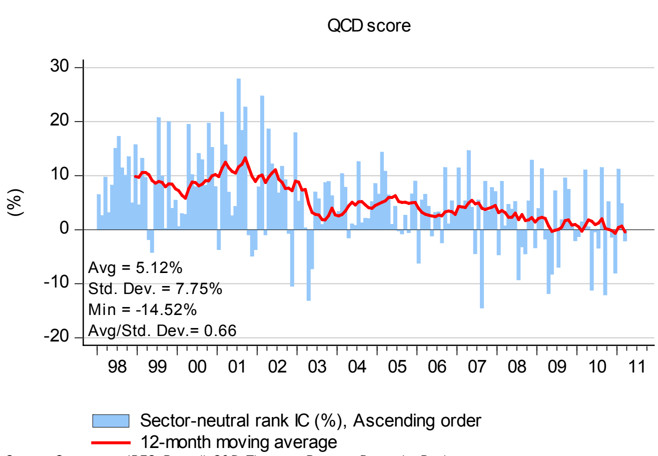
QCD model performance review

Since December 1997, the QCD model has performed very well. The most challenging periods for the QCD model were in late 2003/early 2004 and 2009/early 2010. We have seen some recovery in recent months (Figure 10). We recommend using the QCD model in a sector-neutral context, as the model has stronger skill in selecting stocks than ranking sectors (Figure 10 vs. Figure 11).

In March, our model underperformed with a sector-neutral rank information coefficient (IC) of -2.08%.

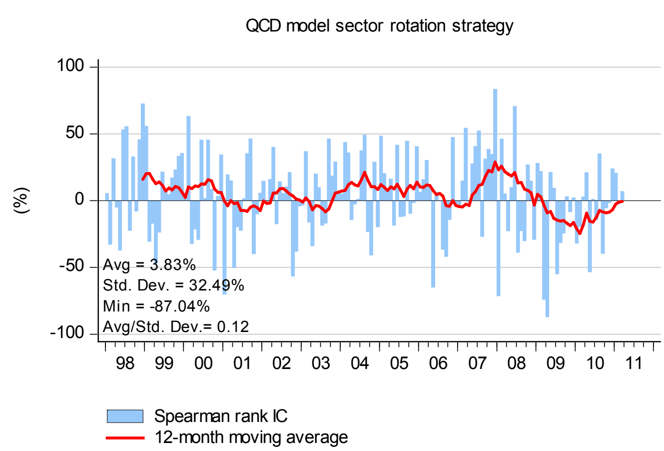
A more useful and realistic performance measurement is done at the portfolio level. We have five model portfolios: long-only large-cap core, long-only large-cap value, long-only large-cap growth, long-only small-cap, and long/short market neutral with typical institutional constraints and transaction costs. The IR/Sharpe ratio for the five model portfolios ranges from 1.5 to 3.2 and stays positive almost every year since 1998. Even in 2008 and 2009, two of the most challenging years for quantitative investing, our market-neutral strategy produces Sharpe ratio of 0.82 and 1.64, respectively.

Figure 10: Sector-neutral rank IC



Source: Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Figure 11: Rank IC – industry rotation



Source: Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Model portfolios

On a monthly basis, we build five standard model portfolios: 1) a long-only large-cap core portfolio benchmarked to the Russell 1000 index; 2) a long-only large-cap value portfolio benchmarked to the Russell 1000 Value index; 3) a long-only large-cap growth portfolio benchmarked to the Russell 1000 Growth index; 4) a long-only small-cap portfolio benchmarked to the Russell 2000 index; and 5) a long/short market neutral portfolio. We can also create customized portfolios for clients, e.g., large-cap value portfolio, large-cap growth portfolio, 130/30 portfolios. Please contact us for details.

The IR/Sharpe ratio for the five model portfolios ranges from 1.5 to 3.2 and stays positive almost every year since 1998. Even in 2008 and 2009, two of the most challenging years for quantitative investing, our market-neutral strategy produces Sharpe ratio of 0.82 and 1.64, respectively.

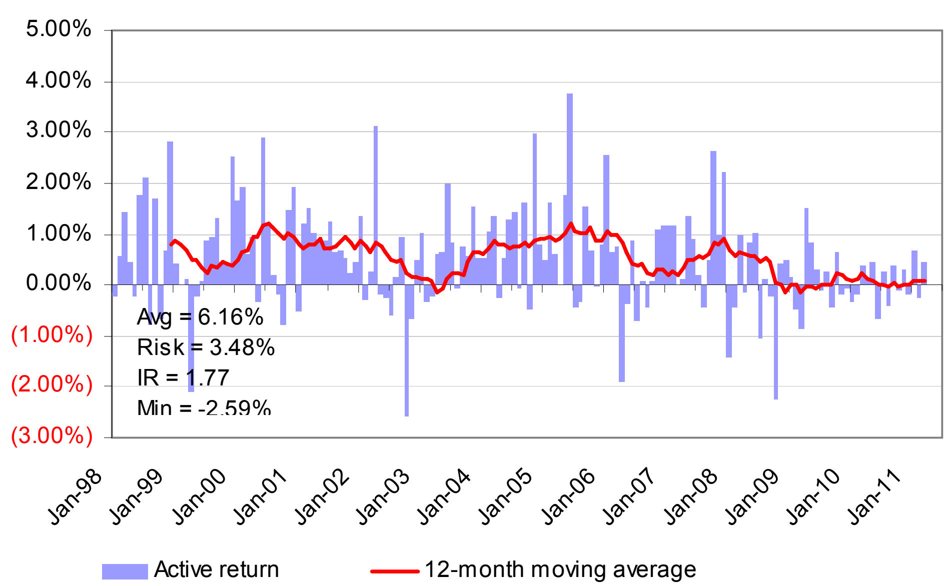
Last month, the five model portfolios produced active returns of 0.47%, 0.44%, 0.48%, -0.14%, and 1.56%, respectively.

Detailed holdings for the five model portfolios for next month are available in our monthly spreadsheet. Please contact us to be added to the spreadsheet distribution list.

Long-only large-cap core portfolio

For the long-only large-cap core portfolio, we try to maximize expected return with about 3.5% realized tracking error, using Russell 1000 as the benchmark. Figure 12 shows the portfolio performance vs. the benchmark.

Figure 12: Active return – long-only large-cap core portfolio

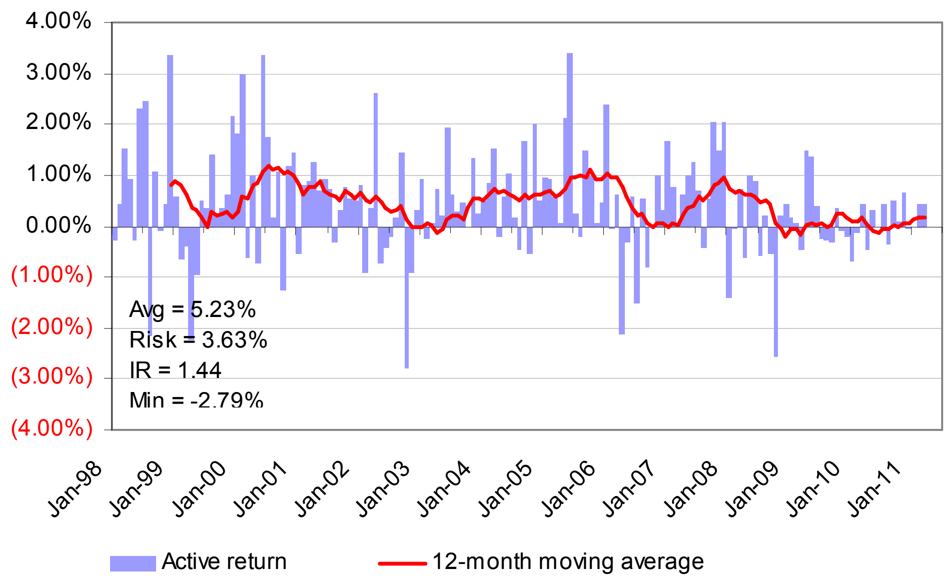


Source: Axioma, Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Long-only large-cap value portfolio

For the long-only large-cap value portfolio, we try to maximize expected return with less than 4% realized tracking error, using Russell 1000 Value as the benchmark. Figure 13 shows the portfolio performance vs. the benchmark.

Figure 13: Active return – long-only large-cap value

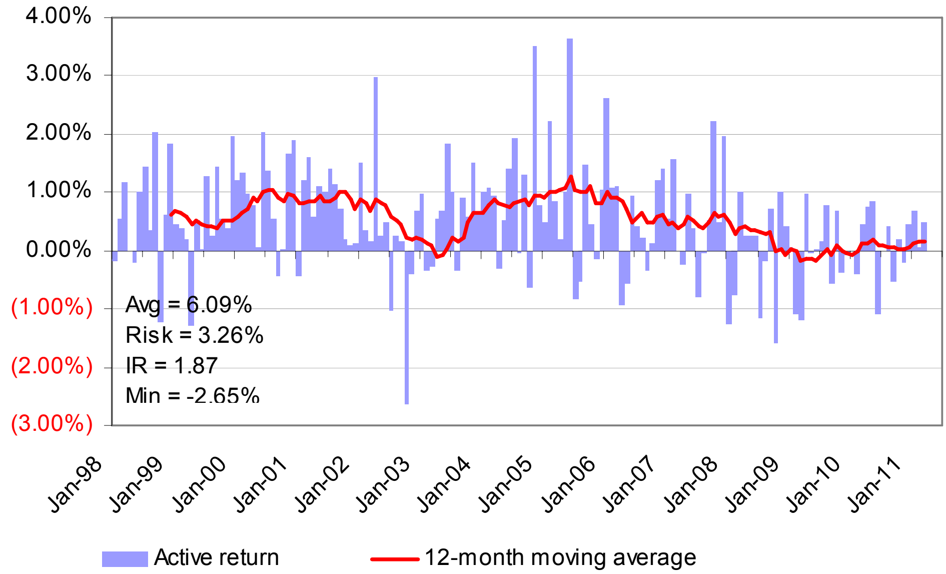


Source: Axioma, Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Long-only large-cap growth portfolio

For the long-only large-cap growth portfolio, we try to maximize expected return with about 3% realized tracking error, using Russell 3000 Growth as the benchmark. Figure 14 shows the portfolio performance vs. the benchmark.

Figure 14: Active return – long-only large-cap growth portfolio

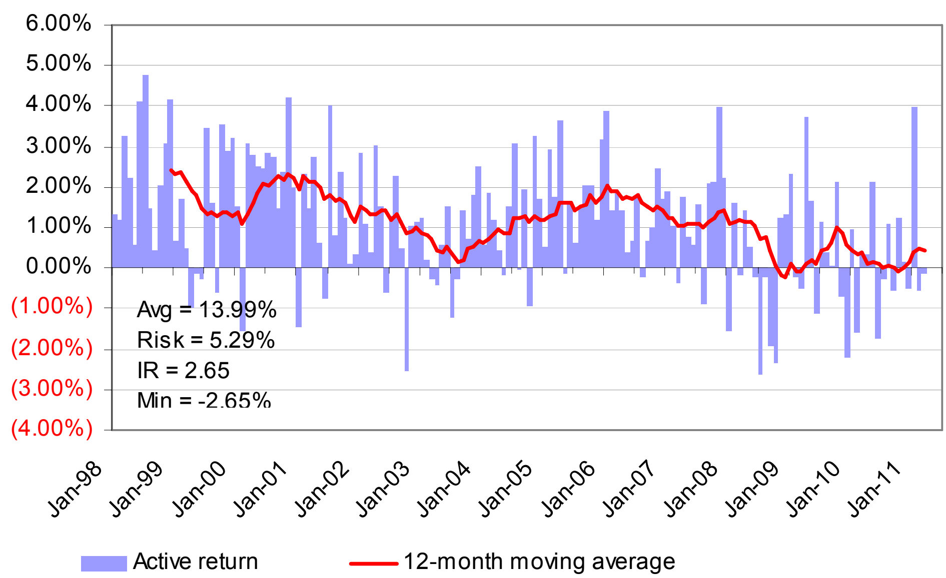


Source: Axioma, Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Long-only small-cap portfolio

For the small-cap long-only portfolio, we try to maximize expected return with about 5% realized tracking error, using Russell 2000 as the benchmark. Figure 15 shows the portfolio performance vs. the benchmark.

Figure 15: Active return – long-only small-cap portfolio

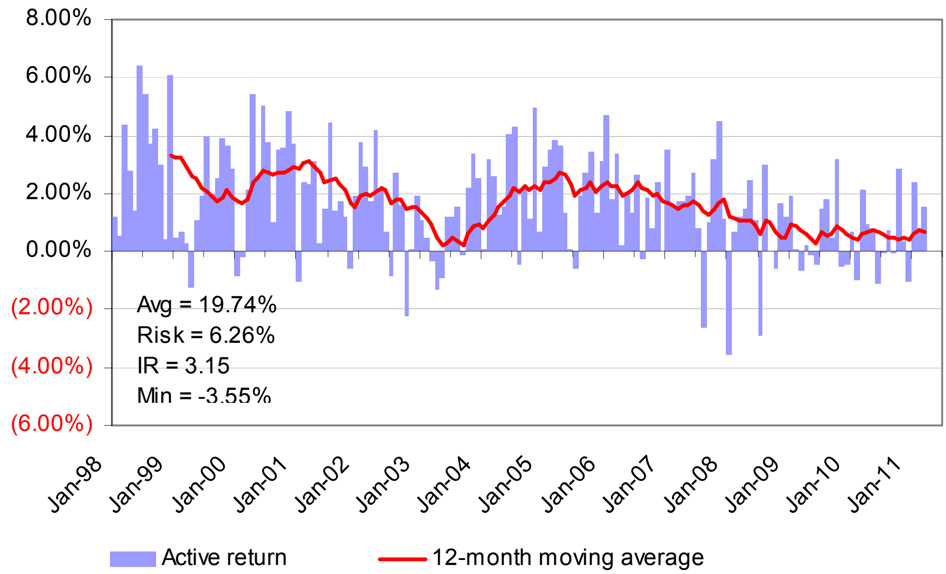


Source: Axioma, Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Long/short market-neutral portfolio

For the long/short market neutral portfolio, we try to maximize expected return with about 6% realized volatility. Figure 16 shows the portfolio performance.

Figure 16: Active return – long/short marketing neutral portfolio



Source: Axioma, Compustat, IBES, Russell, S&P, Thomson Reuters, Deutsche Bank

Please note that with each of the model portfolios, past performance is no guarantee of future results. Calculations include transaction costs. Additional information is available on request.

Appendix – Deutsche Bank US/Global Quant Research Library

Deutsche Bank's US/Global quantitative strategy team produces one monthly newsletter, *Quantum*, and five monthly research series: 1) *Signal Processing* on alpha factors; 2) *QCD Model* on stock-selection models; 3) *Portfolios Under Construction* on risk and portfolio construction; 4) *Academic Insights* on academic research; and 5) *Canada Quant*.

All our research is distributed from DBEQS.Americas@db.com. Please contact us to be added to our research distribution list.

Quantum

Quantum is our monthly newsletter. The aim of Quantum is to make it easier for clients to keep track of all the research we publish, and to serve as a forum to highlight the latest news and thinking in the quant investing world. If you only read one email from us every month, make it *Quantum*.

- **Quantum** (March 31, 2011)
- **Quantum** (February 28, 2011)
- **Quantum** (January 27, 2011)
- **Quantum** (November 29, 2010)
- **Quantum** (October 28, 2010)
- **Quantum** (September 20, 2010)

Signal Processing

This is our flagship monthly alpha signal research series. We try to identify new data sources, build new and innovative factors, and investigate various style rotation models.

- **Oil Shock: A Quant Perspective** (March 25, 2011). Once again the price of oil is caught up in a nexus of political and economic uncertainty. In this report we develop a better way to measure a stock's sensitivity to oil price movements. The enhanced oil beta that we develop is less backwards-looking than the traditional regression beta, and does a better job at capturing future oil price sensitivity.
- **The Long and the Short of It** (January 18, 2011). We use the DataExplorers securities lending database to develop new alpha signals based on stock lending and borrowing data. We show that we can combine these signals into a composite factor that works well in forecasting month-ahead stock returns. We also develop a way to adjust the factor scores for shorting costs, which helps steer the factor towards less costly names on the short side.
- **Frequency Arbitrage** (November 10, 2010). We try to bridge the gap between high and low frequency quant, and find that factors derived from high frequency data do have predictive power even for "traditional", lower-frequency quant investors.

- **Style Rotation** (September 7, 2010). We investigate three potential data sources to predict style factor performance: macroeconomic, capital market, and seasonal patterns. We find most academic research using economic variables in style timing suffers significant look-ahead bias. We test ten style prediction models, ranging from simple averages (assuming no style timing ability), linear regression, robust regression, Markov-switching, state-space, to nonlinear *TREE*, *FOREST*, and *PLANET* techniques. We find style rotation strategies can exhibit significant timing ability, which translates into better portfolio performance. Indeed, the multi-factor model built on style rotation strategies outperforms the naïve model (assuming no style rotation) by 54% in IR in the past 10 years. In the past three years, style rotation boosts IR by 1.30.
- **Beyond the Headlines** (July 19, 2010). In this research, we study text mining and natural language processing (NLP) in stock selection. We use three nonlinear model techniques (*TREE*, *FOREST*, and *PLANET*) to analyze news sentiment data and find signals can be used in both high and low frequency strategies.
- **Industry-Specific Factors** (June 7, 2010). Industry-specific data and factors like loan loss provision, same store sales growth, or break-even load factor have better predicative power than traditional/generic factors. We study 164 industry-specific factors in 12 industries. We found adding industry-specific factors to traditional multi-factor models can enhance model IC and portfolio IR.
- **The Options Issue** (May 12, 2010). We find options market tends to lead equity market. We find four signals from the options market have significant predictive power in forecasting month-ahead stock returns.
- **Launching US Quantitative Strategy** (April 12, 2010). We study three factors: 1) decomposing value factors – valuation ratios can be decomposed into a trend component (persistent) and cyclical component – both can be used to enhance value factor performance; 2) accruals and earnings quality – a small scaling adjustment can make a big difference; 3) market friction and price delay.

QCD Model

QCD is our flagship stock-selection model and illustrates our philosophy for picking stocks quantitatively. The model is updated every month, and is accompanied by an interactive spreadsheet.

- **DB Quant Handbook** (July 22, 2010). QCD is our main stock-selection model with a few unique features: factors are dynamically re-selected every month based on pre-determined algorithms; a nonlinear *TREE* model is combined with a linear panel data econometric model; and style rotation and industry timing models are incorporated in the bottom-up stock-selection model.
- **QCD Model Update** (March 9, 2011)
- **QCD Model Update** (February 7, 2011)
- **QCD Model Update** (January 6, 2011)
- **QCD Model Update** (December 6, 2010)
- **QCD Model Update** (November 2, 2010)
- **QCD Model Update** (October 6, 2010)
- **QCD Model Update** (September 8, 2010)
- **QCD Model Update** (August 6, 2010)

Portfolios Under Construction

In this series, we study various issues related to risk modeling and portfolio construction.

- **Minimum Variance: Exposing the "Magic"** (February 9, 2011). There are some nice properties for minimum variance portfolios, i.e., higher IR than the market portfolios, low turnover, and low correlation with traditional strategies. However, we find MVP is not necessarily a low-risk strategy. In the end, we propose a slight and simple enhancement to the strategy, which significantly improves MVP IR without increasing its risk. We also demonstrate that we can combine the MVP strategy with other active alpha models.
- **Robust Factor Models** (January 24, 2011). Traditionally, managers focus on selecting factors, while using the sample factor covariance matrix in constructing multifactor models. We compare the performance of the sample factor covariance matrix with 12 structured models (constant correlation, single index, four Bayesian shrinkage estimators, and six multivariate GARCH models). Our backtesting suggests that robust factor models incorporating structured covariance matrices improve portfolio IR significantly.
- **Correlation and Opportunity** (December 3, 2010). We find that stock return correlation has a long-term cyclical component that is linked to economic cycles. Negative economic sentiment is linked to increasing correlation.
- **Factor Neutralization and Beyond** (September 21, 2010). We expand our previous factor neutralization for the US market to Europe and find similar evidence. Many alpha factors have significant exposures to volatility. Neutralizing volatility exposure can improve factor consistency.
- **It's all in the Timing** (August 19, 2010). We examine, using "perfect foresight" simulations, whether style-timing actually adds value above and beyond the additional turnover costs incurred. We also use a real-world example, our QCD model, and find style timing is difficult, but not impossible.
- **Volatility = 1/N** (June 16, 2010). Many alpha factors have significant exposures to volatility. Neutralizing volatility exposure can improve factor consistency.
- **Quantiles versus Mean Variance** (April 23, 2010). Comparing quantile portfolios with mean-variance optimization. Two extreme cases of constructing a portfolio – quantiling or mean-variance optimization – can we learn something from both sides?

Academic Insights

On a monthly basis, we compile a list of practical academic papers related to investing. Every third month we also delve deeper into the most interesting ideas by carrying out our own backtesting and analysis.

- **Academic Insights** (March 29, 2011).
- **Academic Insights** (February 25, 2011).
- **Academic Insights** (January 20, 2011).
- **Academic Insights** (November 23, 2010).
- **Academic Insights** (October 27, 2010). *Backtesting edition* – We explore an interesting academic finding that momentum works better for high volatility stocks and reversal works better for low volatility stocks. We suggest four potential ways to exploit this relationship.
- **Academic Insights** (September 27, 2010)
- **Academic Insights** (August 23, 2010)

- **Academic Insights** (July 22, 2010). *Backtesting edition* – We confirm an academic finding that gross profitability over total assets is a better measure of profitability than traditional metrics like ROE and ROA. Furthermore, we show that this ratio is useful for conditioning value factors.
- **Academic Insights** (June 16, 2010)
- **Academic Insights** (May 20, 2010)
- **Academic Insights** (April 16, 2010). *Backtesting edition* – We show how a concept called the "capital gains overhang" can be used to exploit a behavioural bias and enhance the earnings surprise factor.
- **Academic Insights** (March 15, 2010)
- **Academic Insights** (February 12, 2010)

Canada Quant

On a monthly basis, we publish quant strategies unique to the Canadian equity market.

- **The Illusion of M&A and Asset Expansion** (February 14, 2011). In this research piece, we test whether M&A activity and other asset expansion transactions actually lead to a subsequent increase in stock returns. Contrary to the common belief, we find that companies that increase and expand their asset base actually have a tendency underperform.
- **New Options in Canada** (November 23, 2010). In this research, we expand a previous US quant research and find factors based on options data (put/call ratio, options implied volatility, skew, relative volume, and put-call parity) are useful in predicting stock returns in Canada.
- **Introducing Canada Quantitative Strategy** (October 24, 2010). Quant investing in Canada used to be easy – all you needed was price momentum and earnings revision. In the past three years, however, as more and more quant investors outside of Canada start to diversify into less crowded markets like Canada, the performance of traditional factors has dropped severely. In this research, we suggest two potential ways to add alpha in Canada in this challenging environment – identifying new and less crowded factors; and style rotation.

Appendix 1

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