Quant Signals: Performance and Promising Ideas

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Outline

- Traditional Signals – Recent performance
  - Price momentum and Earnings momentum
  - Sell-side Analysts' recommendation
  - Valuation ratios: Book-to-market and Cash-flow to price
- Lessons from 2009
- Promising Ideas
  - Exploit Deviation from fundamentals
  - Combine Momentum with fundamentals
  - Exploit biases in analysts' forecasts

Price Momentum

- Sample:
  - US stocks
  - Exclude stocks priced < $5
  - Exclude stocks with market cap in the 20th percentile of NYSE stocks
- Strategy
  - Ranks stocks based on returns in months t-12 to t-1
  - Buy Winner decile – sell loser decile. Hold for month t.

Performance : Momentum (-12 to -2)

	1990-2009	1990-1999	2000-2008	2009
Mean (% P.A.)	14.7	25.2	13.9	-83.7
SD (% P.A.)	29.2	18.8	34.8	
Sharpe Ratio	.50	1.34	.40	

What was different about 2009?

- Beta (winner minus loser portfolio)
  - 1990-2008 : -.01
  - 2009 : -.65
  - Losers were high beta stocks that were beaten down with the market
- Beta neutral portfolio increases Sharpe ratio by 10%
- Reduces 2009 loss from 83% to 63%

Valuation Ratio

- Cash flow to price: Ratio of previous 12 month cash flow to recent price
  - CF-to-Price (winner minus loser portfolio)
    - 1990-2008 : -3.9%
    - 2009 : -13.8%
    - Losers were priced cheaply in 2009 – On average CF-to-Price for Losers was 22.5% in 2009; Losers beaten down a lot more than justified by cash flows.

$$\text{Momentum profit (\%)} = 2.48 + .29 \times \text{CF-to-P difference (\%)}$$

$$(t - stat = 2.64)$$

Sell-Side Analysts' Recommendations for Past Winners and Losers

	Winners	Losers
1994-2008	2.4	2.0
2009	2.5	2.3

Some Lessons

- Momentum strategies are highly volatile because of a low correlation between winners and losers
- Any strategy based on technical signals should also pay attention to fundamentals and valuation

Earnings Momentum

- Many variations of earnings momentum strategy have been proposed in the literature; e.g. Analyst forecast revision, Standardized Unexpected Earnings etc.
- Preferred Measure:

$$\text{Earnings Surprise} = \frac{\text{Actual} - \text{Consensus Forecast the Previous Month}}{\text{Std.Dev of Analysts' Forecast}}$$

Performance : Earnings Momentum

	1990-2009	1990-1999	2000-2008	2009
Mean (% P.A.)	10.6	14.1	9.6	-18.8
SD (% P.A.)	7.8	5.7	8.7	
Sharpe Ratio	1.3	2.4	1.1	

Why is the risk of the earnings momentum strategy so much lower?

Characteristics in 2009

- Beta (Positive minus negative surprise portfolio)
  - 1990-2008 : -.13
  - 2009 : -.14
  - Beta not very different in 2009
- Yet, beta neutral portfolio increases Sharpe ratio by 10%
- Reduces 2009 loss from 19% to 10%

Valuation Ratio

- Cash flow to price: Ratio of previous 12 month cash flow to recent price
  - CF-to-Price (Positive minus negative surprise portfolio)
    - 1990-2008 : .5%
    - 2009 : -1.2%

$$\text{Earnings Mom profit (\%)} = .8 + .19 \times \text{CF-to-P difference (\%)}$$
$$(t - stat = 2.26)$$

Sell-Side Analysts' Recommendations

- Buy positive Fraction up and sell negative over the previous month
- Hold for one month

$$\text{Fraction up} = \frac{\#\text{ of upgrades} - \#\text{ of downgrades}}{\#\text{ of upgrades} + \#\text{ of downgrades}}$$

Performance : Upgrades minus Downgrades

	1994-2009	1994-1999	2000-2008	2009
Mean (% P.A.)	4.5	7.9	1.9	6.9
SD (% P.A.)	5.8	4.2	6.4	
Sharpe Ratio	.78	1.88	.30	

Valuation Ratios

- Book-to-Price
- Cash Flow-to-Price
- Earnings-to-price – not as effective as cash flow to price

Performance: Book-to-price

	1990-2009	1990-1999	2000-2008	2009
Mean (% P.A.)	2.1	-5.1	7.4	33.6
SD (% P.A.)	22.7	16.7	27.1	
Sharpe Ratio	.09	-.3	.27	

Characteristics: 2009

- Beta (value minus growth portfolio)
  - 1990-2008 : -.36
  - 2009 : .34
- Beta neutral portfolio increases Sharpe ratio from .09 to .28

Valuation Ratio

- Cash flow to price: Ratio of previous 12 month cash flow to recent price
  - CF-to-Price (value minus growth portfolio)
    - 1990-2008 : 14%
    - 2009 : 20%

$$\text{Value minus Growth}(\%) = -1.4 + .11 \times \text{CF-to-P difference } (\%)$$
$$(t-stat = 1.15)$$

Performance: CF-to-price

	1990-2009	1990-1999	2000-2008	2009
Mean (% P.A.)	15.4	10.4	19.8	35.6
SD (% P.A.)	22.9	15.9	28.1	
Sharpe Ratio	.67	.65	.71	

Characteristics: 2009

- Beta
  - 1990-2008 : -.57
  - 2009 : .45
- Beta neutral portfolio increases Sharpe ratio from .67 to .96

Valuation Ratio

- Cash flow to price: Ratio of previous 12 month cash flow to recent price
  - CF-to-Price (high minus low portfolio)
    - 1990-2008 : 31%
    - 2009 : 42%

$$\text{Value minus Growth(\%)} = -.59 + .6 \times \text{CF-to-P difference (\%)}$$

$$(t - stat = .99)$$

Correlation

	Price Momentum	Earnings Momentum	Book-to-price
Earnings Momentum	.53		
Book-to-price	-.72	-.21	
CF-to-Price	-.41	.02	.82

Recent Ideas

- Examine divergence between past returns and changes in fundamentals (Dha et al., 2010, "Decomposing the Short-Term Return Reversal")
- Buy winners with strong fundamentals and sell losers with weak fundamentals (Lee and Shih, 2010, "Technical, Fundamental, and Combined Information for Separating Winners from Losers")
- Exploit biases in analysts' forecasts (Green et al., 2010, "Inferring Investor Sentiment From Analyst Forecasts")

Past Returns and Changes in Fundamentals

- One-month change in fundamental value: Present value of changes in cash flows implied by changes in analysts' one- and two-year ahead earnings forecast and long term growth (Earnings growth rate assumed to linearly decline from the LTG forecast to steady state over years +5 to +10)

- Sort stocks based on previous month returns minus change in fundamental value (Diff)
  - High Diff indicates returns too high to be justified by changes in fundamentals and Low DIFF indicates returns too low relative to change in fundamentals.
  - Low Diff portfolios should outperform high Diff portfolio

Strategy

- Short-Horizon Return reversals:
  - Buy Decile of stocks with the lowest return in the previous month and sell the highest return stocks (Jegadeesh, JF 1990)
- Diff Reversal
  - Buy Decile of stocks with the smallest (or negative) Diff in the previous month and sell the highest Diff stocks

Performance: Reversal and Diff (1982-2008)

	Reversal	Diff
Mean (% P.A.)	8.0	18.9
SD (% P.A.)	14.5	9.3
Sharpe Ratio	.56	2.1

Second month profit for Diff strategy is 3.6%

Momentum and fundamentals

- Lee and Shih (2010)
  - 12-month momentum
  - Covariance between returns and abnormal trading volume of the previous 12-months (Intuition – larger the covariance, larger is the informed trading)
  - Fundamentals based on Financial statements
    - F-Score for value firms (Piotroski, JAE, 2000)
    - G-Score for growth firms (Mohanram, RAS 2005)

Piotroski (JAE, 2000): F-score

- Sum of the following indicator variables
  - 1 if ROA>0; 0 otherwise
  - 1 if cash flow > 0
  - 1 if change in ROA>1
  - 1 if accrual (Earnings-Cash flow)<0
  - 1 if change in leverage <0
  - 1 if change in current ratio >0
  - 1 if No new equity issue in the last 12 months
  - 1 if year-over-year increase in gross margin
  - 1 if year-over-year increase in asset turnover

- Large F-Score indicates strong and improving fundamentals
- F-Scores predict returns for value firms (quintile of firms with largest book-to-price ratio) High score minus low score portfolio earns about 10% per year over the sample period 1976-1996

G-Score (Mohanram, RAS 2005)

- Sum of the following indicator variables
  - 1 of ROA greater than median ROA for growth firms in the same industry; and 0 otherwise
  - 1 of Cash Flow ROA greater than industry median
  - 1 if cash flow > earnings (negative accruals)
  - 1 if earnings variability is less than industry median
  - 1 if sales growth variability is less than industry median
  - 1 if R&D/assets greater than industry median
  - 1 if Capex/assets
  - 1 if advertisement/sales greater than industry median
- Large G-Score indicates better fundamentals than industry peers
- G-Scores predict returns for Growth firms (quintile of firms with smallest book-to-price ratio)
- High score minus low score portfolio earns about 18% per year over the sample period 1978-2001

Performance (1982-2007)

Signals	Growth	Value
Momentum Quintiles (-6 to -2) (winner – Loser)	.91%	.60%
Momentum + Cov (unexpected Vol., ret)	.84%	.91%
Momentum + Cov (unexpected Vol., ret) +G-Score/F-Score	3.3%	1.78%

Abnormal returns persist for up to 6 months

Strategy to directly exploit biases in analysts’ expectations

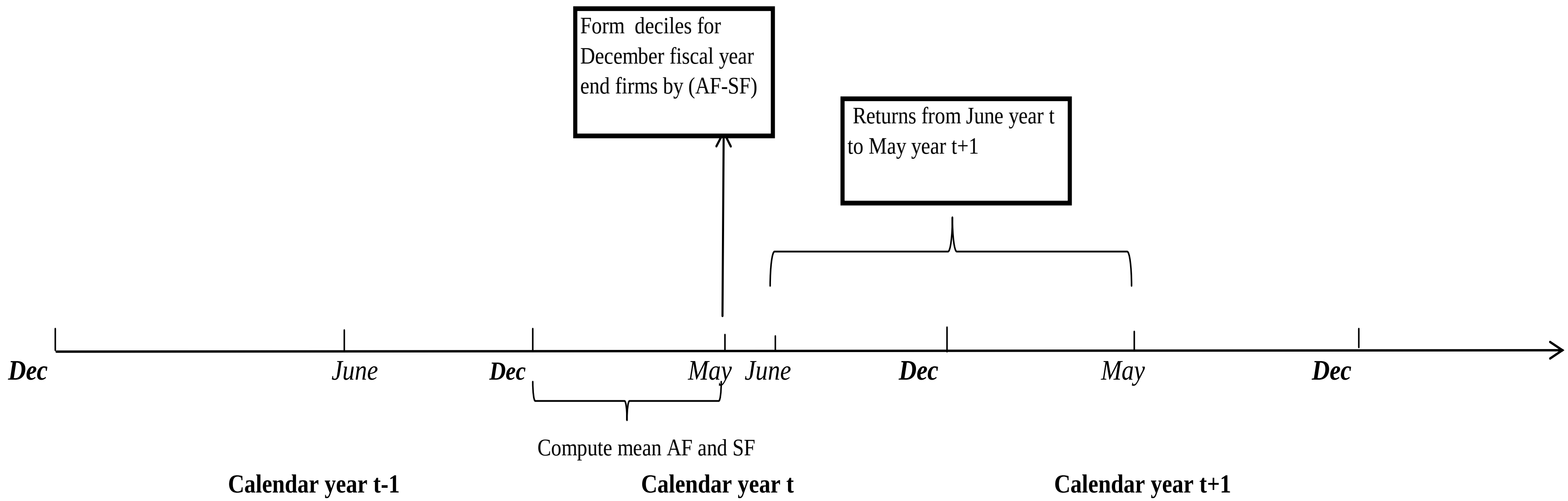
- Numerous papers document that analysts’ earnings forecasts are biased
- It is likely that stock for which analysts are most favorably biased are overpriced and stocks for which analysts are most unfavorably biased are underpriced
- How would we identify analyst biases?
- Green et al. (2010, Emory) measure bias as Analysts’ forecasts minus Statistical Forecast soon after earnings announcements and construct a trading strategy

Statistical Forecasts

- Estimate statistical forecast for year-ahead EPS using the following independent variables soon after fourth quarter earnings announcements for December year-end firms:
  - Past annual EPS
  - F-Score
  - Accrual
  - Earnings Volatility

$$EPS_{t+1} = 0.145 + 0.719 * EPS_t + 0.0126 * F\_SCORE_t + 0.3304 * ACCRUALS_t - 0.022 * \sigma(Earnings_{t/t-4}) * EPS_t$$

Timing



Error=Analysts Forecast - Statistical forecast

Analysts consensus forecasts measured as the average of the first forecast by each analyst after earnings announcement

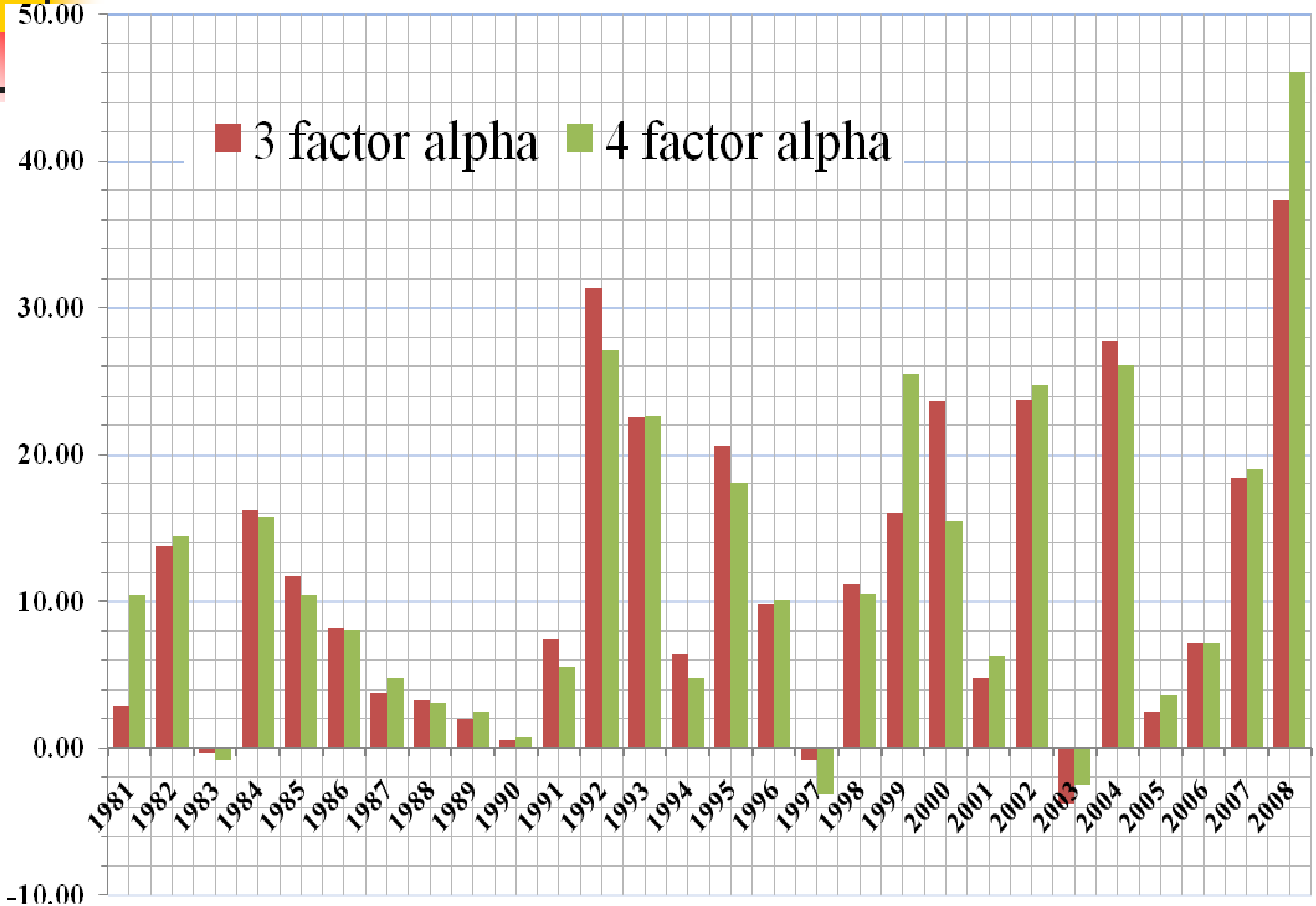
Performance: Subperiods

Subperiods, Portfolio (AF-SF) ranking

	D1 (Low AF-SF)	D2	D3	D4	D5	D6	D7	D8	D9	D10 (High AF-SF)	D1-D10
PanelA: 3 factor alpha											
1981-1987	0.47**	0.47***	0.66***	0.44**	0.42***	0.36	0.05	0.04	0.01	-0.20	0.67***
t-stat	(2.65)	(4.25)	(4.10)	(2.60)	(3.85)	(1.67)	(0.22)	(0.47)	(0.07)	(-0.83)	(3.44)
1988-1994	0.49	0.46	0.52	0.33	0.24	0.03	-0.06	-0.23	(0.11)	-0.39	0.88*
t-stat	(1.63)	(3.47)	(6.30)	(2.26)	(1.66)	(0.31)	(-0.34)	(-1.71)	(0.67)	(-1.92)	(2.36)
1995-2001	0.31	0.49	0.21	0.01	0.01	0.01	-0.02	-0.28*	-0.34	-0.71***	1.01***
t-stat	(1.11)	(1.85)	(1.41)	(0.06)	(0.06)	(0.05)	(-0.07)	(-2.19)	(-1.81)	(-6.47)	(3.72)
2002-2008	1.02***	0.37	0.36	0.77***	0.45	0.16	0.12	0.12	-0.18	-0.33	1.35***
t-stat	(2.93)	(1.75)	(1.38)	(3.62)	(1.82)	(1.24)	(1.01)	(0.99)	(-0.92)	(-1.35)	(2.89)

- Raw return difference is of the same magnitude as 3-factor alpha
- Average return for 1981 to 2008: 12%
- Sharpe Ratio: 1.17

Annual Returns



Exploiting Analysts’ Biases

- Profits increase over time; investors seem more focused on analysts’ forecasts in recent periods
- Strategy could be improved when complimented with momentum and fundamental signals

Conclusion

- Performance of momentum strategies weaker over the last decade compared with the ’90s
- Performance of Value strategies stronger over the last decade compared with the ’90s
- Value and momentum strategies are negatively correlated
- More money likely chasing momentum after the strong performance in the ’90s and the poor performance of value strategies
- Important to pay attention to valuation even when applying momentum strategies

Conclusion

- Evidence on some strategies that combine past returns with measures of valuation is promising
  - Short and intermediate horizon strategies
- Biases in analysts' earnings forecasts lead to mispricing
  - Longer horizon strategies
- More precise estimates of forecast biases coupled with momentum and fundamental signals could lead to improved strategies