Quant Concepts

The Search for Alpha

Australian Quantitative Analysis

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See page 89 for analyst certification and important disclosures, including non-US analyst disclosures.

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The Search for Alpha Abstracts

Paper 1. The 52-Week High and Momentum Investing *Page 5*

This paper tests whether stocks' proximity to their 52-week high has explanatory power for future returns. A stock that is near (or far) from its 52-week high is one for which good news (bad news) has recently arrived. This may be the time that investors react to news, so profits from momentum investing may be at their highest. We concur with T.George and C-Y Hwang (2004), who find ***"the 52-week high is a better predictor of future returns than are past returns".*** Furthermore we find that much of the ***incremental power*** relative to 'fixed length' momentum metrics ***comes from the short/underweight portfolio*** (weak momentum).

This paper draws on T. George and C-Y Hwang, "The 52-Week High and Momentum Investing", *Journal of Finance,* Volume 59, No 5**,** pp 2145-2176, October 2004.

Paper 2: Information Uncertainty and Behavioural Bias *Page 17*

This paper uses proxies for Information Uncertainty to attempt to improve the strength of 'news' based signals. Greater uncertainty leaves more room for psychological bias. Our tests suggest investors punish bad news more harshly for firms with high 'Information Uncertainty'. We find Information Uncertainty adjusted Price Momentum and Earnings Momentum strategies are stronger and more statistically significant than standard Price Momentum and Earnings Momentum strategies.

This paper draws on X. Frank Zhang, "Information Uncertainty and Stock Returns", Journal of Finance, Volume 61 No1, pp 105-139, February 2006.

Paper 3: Combining Fundamental Scorecards *Page 37*

We create a 'Fundamental Scorecard' from a selection of balance sheet ratios. The components come from the 2000 Piotroski paper, *'Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers'* and Mohanram's 2004 *'Separating Winners from Losers Among Low Book-to-Market Stocks using Financial Statement Analysis'*.

The paper uses a selection of ratios from the Balance Sheet and Income Statement to create a signal with very low turnover. The Scorecard works particularly well independently of other models.

We replaced the JPQ Health Score with this Fundamental Scorecard in our monthly paper portfolio. The revised model performs better in the near term, yet lags the standard model in the longer term (though still ahead of the benchmark).

The source papers, reviewed in the finals section of this Quant Concepts Edition, are;

Partha Mohanram, *'Separating Winners from Losers Among Low Book-to-Market Stocks using Financial Statement Analysis'*, Review of Accounting Studies (10), 2005, 133-170.

Joseph Piotroski, *'Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers'*, Journal of Accounting Research, Vol 38, Supplement 2000, 1- 41.

Paper 4: Recommendations Analysed *Page 50*

We investigated if Analysts' Buy/Sell Recommendations in Australia had merit stand-alone strategy, and if we could use Recommendations to improve existing quantitative signals. We felt analysts could provide guidance in the choice between value and value-for-reason stocks, and filter an Earning Revisions signals.

We find there is value in c*hanges* in Analyst Buy/Sell Recommendations. This value is best captured when Changes in Analysts Buy/Sell Recommendations act as a confirmation or filter of other signals.

Quantitative managers may find signal strength is improved if Analyst Buy/Sell Recommendations are used as a sort or filter on an existing signal.

The paper was based on Jegadeesh, N., Kim, J., Krische, S., and Lee, C., June 2004, Analyzing the Analysts: When do Recommendations Add Value?, *Journal of Finance* 59, 1083-1124

Paper 5: The Effect of Imputation *Page 64*

This paper is a reference document that builds upon the 2 March 2006 edition of Quant Concepts, where we introduced the Gross Accumulation Index series ("Grossing up the Index").

Importantly, we compare factor tests across a broad suite of factors on both a Net and Gross return basis. We present tables which contain a Factor Summary quantifying the effect of imputation credits on the returns of a suite of factors. We also provide a Complete Factor Analysis as an appendix. We find ***funds management would be more Value orientated if imputation credits were measured***

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Paper 1

The 52-Week High and Momentum Investing

Executive Summary

- This paper tests whether stocks' proximity to their 52-week high has explanatory power for future returns.

- A stock that is near (or far) from its 52-week high is one for which good news (bad news) has recently arrived. This may be the time that investors react to news, so profits from momentum investing may be at their highest.

- T.George and C-Y Hwang (2004) find ***"the 52-week high is a better predictor of future returns than are past returns".***

  Our results support this conclusion**.** Furthermore we find that much of the ***incremental power*** relative to 'fixed length' momentum metrics ***comes from the short/underweight portfolio*** (weak momentum).

  This suggests the ***dynamically referenced starting point*** (the time that a stock was at its 52-Week High) is the key addition to the factor. We believe that ***standard momentum theory is still at play*** – under reaction in the short term, over reaction in the long term.

- The ***anchor and adjust*** argument of the literature may be true for stocks near their 52-Week High, however while strong, the new signal is marginally weaker than fixed length return metrics in differentiating among the strong momentum.

This paper draws on T. George and C-Y Hwang, "The 52-Week High and Momentum Investing", *Journal of Finance*, Volume 59, No 5**,** pp 2145-2176, October 2004. The article is summarized in the Literature Review section of this edition of Quant Concepts.

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Introduction

This paper tests whether stocks' proximity to their 52-week high has predictive ability for forward returns.

Momentum theories suggest that the market under reacts in the short term, over reacts in the long term.

"A stock whose price is close to its 52-week high is one for which good news has recently arrived, suggesting that subsequent returns to momentum may be at their highest."

T. George and C-Y Hwang in 'The 52-Week High and Momentum Investing' conclude 'an explanation of behaviour consistent with the results is that Traders use the 52-week high as a reference point against which they evaluate the potential impact of news. When good news has pushed a stock's price near or to its 52-Week High, Traders are reluctant to bid the price of the stock higher even if the information warrants it. …..

Similarly, when bad news pushes a stock's price far from its 52-Week High, traders are initially unwilling to sell the stock at prices that are as low as the information implies.'

The information eventually prevails, and the price either rises (for good news) or falls in the case of bad news. What we expect is that **stocks close to their 52-week high will continue to rise, whereas stocks far away from their 52-week high continue to fall.**

The results suggest the market is not weak-form efficient and **this factor is dominant over metrics of price momentum based on past returns,** which George and Hwang attribute to an anchor and adjust bias.

In what follows we investigate and compare the explanatory power of different momentum metrics against the 52-week high momentum measure.

This paper draws on T. George and C-Y Hwang, "The 52-Week High and Momentum Investing", Journal of Finance, Volume 59, No 5**,** pp 2145-2176, October 2004. The article is summarized in the Literature Review section of this paper.

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Methodology

We ran univariate backtests on monthly data from 31/12/1995 to 31/12/2005. The universe tested was the ASX 200**.**

52-Week High Momentum– Stand Alone Strategy

- We created daily accumulation return indices for stocks
- The '52-week high ratio' is the ratio of the current accumulation return index for a stock relative to the end of day maximum value reached over the previous twelve months.
- Quintiles for the 52-week high ratio were created according to the descending 52-week high ratio.

Note that we are not using the published Close Prices (or intra day price Highs) as reference for the '52-week high' reached. It is the high of a daily *accumulation return index* of a stock.

The timing of a 52-week high is essentially the same under a Close Price or Index Level high definition. The advantage of using a return index is that it easily factors in dividends and corporate actions such as stock splits, the downside is that one can argue that some of the psychological grounding behind the anchor and adjust bias may be diluted. The difference between the two we would expect to be marginal.

The 52-Week High Momentum - Family

- We calculated time series of ICs and optimized the weights of the following 'Momentum Family' components:

  - 52 Week High Ratio (standardized)
  - Average of 1, 3, 6 and 12 month returns
  - The True Market Surprise (decayed)
  - Price Acceleration

We then combined the normalized inputs according to the optimized weights and created a new 52-week high Momentum Family factor.

Alternative Momentum Measures

We undertook univariate backtests for other momentum metrics to provide reference points for comparison to the 52-week high momentum measure. These include:

- 52-Week Low Ratio
- 1 month past return
- 3 month past return
- 6 month past return
- 12 month past return
- Arithmetic average of 1, 3, 6 and 12 month past returns
- Barra Momentum
- 52 Week-High Family
- JPQ Price Momentum Family

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Results

Stand Alone Momentum Factors

Over the test period the average IC for the 52 Week-High Ratio is **10.2%.** This ***IC is stronger than all other return based momentum factors tested***, with 6 month past return being the second best performer on this basis with an IC of 9.4%.

On a ***long-short basis***, the 52-Week High strategy ranks third amongst the strategies tested, returning an average of ***2.6% per month***

The ***hit rate is a respectable 67%,*** which is in the middle of the range for the momentum strategies tested, whose hit-rates ranged from 61% to 73%.

Turnover is another important factor to consider when evaluating factors. While a univariate backtest does not reflect interaction with other signals in a portfolio setting, it is a reasonable starting point. Univariate turnover for the momentum strategies ranges from 15% per month (average of 1, 3, 6 and 12 months as the factor), to 75% for one month return. ***Turnover for the 52-Week high measure is 35% per month***.

Momentum Family Results

Probably most interesting is what happened when we included the 52-week high in our momentum family.

- ***The IC of the family improved form 8.8% to 10.7%,*** the ***hit rate*** stayed reasonably ***constant at 70%***
- Turnover increased from 25% pm to 29% pm.

The return to the top quintile was 1.9% p.m for the Standard Price Momentum family, and this fell to 1.7% for the 52 Week High Family. So the top performing quintile performs slightly better using an optimized return based momentum metric. However, the return to P5, which was a respectable -0.5% using the return based momentum metric, fell to -1.0% using the 52 Week High Ratio family. This suggests that ***much of the improved power of the 52 Week High family factor comes from the poor performance of P5 –*** its ability to differentiate among the losers better than fixed return metrics.

In Figure 1: Momentum Measure Univariate Backtest Summary we show that on a stand-alone basis, the IC of the 52-Week High Momentum Ratio had greater predictive power for forward returns than did fixed return based metrics over the test period.

Figure 4: Momentum Measures Correlation of Information Coefficients, shows that the 52-Week high ratio has a close correlation (0.89) with the IC produced by a factor constructed from the average of 1, 3, 6 and 12 month returns. Correlations of ICs range between 60% and 89%.

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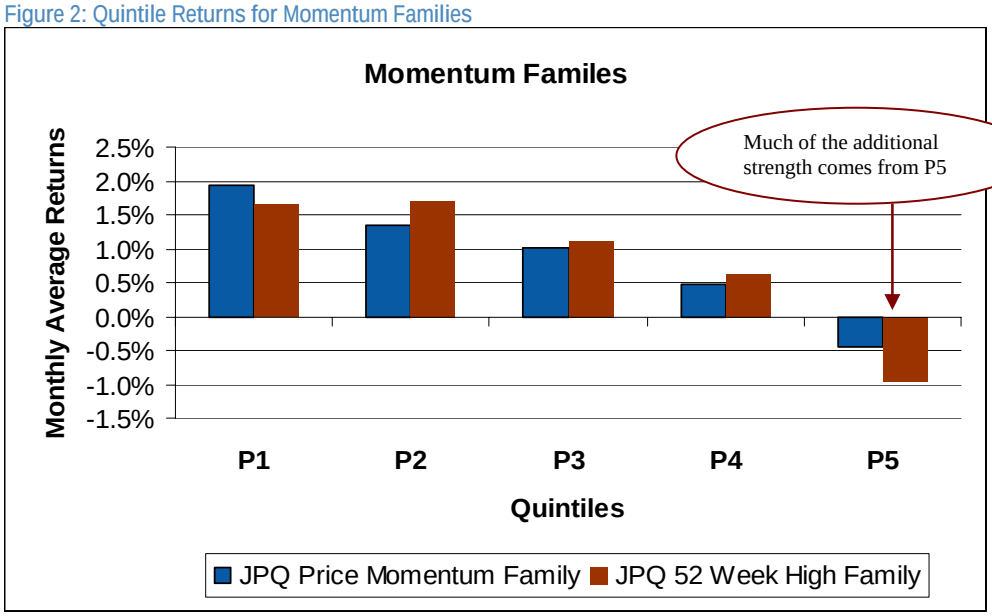
In Figure 5 and Figure 6 we present correlation of the 52-week high measure with Earnings Measures and Value Measures. The correlation with Earnings metrics is in the order of 60%. The correlation with Value metrics is in the order of -20% to -40%.

Figure 1: Momentum Measure Univariate Backtest Summary

					Average Monthly Returns for Portfolios Px					
Description	Avg IC	T-Stat	Hit Rate	Turn Over	P1 - P5	P1	P2	P3	P4	P5
Stand Alone Metrics										
52WeekHighRatio	10.2%	4.14	67%	35%	2.6%	1.6%	1.6%	1.2%	0.9%	-1.0%
52WeekLowRatio	4.6%	3.43	64%	31%	1.3%	1.6%	1.2%	0.6%	0.5%	0.3%
Price Momentum - avg (1,3,6,12)	8.8%	4.48	73%	15%	2.4%	1.9%	1.4%	0.9%	0.5%	-0.5%
BARRA B3 Momentum	7.7%	3.82	67%	18%	2.0%	1.7%	1.2%	1.0%	0.7%	-0.3%
1 month Price Momentum	3.5%	2.36	61%	75%	1.0%	1.1%	1.0%	1.2%	0.9%	0.1%
3 month Price Momentum	8.4%	4.69	66%	42%	2.5%	1.9%	1.4%	0.9%	0.7%	-0.6%
6 month Price Momentum	9.4%	4.82	69%	28%	2.8%	2.0%	1.2%	1.2%	0.6%	-0.8%
12 month Price Momentum	8.9%	4.79	69%	20%	2.7%	1.9%	1.3%	1.1%	0.7%	-0.8%
Optimized Families										
JPQ Price Momentum Family	8.8%	5.40	70%	27%	2.4%	1.9%	1.3%	1.0%	0.5%	-0.5%
JPQ 52 Week High Family	10.7%	4.53	71%	29%	2.6%	1.7%	1.7%	1.1%	0.6%	-1.0%

source: JPMoran

Figure 2: Quintile Returns for Momentum Families



source: J.P. Morgan

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Figure 3: Quintile Statistics @ 30 September 2006

Quintile	Avg High ratio	Avg Momentum Measure*	Avg Rank (High Ratio)	Avg Rank (Momentum Measure)
1	1.00	16.9%	12	54
2	0.98	15.7%	61	65
3	0.95	6.9%	101	104
4	0.87	4.4%	141	128
5	0.72	-3.4%	181	151

*The 'Momentum Measure' is the Average of 1, 3, 6 and 12 Month returns
source: J.P. Morgan

Figure 4: Momentum Measures Correlation of Information Coefficients

	52 Week High Ratio	*52 Week LowRatio*	*Avg (1,3,6,12)*	*Barra Momentum*	*1 mth*	*3 mth*	*6 mth*	*12 mth*	*52 Week High Family*	*Avg (1,3,6,12) Family*
52 Week High Ratio	100%	-12%	89%	77%	60%	82%	85%	74%	98%	87%
52 Week Low Ratio		100%	-2%	7%	-17%	-7%	-4%	13%	-10%	-3%
Avg (1,3,6,12)			100%	90%	47%	76%	86%	88%	89%	91%
Barra Momentum				100%	49%	78%	85%	97%	79%	84%
1 mth					100%	73%	65%	48%	61%	57%
3 mth						100%	91%	77%	84%	85%
6 mth							100%	85%	87%	92%
12 mth								100%	76%	84%
52 Week High Family									100%	90%
Avg (1,3,6,12) Family										100%

source: J.P. Morgan

Figure 5: Correlation of Information Coefficients with Value Measures

	52 Week High	*Value Family*	*Val rel GIC*	*Val rel Mkt*	*Val PE Grth*	*Val rel Hist*
52 Week High	100%					
Val Family	-19%	100%				
Val rel GIC	-19%	96%	100%			
Val rel Mkt	-7%	94%	86%	100%		
Val PE Grth	-23%	79%	74%	69%	100%	
Val rel Hist	-44%	50%	41%	35%	40%	-12%

source: J.P. Morgan

Figure 6: Correlation of Information Coefficients with Earnings Measures

	52 Week High	Emom Family	Earning mom	ER1mth	ER3Mth
52 Week High	100%				
Earnings Mom Family	56%	100%			
Earnings Mom	68%	87%	100%		
ER1mth	62%	74%	87%	100%	
ER3Mth	60%	75%	82%	67%	100%

source: J.P. Morgan

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Conclusion

George and Hwang (2004) find:

"profits to a momentum strategy based on the nearness to the 52-week high are superior to those where the arrival of news is measured by a return computed over a fixed-length interval in the past (eg. 6 months)"

Our univariate backtests support George and Hwang's conclusions. We tested a broad variety of popular momentum measures based on past returns, as well as the 52-Week High.

We find much of the incremental power of the 52-week high measure emanates from the 'short side,' or poor momentum stocks. This suggests to us that the dynamic starting point (the point in time that is the 52-Week High) that allows the portfolios to be responsive to drivers of stock returns.

We were able to significantly improve upon the Momentum Family results in a univariate backtest environment. The Information Coefficient of the 52-week high Momentum Family was 10.7%, compared to the standard JPQ Momentum Family IC of 8.8%. Turnover and hit rate statistics were largely unchanged. The new family weights were 60% 52-week high. 30% TMS, 10% Average of (1, 3, 6, 12) month return.

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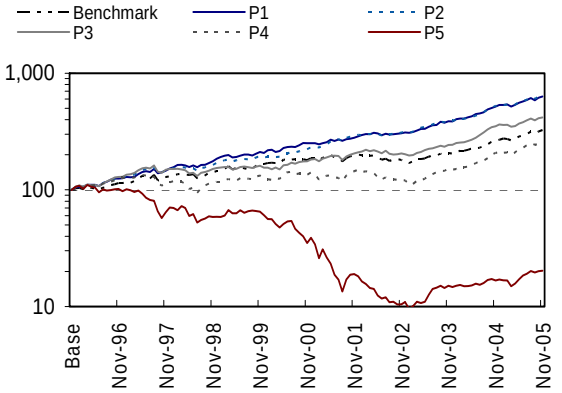
Appendix: Complete Individual Backtest Results

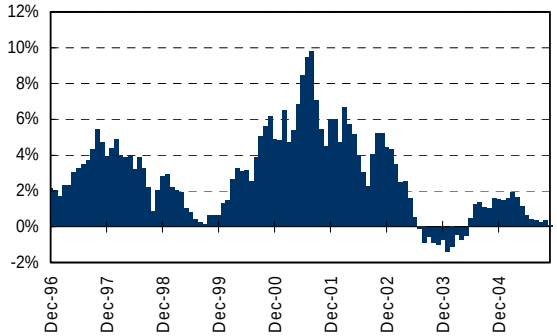
Factor: 52WeekHighRatio vs. ASX200
Factor Performance Statistics

3 Year(s): 31/12/1996 to 31/12/1999 Portfolio Statistics					3 Year(s): 31/12/1999 to 31/12/2002 Portfolio Statistics					3 Year(s): 31/12/2002 to 31/12/2005 Portfolio Statistics					Total Period: 31/12/1995 to 31/12/2005 Portfolio Statistics				
Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.
1	1.5%	18.9%	3%	72%	1	1.1%	13.0%	2%	67%	1	2.1%	27.4%	2%	47%	1	1.6%	20.2%	3%	60%
2	1.2%	15.3%	3%	67%	2	1.3%	16.6%	3%	81%	2	2.1%	28.4%	2%	53%	2	1.6%	20.6%	3%	65%
3	0.7%	7.6%	4%	53%	3	0.7%	8.4%	4%	72%	3	2.0%	26.6%	2%	61%	3	1.2%	15.3%	3%	63%
4	0.3%	1.8%	4%	25%	4	-0.1%	-2.8%	5%	44%	4	2.1%	28.0%	3%	56%	4	0.9%	9.8%	4%	43%
5	-1.0%	-13.7%	7%	33%	5	-4.3%	-44.2%	10%	19%	5	1.9%	23.0%	5%	33%	5	-1.0%	-14.4%	8%	28%
Long Short Strategy Statistics Portfolio 1 less Portfolio 5					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**				
	Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.
Long/Shor	2.5%	31.6%	6%	**64%**	Long/Shor	5.3%	76.8%	9%	**78%**	Long/Short	0.2%	1.5%	4%	**58%**	Long/Short	2.6%	31.9%	7%	**67%**
T-Stat					**T-Stat**					**T-Stat**					**T-Stat**				
Long/Shor	**2.54**				Long/Shor	**3.37**				Long/Short	**0.31**				Long/Short	**4.14**			

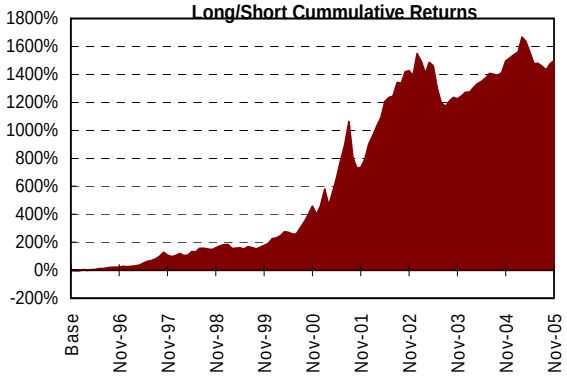
Portfolio Index Performance



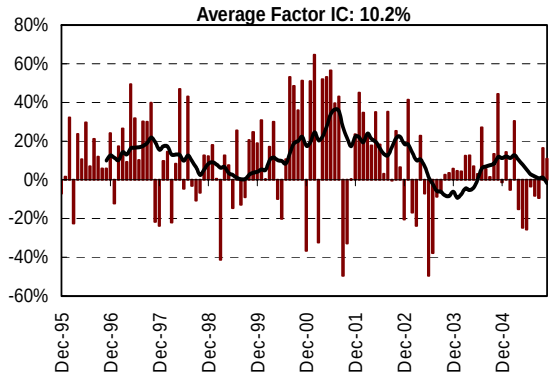
12 Month Rolling Returns Of L/S Strategy



Cumulative Returns



Monthly Information Co-Efficients (IC)



source: J.P. Morgan

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52 Week Low Ratio - stand alone in ASX200
Factor Performance Statistics

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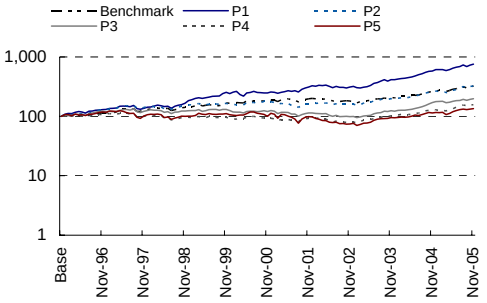
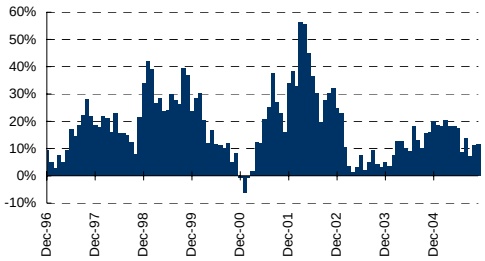
1	2.0%	25.0%	4%	75%	1	0.7%	7.2%	5%	64%	1	2.5%	34.3%	3%	67%	1	1.8%	22.4%	4%	68%
2	0.8%	8.9%	4%	58%	2	0.0%	-1.1%	4%	58%	2	2.0%	26.6%	3%	44%	2	1.1%	12.5%	4%	55%
3	0.2%	2.2%	4%	47%	3	-0.7%	-8.8%	4%	44%	3	2.0%	25.9%	3%	39%	3	0.6%	7.0%	4%	45%
4	-0.3%	-4.1%	4%	31%	4	-0.4%	-5.7%	4%	42%	4	1.9%	25.2%	3%	42%	4	0.4%	4.6%	4%	36%
5	-0.1%	-2.2%	5%	33%	5	-0.9%	-12.5%	7%	31%	5	1.7%	21.7%	3%	50%	5	0.4%	3.0%	5%	39%
Long Short Strategy Statistics Portfolio 1 less Portfolio 5					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**				
	Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.
Long/Shor	2.0%	26.5%	3%	**72%**	Long/Shor	1.6%	18.3%	6%	**72%**	Long/Short	0.8%	10.1%	3%	**64%**	Long/Short	1.4%	17.2%	4%	**68%**
T-Stat					**T-Stat**					**T-Stat**					**T-Stat**				
Long/Shor	**3.50**				Long/Shor	**1.61**				Long/Short	**1.83**				Long/Short	**3.76**			

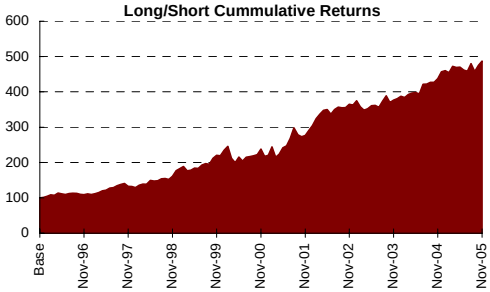
Portfolio Index Performance



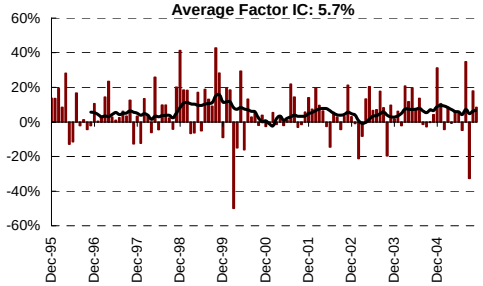
12 Month Rolling Returns Of L/S Strategy



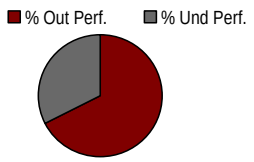
Cumulative Returns



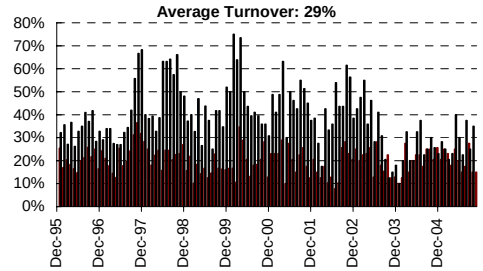
Monthly Information Co-Efficients (IC)



Monthly Hit Rate



Turnover



source: J.P. Morgan

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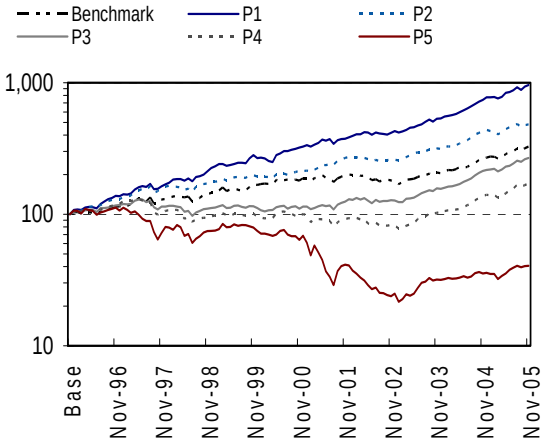
J.P.Morgan

Factor: Avg (P1, P3, P6, P12) vs. ASX200

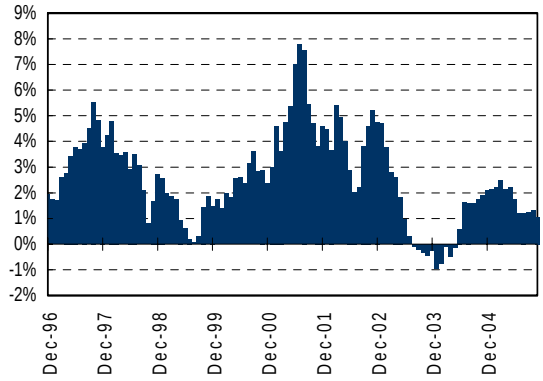
Factor Performance Statistics

3 Year(s): 31/12/1996 to 31/12/1999 Portfolio Statistics					3 Year(s): 31/12/1999 to 31/12/2002 Portfolio Statistics					3 Year(s): 31/12/2002 to 31/12/2005 Portfolio Statistics					Total Period: 31/12/1995 to 31/12/2005 Portfolio Statistics				
Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.
1	2.1%	26.8%	4%	78%	1	1.2%	13.9%	4%	72%	1	2.4%	32.0%	3%	64%	1	1.9%	25.3%	3%	73%
2	1.3%	15.4%	4%	61%	2	0.8%	9.7%	3%	69%	2	1.7%	22.3%	3%	36%	2	1.4%	16.9%	3%	58%
3	0.0%	-0.5%	4%	42%	3	0.3%	3.5%	3%	67%	3	2.1%	27.8%	2%	56%	3	0.9%	10.3%	3%	53%
4	-0.4%	-5.4%	4%	33%	4	-0.4%	-6.2%	4%	42%	4	2.1%	27.2%	3%	56%	4	0.5%	5.6%	4%	44%
5	-0.7%	-10.9%	7%	36%	5	-2.8%	-32.3%	9%	19%	5	1.5%	18.8%	5%	39%	5	-0.5%	-8.5%	7%	31%
Long Short Strategy Statistics Portfolio 1 less Portfolio 5					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**				
	Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.
Long/Shor	2.8%	36.4%	6%	**72%**	Long/Shor	4.0%	53.6%	8%	**75%**	Long/Short	0.8%	9.5%	4%	**64%**	Long/Short	2.4%	30.8%	6%	**73%**
T-Stat					**T-Stat**					**T-Stat**					**T-Stat**				
Long/Shor	**2.91**				Long/Shor	**2.91**				Long/Short	**1.31**				Long/Short	**4.48**			

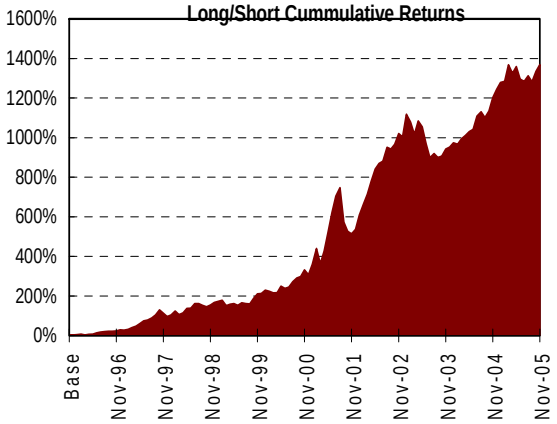
Portfolio Index Performance



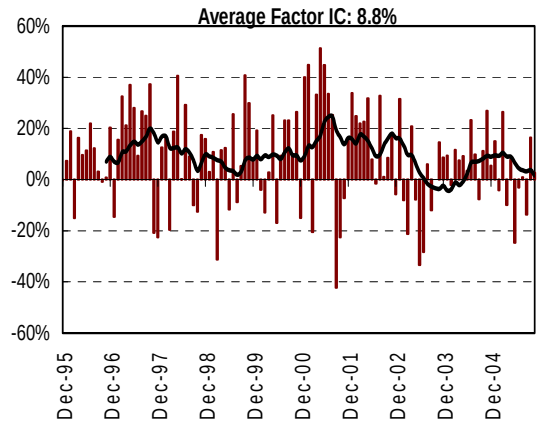
12 Month Rolling Returns Of L/S Strategy



Cumulative Returns



Monthly Information Co-Efficients (IC)



source: J.P. Morgan

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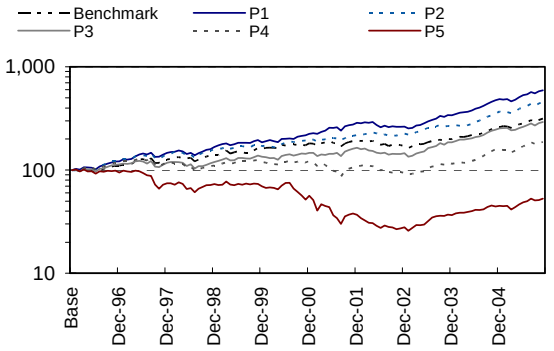
Factor: fam_mom_52weekhigh vs. ASX200

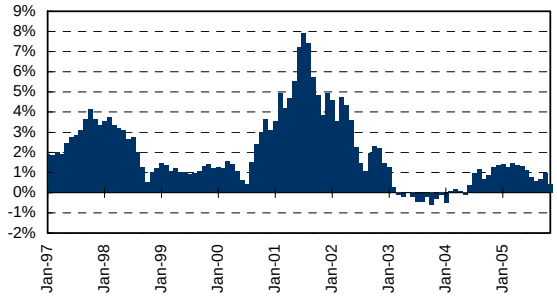
Factor Performance Statistics

3 Year(s): 31/12/1996 to 31/12/1999 Portfolio Statistics					3 Year(s): 31/12/1999 to 31/12/2002 Portfolio Statistics					3 Year(s): 31/12/2002 to 31/12/2005 Portfolio Statistics					Total Period: 31/01/1996 to 31/12/2005 Portfolio Statistics				
Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.
1	1.4%	17.2%	3%	89%	1	0.9%	10.2%	4%	61%	1	2.3%	31.2%	3%	69%	1	1.6%	19.6%	3%	74%
2	1.1%	12.6%	4%	58%	2	0.7%	8.0%	3%	75%	2	2.0%	26.6%	3%	47%	2	1.3%	16.4%	3%	61%
3	0.7%	7.1%	4%	56%	3	0.2%	1.1%	4%	58%	3	2.1%	26.9%	3%	53%	3	1.0%	11.4%	4%	55%
4	0.2%	2.0%	4%	42%	4	-0.6%	-8.5%	5%	44%	4	1.9%	24.8%	3%	42%	4	0.6%	6.5%	4%	44%
5	-0.7%	-9.3%	5%	22%	5	-2.4%	-27.6%	8%	31%	5	1.9%	23.9%	4%	44%	5	-0.4%	-6.2%	6%	31%
Long Short Strategy Statistics Portfolio 1 less Portfolio 5					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**				
	Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.
Long/Shor	2.0%	26.7%	3%	**78%**	Long/Shor	3.2%	43.4%	6%	**64%**	Long/Short	0.5%	5.3%	2%	**53%**	Long/Short	1.9%	24.2%	4%	**67%**
T-Stat					**T-Stat**					**T-Stat**					**T-Stat**				
Long/Shor	**3.79**				Long/Shor	**3.02**				Long/Short	**1.15**				Long/Short	**4.85**			

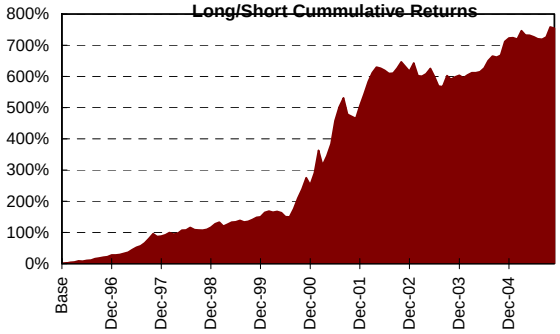
Portfolio Index Performance



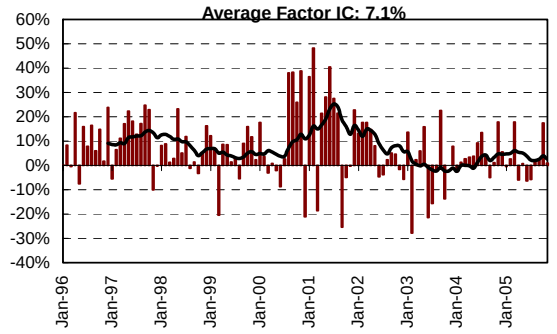
12 Month Rolling Returns Of L/S Strategy



Cumulative Returns



Monthly Information Co-Efficients (IC)



source: J.P. Morgan

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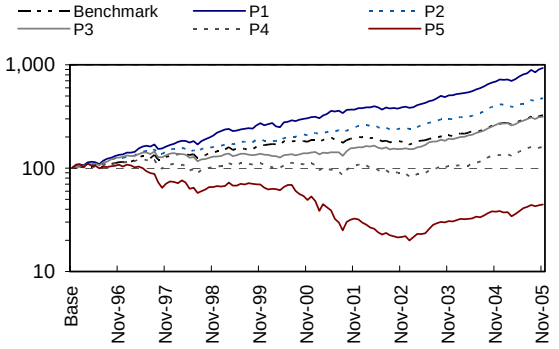
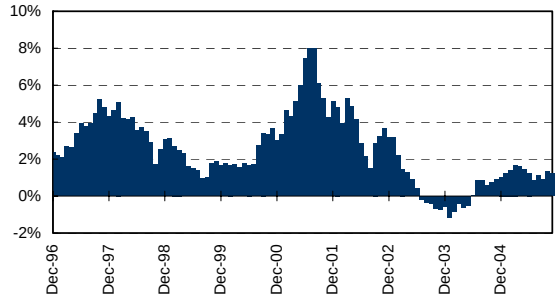
Factor: FAM_PM_TWPW vs. ASX200
Factor Performance Statistics

3 Year(s): 31/12/1996 to 31/12/1999 Portfolio Statistics					3 Year(s): 31/12/1999 to 31/12/2002 Portfolio Statistics					3 Year(s): 31/12/2002 to 31/12/2005 Portfolio Statistics					Total Period: 31/12/1995 to 31/12/2005 Portfolio Statistics				
Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.	Port	Avg Ret	Ann Ret	Std Devn	% Out Perf.
1	2.0%	26.2%	4%	89%	1	1.1%	12.6%	4%	75%	1	2.5%	34.0%	3%	64%	1	1.9%	24.9%	4%	76%
2	1.2%	14.7%	4%	64%	2	0.7%	8.2%	3%	75%	2	1.9%	25.2%	2%	50%	2	1.3%	16.8%	3%	61%
3	0.3%	2.7%	4%	33%	3	0.4%	3.7%	3%	64%	3	2.0%	26.7%	3%	53%	3	1.0%	12.0%	3%	53%
4	0.1%	-0.5%	4%	39%	4	-0.5%	-6.6%	4%	47%	4	1.7%	21.1%	3%	42%	4	0.5%	4.9%	4%	41%
5	-1.0%	-13.6%	6%	22%	5	-2.8%	-31.5%	8%	25%	5	2.1%	26.4%	4%	44%	5	-0.5%	-7.7%	6%	31%
Long Short Strategy Statistics Portfolio 1 less Portfolio 5					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**					**Long Short Strategy Statistics Portfolio 1 less Portfolio 5**				
	Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.		Avg Ret	Ann Ret	Std Devn	% Out Perf.
Long/Shor	3.1%	42.3%	4%	**75%**	Long/Shor	3.9%	53.6%	7%	**78%**	Long/Short	0.5%	5.1%	3%	**58%**	Long/Short	2.4%	31.1%	5%	**70%**
T-Stat					**T-Stat**					**T-Stat**					**T-Stat**				
Long/Shor	**4.33**				Long/Shor	**3.46**				Long/Short	**0.92**				Long/Short	**5.40**			

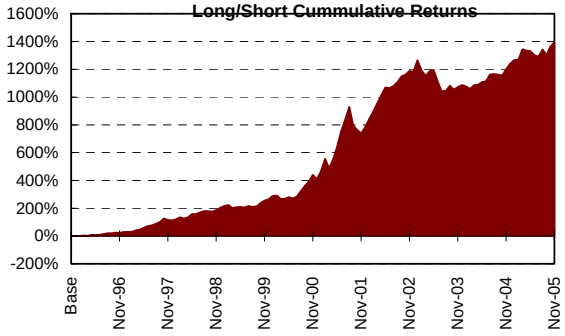
Portfolio Index Performance



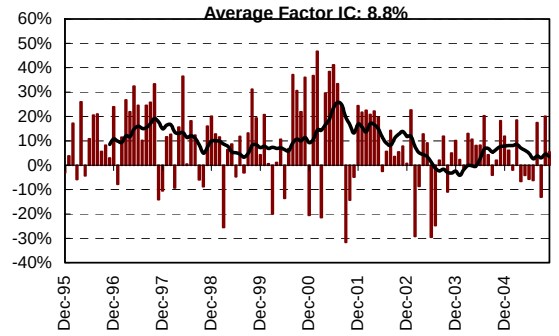
12 Month Rolling Returns Of L/S Strategy



Cumulative Returns



Monthly Information Co-Efficients (IC)



source: J.P. Morgan

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PAPER 2

Information Uncertainty and Behavioural Bias

Executive Summary

- This paper uses proxies for Information Uncertainty to attempt to improve the strength of 'news' based signals.
- Greater uncertainty leaves more room for psychological bias. Our tests suggest investors punish bad news more harshly for firms with high 'Information Uncertainty'.
- We find Information Uncertainty adjusted Price Momentum and Earnings Momentum strategies are stronger and more significant than standard Price Momentum and Earnings Momentum strategies.
- Replacing standard Price Momentum and Earnings Momentum factors with Information Uncertainty adjusted Price Momentum and Information Uncertainty adjusted Earnings Momentum in a long only portfolio simulation improves the alpha from 2.7% p.a to 3.1% p.a.
- This paper draws on X. Frank Zhang, "Information Uncertainty and Stock Returns", *Journal of Finance, Volume 61 No1***,** pp 105-139, February 2006. The article is summarized in the Literature Review section of this edition of Quant Concepts.

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Introduction

Consider two reasonably identical oil producers. One is covered by 12 sell-side analysts, the other is covered by 1. Both companies have upgrades to FY1 earnings thanks to rising oil prices. Would their prices react the same way? If the upgrades for both companies reach the same investors, do the investors treat the flow of information from one broker differently to the same signal from 12? What if it confirms or challenges their opinion on the stock?

The availability of information on a company may well impact price reaction to company news. This paper tests the effect of information flow on the efficacy of 'news based' investment strategies. We leverage off a paper by X. Frank Zhang, "Information Uncertainty and Stock Returns", where he notes:

"Information Uncertainty refers to potential ambiguity with respect to the implications of new information on a firm's value, which potentially stems from two sources: the volatility of a firm's underlying fundamentals and poor information".

We test how proxies for Information Uncertainty interact with the 'news based' investment strategies JPM Quant Price Momentum and JPM Quant Earnings Revisions. If Information Uncertainty interacts predictably with news based investment strategies we may be able to refine the implementation of these investment strategies.

Proxies for Information Uncertainty

We use as proxies for Information Uncertainty the following metrics:

1. *Firm size* by market capitalization – where smaller size implies greater uncertainty.
2. *Firm age* in years – younger implies greater uncertainty.
3. *Analyst coverage* - the number of analysts covering the firm in the previous year, fewer analysts implies greater uncertainty.
4. *Dispersion in analyst's forecasts*, which is the standard deviation of forecasts scaled by prior year end price. Higher dispersion implies greater uncertainty.
5. *Return volatility* which is the standard deviation of weekly excess returns over the last year. Higher volatility implies greater uncertainty.
6. *Cash flow volatility* calculated as the standard deviation of Cash Flow from Operations over the past 5 years (min 3). Higher Cash Flow volatility implies greater uncertainty.

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Is Information Uncertainty a Risk Factor?

Figure 7: Information Uncertainty – Average Monthly Portfolio Returns presented below presents monthly returns for portfolios created from each Information Uncertainty proxy. If these proxies were a risk factor, we would have expected to see increasing returns across increasing levels of uncertainty. ***There is no evidence that information uncertainty is a risk proxy compensated for by higher returns***, rather we find that more uncertain stocks have lower returns at the extremes. The spread of returns was generally not monotonic, suggesting that Information Uncertainty proxies by themselves are neither alpha generators nor risk factors.

The universe was the ASX200 from 31/12/1995 to 30/06/2006.

Figure 7: Information Uncertainty – Average Monthly Portfolio Returns

Portfolios		Firm Size	Firm Age	Analyst Coverage	Dispersion of forecasts	Return Volatility	Cash Flow Volatility
(low uncertainty)	1	1.0%	1.4%	1.1%	1.4%	1.2%	0.8%
	2	1.1%	0.7%	1.2%	1.1%	1.2%	1.1%
	3	1.4%	0.6%	0.8%	1.4%	1.2%	0.9%
	4	1.2%	1.2%	1.2%	0.9%	1.0%	1.1%
	5	0.6%	0.7%	0.7%	0.7%	1.0%	1.2%
(high uncertainty)	*6*	0.0%	0.7%	0.7%	0.4%	0.0%	1.2%
P1 *less* P6 *return*		1.1%	0.7%	0.4%	1.0%	1.2%	-0.4%
P1 *less* P6 T-stat		2.1	2.0	1.0	2.2	1.6	-1.2

Source: J.P. Morgan Quant

Below we present the behaviour of the two alpha generators to contrast the profile of these relative to the Information Uncertainty proxies above.

Figure 8: Alpha Generators
Average Monthly Portfolio Returns

Portfolios		Earnings Momentum	Price Momentum
	1	2.0%	2.0%
	2	1.6%	1.5%
	3	1.2%	1.1%
	4	1.0%	0.8%
	5	0.3%	0.3%
	6	-0.5%	-0.6%
P1 *less* P6 *return*		2.4%	2.6%
P1 *less* P6 T-stat		5.3	4.2

Source: JPMorgan Quant

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Correlations among Information Uncertainty Proxies

We looked into the correlation between the uncertainty proxies and found that size and analyst coverage most highly correlated, which was expected. Age and size are also reasonably correlated, and return volatility decreased with size.

Figure 9: Information Uncertainty – Correlation between Uncertainty Proxies

	Size	Age	Analysts	CV FY1	Return Vol	Cash Flow Vol
Size		0.27	**0.66**	- 0.06	**- 0.46**	- 0.21
Age			0.17	- 0.01	- 0.10	- 0.05
Analysts				- 0.03	0.11	0.30
CV FY1					0.11	0.30
Return Vol						0.30
Cash Flow Vol						

Source: J.P. Morgan Quant

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Information Uncertainty and Price Momentum

The first strategy tested was JPQ Price Momentum. We define price momentum as average of the one, three, six and twelve-month returns. As the shorter duration returns are captured more often, this factor has a bias towards more recent price movement

$$\text{Price Momentum} = \frac{R_1 + R_3 + R_6 + R_{12}}{4}$$

The history of this factor is published monthly in the *JPM Quant Factor Companion.*

The figure below shows the high and low Price Momentum portfolio returns, within three groupings of Information Uncertainty (Low Uncertainty, Medium Uncertainty and High Uncertainty). What we wanted to establish was whether there was any reliable interaction of Price Momentum with the proxies. If the spread of returns within the information uncertainty proxies interacted in a predictable way with the alpha generators then, there is scope for further refinement of the strategy.

Figure 10: Average Monthly Portfolio Returns of Price Momentum across Information Uncertainty

Uncertainty	Price Momentum	Firm Size	Analyst Coverage	Dispersion of forecasts	Return Volatility	*Composite*	Firm Age	Cash Flow Volatility
Low uncertainty	High pmom	1.5%	1.5%	1.7%	1.4%	*1.5%*	1.5%	1.5%
Medium Uncertainty	High pmom	1.8%	1.3%	1.6%	1.6%	*1.6%*	1.6%	1.6%
High Uncertainty	High pmom	1.2%	1.9%	1.2%	1.2%	*1.4%*	1.6%	1.8%
Low uncertainty	Low pmom	0.6%	0.7%	0.8%	1.1%	*0.8%*	0.7%	0.4%
Medium Uncertainty	Low pmom	0.9%	0.6%	0.7%	0.6%	*0.7%*	0.1%	0.4%
High Uncertainty	Low pmom	-0.6%	-0.3%	-0.2%	-0.7%	*-0.5%*	-0.1%	0.5%

Source: J.P. Morgan Quant

The High Price Momentum portfolio returns are reasonably consistent across the Information Uncertainty groupings. The Low Price Momentum portfolio returns deteriorate as the level of uncertainty increases. So while positive news is treated similarly along cross-sections of Information Uncertainty, it seems that ***bad news is punished more harshly as the level of uncertainty increases.***

The most consistent spread of returns between Low to High Uncertainty groupings across both Price Momentum and Earnings Momentum were observed for size, analyst coverage, dispersion of analyst forecasts and return volatility. We combined these to form an Information Uncertainty score, addressed more thoroughly in "Allowing for Uncertainty".

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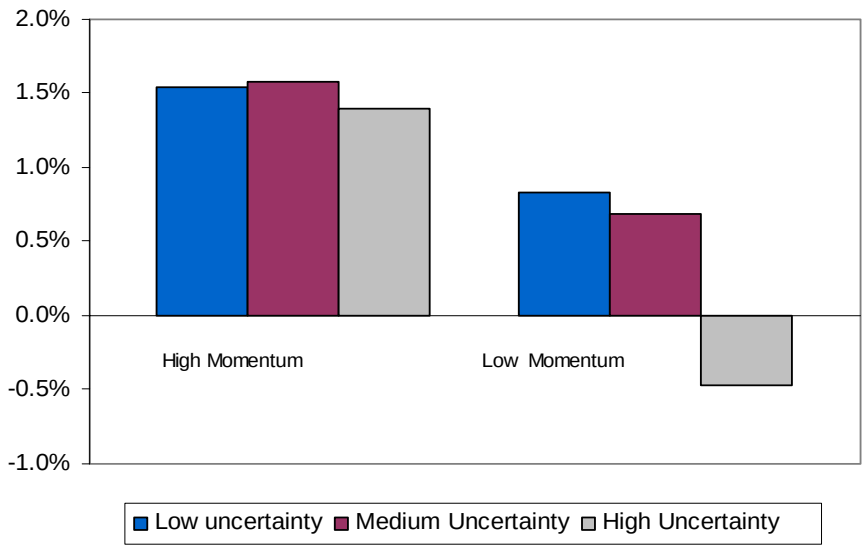
Figure 11: High and Low momentum portfolio returns - Information Uncertainty Composite



Source: J.P. Morgan Quant

The figure above presents the returns to the high and low Price Momentum portfolios across the three categories of Information Uncertainty (for the Information Uncertainty Composite). An increasing spread of returns between the low and high momentum portfolios across bands of Information Uncertainty demonstrates that proxies for Information Uncertainty are an effective differentiating factor for the Price Momentum factor. The spreads are shown in the table below.

Figure 12: The spread of Price Momentum within bands of Information Uncertainty

Intra-uncertainty return Spreads	Firm Size	Firm Age	Analyst Coverage	Dispersion of forecasts	Return Volatility	Cash Flow Volatility
Low uncertainty	0.9%	0.8%	0.8%	0.9%	0.4%	1.1%
Medium Uncertainty	0.9%	1.5%	0.7%	0.9%	1.1%	1.2%
High Uncertainty	1.9%	1.7%	2.2%	1.5%	1.9%	1.3%

Source: J.P. Morgan Quant

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Information Uncertainty and Earnings Momentum

The second strategy tested was JPQ Earnings Momentum. The standard JPQ Earnings Momentum is a one-year forward earnings revision number calculated by time-weighting the revisions in the IBES consensus earnings for the next two fiscal years according to the year end of the company. The three-month and one-month (one-year forward) earnings revisions are weighted (30% and 70% respectively) to calculate an overall earnings revision number.

The history of this factor is published monthly in the *JPM Quant Factor Companion*.

The figure below shows the high and low Earnings Momentum portfolio returns, within three groupings of Information Uncertainty (Low Uncertainty, Medium Uncertainty and High Uncertainty)

Figure 13: Average Monthly Portfolio Returns of Earnings Momentum across Information Uncertainty

Uncertainty	Earnings Momentum	Firm Size	Analyst Coverage	Dispersion of forecasts	Return Volatility	*Composite*	Cash Flow Volatility	Firm Age
Low uncertainty	High emom	1.5%	1.4%	1.7%	1.5%	*1.5%*	1.4%	1.8%
Medium Uncertainty	High emom	1.8%	1.7%	1.7%	1.7%	*1.7%*	1.5%	1.6%
High Uncertainty	High emom	1.5%	1.6%	1.3%	1.4%	*1.5%*	2.2%	1.5%
Low uncertainty	Low emom	1.0%	0.8%	0.9%	1.0%	*0.9%*	0.7%	0.5%
Medium Uncertainty	Low emom	0.5%	0.3%	0.5%	0.6%	*0.5%*	0.4%	0.2%
High Uncertainty	Low emom	-0.5%	-0.2%	-0.4%	-0.8%	*-0.5%*	0.2%	0.0%

Source: J.P. Morgan Quant

As for Price Momentum, we find that High Earnings Momentum portfolio returns are reasonably consistent across the groupings for Information Uncertainty, however the ***Low Earnings Momentum portfolio returns are progressively worse as the level of uncertainty increases.***

The figure on the next page presents the spreads between the high and low Earnings Momentum portfolios across the three categories of Information Uncertainty. This increasing spreads demonstrate that Information Uncertainty effectively differentiates among stocks within the Earnings Momentum factor.

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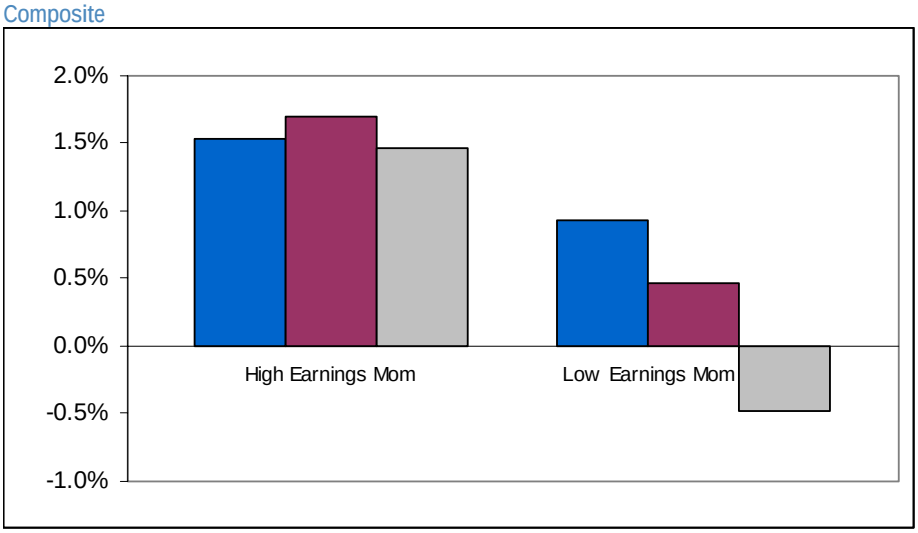
Figure 14: High and Low Earnings Momentum portfolio returns - Information Uncertainty Composite



Source: J.P. Morgan Quant

Figure 15: The spread in Average Monthly returns of Earnings Momentum within bands of Information Uncertainty

Intra-uncertainty return Spreads	Firm Size	Firm Age	Analyst Coverage	Dispersion of forecasts	Return Volatility	Cash Flow Volatility
Low uncertainty	0.5%	1.3%	0.6%	0.8%	0.5%	0.7%
Medium Uncertainty	1.3%	1.4%	1.4%	1.2%	1.1%	1.1%
High Uncertainty	2.0%	1.4%	1.9%	1.7%	2.1%	2.0%

Source: J.P. Morgan Quant

Allowing for Uncertainty

Price Momentum and Earnings Momentum both seemed to interact predictably with Information Uncertainty proxies. The spread of returns increases between high momentum (earnings or price) and low momentum groupings as information uncertainty increases – demonstrated in figures 12 and 15. This was most consistently observed for size, analyst coverage, dispersion of analyst forecasts and return volatility.

To exploit this behaviour we applied factor loadings to JPQ Price Momentum and JPQ Earnings Momentum to broad Information Uncertainty groupings. Stocks were sorted into three groups according to their average rank across four proxies for Information Uncertainty (size, analyst coverage, dispersion of analyst forecasts and return volatility). The loadings were applied to normalized scores, which we then re-normalized prior to portfolio simulations.

Two alternate factor loading schemes were applied monthly as detailed below. These loading schemes were chosen to highlight the sensitivity of the factor to information uncertainty groupings.

			IU1	IU2
1)	Low uncertainty	JPQ Factor	x 1.0	x 1.0
2)	Medium uncertainty	JPQ Factor	x 1.1	x 1.2
3)	High uncertainty	JPQ Factor	x 1.2	x 1.4

Results: Portfolio Simulations

The following two tables present the outputs of ten year simulations for long only and long/short portfolio simulations. We present results for the standard JP Morgan Quant model, and a model which contains Information Uncertainty Adjusted Price Momentum and Information Adjusted Earnings Momentum. We did not adjust the Value and Shareholder Value components of the model

The Standard Model portfolio is constructed from the following Factor Families:

1) 20% Price Momentum Family:
2) 30% Earnings Momentum Family
3) 20% Value Family
4) 30% Shareholder Value

The adjusted models take the normalized components of the Price Momentum and Earnings Momentum family and adjust these for Information Uncertainty then re-normalize these inputs.

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The universe tested is the ASX200, over the period 30 Jun 1996 to 30 June 2006. Active positions allowed were:

Top 20 :	+/- 5%
21-50 :	+/- 4%
51-100:	+/- 3%
101-200	+/- 2% (1% for n > 201 where there are more than 200 constituents in ASX 200)

Figure 16: Long Only Simulations – Standard vs Information Adjusted

		……OutPerformance ……..		
	ASX 200 return	**Standard Model**	**Information Uncertainty 1**	**Information Uncertainty 2**
Ten years Ending:				
30/06/2006	12.67%	4.77%	5.55%	5.23%
Three Years Ending:				
30/06/2006	24.10%	2.03%	2.90%	1.75%
30/06/2003	0.62%	5.33%	5.29%	5.04%
30/06/2000	10.40%	6.58%	7.86%	8.49%
Year Ending:				
30/06/2006	23.79%	3.21%	5.89%	2.29%
30/06/2005	26.74%	4.22%	5.56%	5.36%
30/06/2004	21.82%	-1.16%	-2.43%	-2.14%
30/06/2003	-2.00%	1.64%	3.22%	2.00%
30/06/2002	-4.86%	6.83%	6.07%	6.53%
30/06/2001	9.26%	7.79%	6.69%	6.75%
30/06/2000	15.66%	3.01%	6.67%	4.29%
30/06/1999	14.38%	14.21%	12.75%	16.49%
30/06/1998	1.70%	3.18%	4.65%	5.34%
30/06/1997	25.80%	4.78%	6.61%	5.52%

Source: J.P. Morgan Quant

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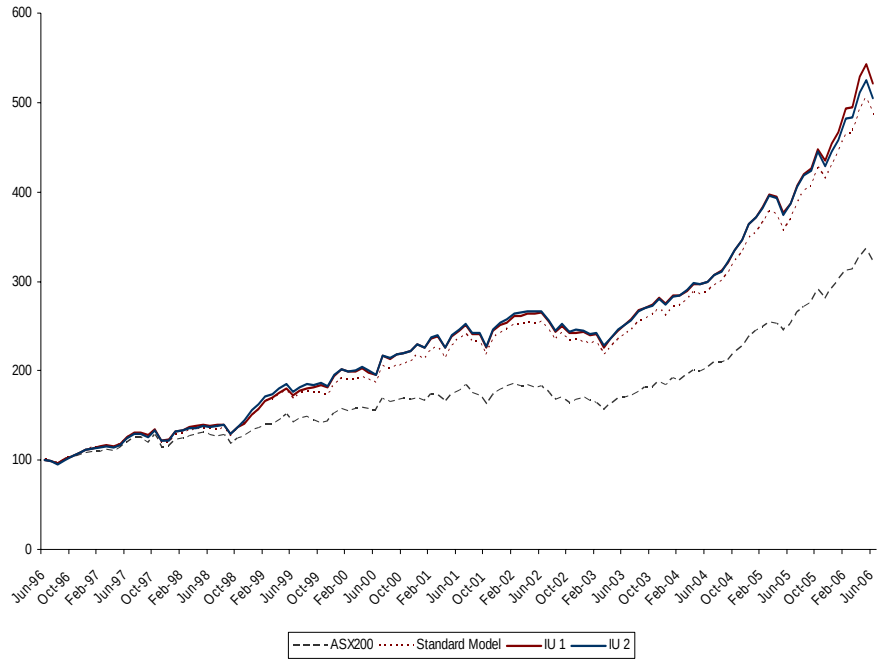
Figure 17: Long Only Simulations – Cumulative Performance



Source: J.P. Morgan Quant

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Conclusion

The results of this paper suggest that news based investment strategies, JPQ Price Momentum and JPQ Earnings Momentum, could be subtly improved by adjusting these factors for proxy measures of Information Uncertainty.

Factor backtests of JPQ Price Momentum and JPQ Earnings Momentum comparing Information Uncertainty adjusted factors with the standard factors suggest that the Information Uncertainty Adjusted factors add between 0.5%-0.8% to the outperformance of a standard quantitative model, based on portfolio simulations with outperformance around 4.8% p.a. This suggests the adjusted factors are in the order of 10-15% stronger than standard factors

The reason why adjusting for Information Uncertainty should be effective at improving alpha of news based investment strategies is that greater uncertainty leaves more room for psychological bias. Our findings suggest that investors are overconfident when firms are harder to value, punishing bad news more harshly for firms with high 'Information Uncertainty'.

This paper was based upon ideas from X. Frank Zhang, "Information Uncertainty and Stock Returns", *Journal of Finance*, *Volume 61 No1***,** pp 105-139, February 2006. The article is summarized in the Literature Review section of this e

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Appendix: Factor Backtests

Price Momentum Composite: In a factor backtest the *JPQ Price Momentum Composite is improved through adjustment for Information Uncertainty.* The strength of the long/short factor backtest results is improved in the order of 10-15% in IC terms or outperformance.

Earnings Momentum Composite: *There was subtle improvement to be had adjusting the Earnings Momentum family for Information Uncertainty.* The quintile spread of returns is improved marginally, with most of the benefit coming from a poorer quintile 5.

The following six pages contain tables of Performance Summaries and graphs of the Monthly Information Co-efficient. These figures are the output of factor backtests comparing the standard and adjusted Price Momentum and Earnings Momentum factors. We present three series of figures for each Price Momentum and Earnings Momentum families. Firstly the Standard factors, then the factors adjusted for the two loadings for Information Uncertainty proxies.

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The Impact of Adjusting Price Momentum for Information Uncertainty

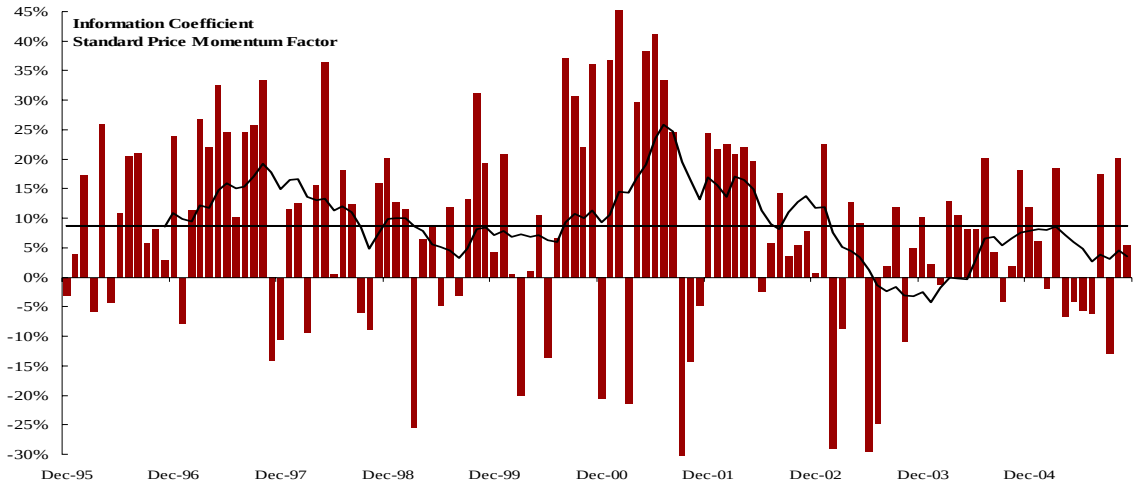
Figure 18: Factor Backtests – Standard Price Momentum Performance History

Standard Price Momentum Family
Factor Performance Statistics: 1MthFwd

3 Years to Dec-1999 Quintile Statistics					3 Years to Dec-2002 Quintile Statistics					3 Years to Dec-2005 Quintile Statistics					Dec-1995 to Dec-2005 Quintile Statistics				
Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.
1	2.16%	3.7%	85%	15%	1	1.06%	3.7%	75%	25%	1	2.51%	2.9%	64%	36%	1	1.93%	3.5%	76%	24%
2	1.40%	3.4%	58%	42%	2	0.70%	2.8%	75%	25%	2	1.92%	2.5%	50%	50%	2	1.35%	3.0%	61%	39%
3	0.73%	3.6%	44%	56%	3	0.36%	3.4%	64%	36%	3	2.02%	2.5%	53%	47%	3	1.01%	3.3%	53%	48%
4	0.30%	4.0%	35%	65%	4	-0.47%	4.5%	47%	53%	4	1.65%	3.1%	42%	58%	4	0.48%	4.0%	41%	59%
5	-0.60%	5.6%	25%	75%	5	-2.79%	8.0%	25%	75%	5	2.05%	4.1%	44%	56%	5	-0.46%	6.3%	31%	69%
Significance Statistics					**Significance Statistics**					**Significance Statistics**					**Significance Statistics**				
Significant Positive T-Stats (%)			60%		Significant Positive T-Stats (%)			53%		Significant Positive T-Stats (%)			22%		Significant Positive T-Stats (%)			47%	
Significant Negative T-Stats (%)			6%		Significant Negative T-Stats (%)			17%		Significant Negative T-Stats (%)			11%		Significant Negative T-Stats (%)			11%	
Average T-Stat			1.89		Average T-Stat			1.92		Average T-Stat			0.37		Average T-Stat			1.44	
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**				
Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.
Long/Short	2.8%	3.9%	72.9%	27.1%	Long/Short	3.9%	6.7%	77.8%	22.2%	Long/Short	0.5%	3.0%	58.3%	41.7%	Long/Short	2.4%	4.9%	70.0%	30.0%
	T-Stat					**T-Stat**					**T-Stat**					**T-Stat**			
Long/Short	4.89				Long/Short	3.46				Long/Short	0.92				Long/Short	5.40			

Source: J.P. Morgan Quant

Figure 19: Factor Backtests – Standard Price Momentum Factor - Monthly Information Co-efficient



Source: J.P. Morgan Quant

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Figure 20: Factor Backtests – Information Uncertainty Adjusted Price Momentum Backtest

Information Uncertainty Adjusted Price Momentum (1.0, 1.1, 1.2)
Factor Performance Statistics: 1MthFwd

3 Years to Dec-1999 Quintile Statistics					3 Years to Dec-2002 Quintile Statistics					3 Years to Dec-2005 Quintile Statistics					Dec-1995 to Dec-2005 Quintile Statistics				
Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.
1	2.15%	3.8%	75%	25%	1	1.29%	4.2%	78%	22%	1	2.63%	3.3%	64%	36%	1	2.04%	3.8%	73%	28%
2	1.50%	3.3%	60%	40%	2	0.73%	3.0%	72%	28%	2	1.98%	2.6%	50%	50%	2	1.41%	3.0%	61%	39%
3	0.87%	3.5%	52%	48%	3	0.53%	2.6%	61%	39%	3	1.89%	2.6%	50%	50%	3	1.07%	3.0%	54%	46%
4	0.32%	3.9%	33%	67%	4	-0.41%	3.9%	50%	50%	4	1.89%	2.8%	44%	56%	4	0.57%	3.7%	42%	58%
5	-0.68%	6.1%	31%	69%	5	-3.43%	9.9%	22%	78%	5	1.78%	4.5%	36%	64%	5	-0.77%	7.3%	30%	70%
Significance Statistics					**Significance Statistics**					**Significance Statistics**					**Significance Statistics**				
Significant Positive T-Stats (%)			52%		Significant Positive T-Stats (%)			67%		Significant Positive T-Stats (%)			36%		Significant Positive T-Stats (%)			52%	
Significant Negative T-Stats (%)			10%		Significant Negative T-Stats (%)			17%		Significant Negative T-Stats (%)			19%		Significant Negative T-Stats (%)			15%	
Average T-Stat			1.95		Average T-Stat			2.23		Average T-Stat			0.51		Average T-Stat			1.60	
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**				
Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.
Long/Short	2.8%	4.5%	70.8%	29.2%	Long/Short	4.7%	8.8%	80.6%	19.4%	Long/Short	0.9%	3.7%	58.3%	41.7%	Long/Short	2.8%	6.1%	70.0%	30.0%
	T-Stat					**T-Stat**					**T-Stat**					**T-Stat**			
Long/Short	4.35				Long/Short	3.20				Long/Short	1.40				Long/Short	5.04			

Source: J.P. Morgan Quant

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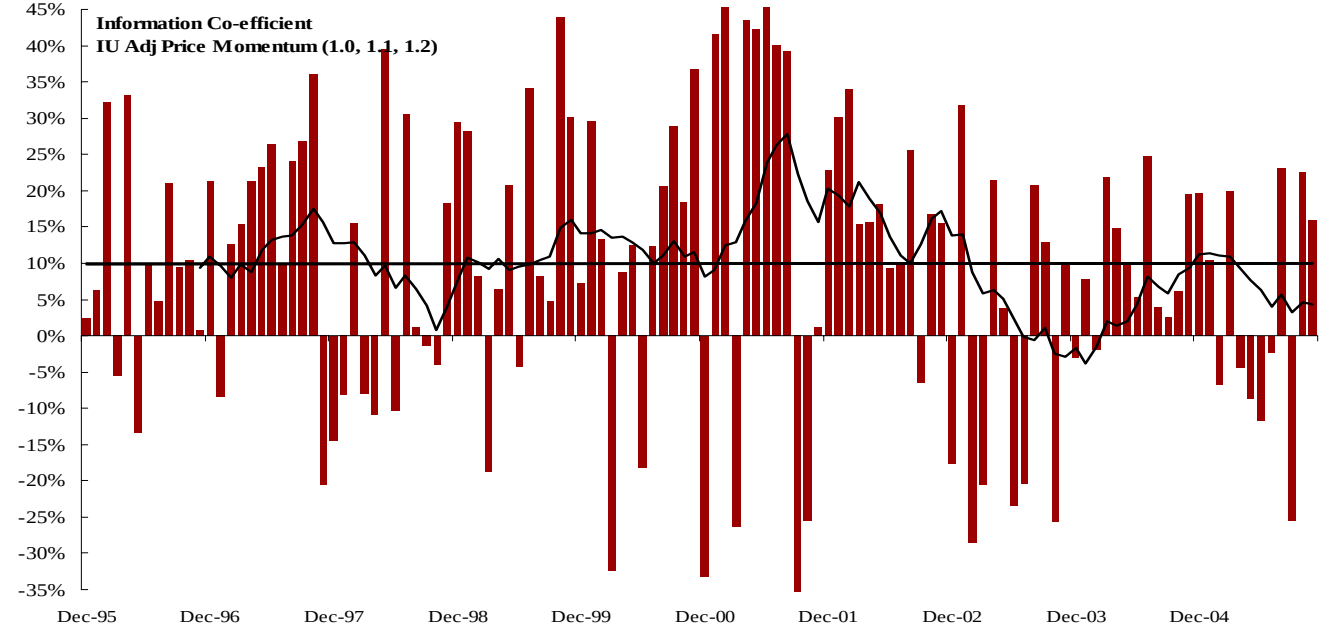
Figure 21: Factor Backtests – Information Adjusted Price Momentum - Monthly Information Co-efficient



Source: J.P. Morgan Quant

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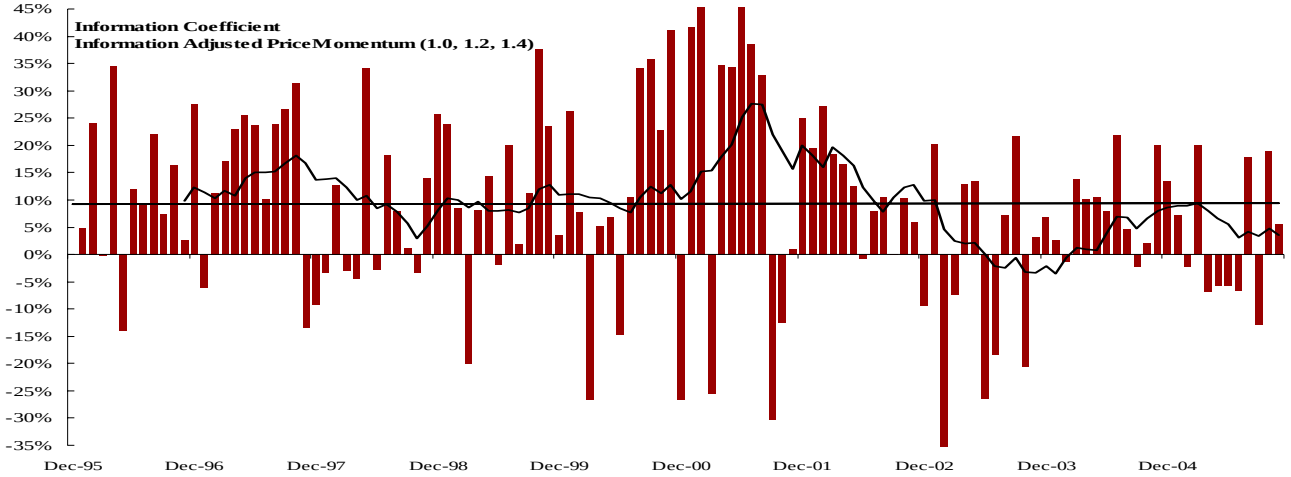
Figure 22: Factor Backtests – Information Uncertainty Adjusted Price Momentum Backtest

Information Adjusted Price Momentum (1.0, 1.2, 1.4)
Factor Performance Statistics: 1MthFwd

3 Years to Dec-1999 Quintile Statistics					3 Years to Dec-2002 Quintile Statistics					3 Years to Dec-2005 Quintile Statistics					Dec-1995 to Dec-2005 Quintile Statistics				
Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.
1	2.32%	3.9%	79%	21%	1	1.16%	4.0%	69%	31%	1	2.60%	3.0%	67%	33%	1	2.06%	3.7%	73%	28%
2	1.12%	3.4%	52%	48%	2	0.46%	2.9%	64%	36%	2	1.81%	2.6%	47%	53%	2	1.13%	3.1%	54%	46%
3	0.93%	3.8%	58%	42%	3	0.63%	3.3%	75%	25%	3	2.02%	2.7%	42%	58%	3	1.16%	3.4%	58%	42%
4	0.55%	3.7%	42%	58%	4	-0.33%	4.1%	50%	50%	4	1.61%	3.0%	31%	69%	4	0.60%	3.7%	41%	59%
5	-0.75%	5.7%	25%	75%	5	-3.20%	8.7%	28%	72%	5	2.13%	4.1%	47%	53%	5	-0.62%	6.6%	33%	68%
Significance Statistics					**Significance Statistics**					**Significance Statistics**					**Significance Statistics**				
Significant Positive T-Stats (%)			54%		Significant Positive T-Stats (%)			50%		Significant Positive T-Stats (%)			31%		Significant Positive T-Stats (%)			46%	
Significant Negative T-Stats (%)			6%		Significant Negative T-Stats (%)			17%		Significant Negative T-Stats (%)			14%		Significant Negative T-Stats (%)			12%	
Average T-Stat			1.92		Average T-Stat			2.06		Average T-Stat			0.38		Average T-Stat			1.50	
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**				
Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.
Long/Short	3.1%	4.0%	75.0%	25.0%	Long/Short	4.4%	7.3%	77.8%	22.2%	Long/Short	0.5%	3.4%	50.0%	50.0%	Long/Short	2.7%	5.3%	68.3%	31.7%
	T-Stat					**T-Stat**					**T-Stat**					**T-Stat**			
Long/Short	5.34				Long/Short	3.56				Long/Short	0.84				Long/Short	5.56			

Source: J.P. Morgan Quant

Figure 23: Factor Backtests – Information Adjusted Price Momentum - Monthly Information Co-efficient



Source: J.P. Morgan Quant

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The Impact of Adjusting Earnings Momentum for Information Uncertainty

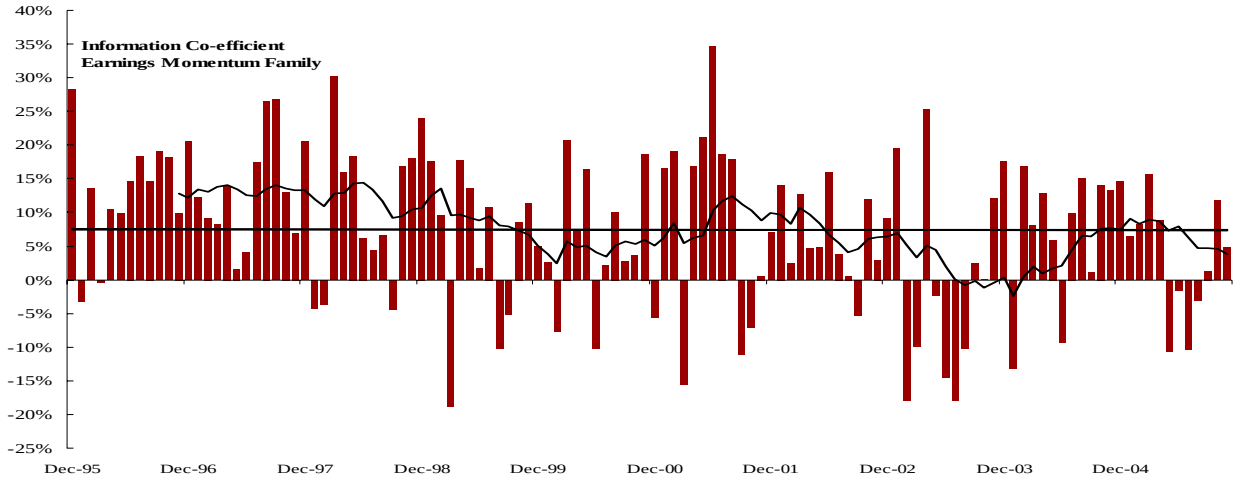
Figure 24: Factor Backtests – Standard Earnings Momentum – Performance History

Standard Earnings Momentum Family
Factor Performance Statistics: 1MthFwd

3 Years to Dec-1999 Quintile Statistics					3 Years to Dec-2002 Quintile Statistics					3 Years to Dec-2005 Quintile Statistics					Dec-1995 to Dec-2005 Quintile Statistics				
Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.
1	2.16%	4.6%	77%	23%	1	0.77%	3.9%	75%	25%	1	2.40%	3.1%	64%	36%	1	1.81%	4.0%	73%	28%
2	1.28%	3.6%	58%	42%	2	0.21%	3.5%	53%	47%	2	2.17%	2.2%	50%	50%	2	1.23%	3.2%	54%	46%
3	0.69%	3.8%	48%	52%	3	-0.23%	3.8%	50%	50%	3	2.16%	2.3%	53%	47%	3	0.85%	3.5%	50%	50%
4	0.16%	3.6%	31%	69%	4	-0.05%	3.8%	58%	42%	4	1.67%	2.9%	31%	69%	4	0.55%	3.5%	39%	61%
5	-0.20%	4.8%	25%	75%	5	-1.57%	6.6%	22%	78%	5	1.75%	3.9%	31%	69%	5	-0.02%	5.3%	26%	74%
Significance Statistics					**Significance Statistics**					**Significance Statistics**					**Significance Statistics**				
Significant Positive T-Stats (%)			44%		Significant Positive T-Stats (%)			36%		Significant Positive T-Stats (%)			28%		Significant Positive T-Stats (%)			37%	
Significant Negative T-Stats (%)			2%		Significant Negative T-Stats (%)			3%		Significant Negative T-Stats (%)			11%		Significant Negative T-Stats (%)			5%	
Average T-Stat			1.41		Average T-Stat			0.97		Average T-Stat			0.49		Average T-Stat			1.00	
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**				
Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.
Long/Short	2.4%	2.9%	81.3%	18.8%	Long/Short	2.3%	4.2%	80.6%	19.4%	Long/Short	0.6%	2.6%	69.4%	30.6%	Long/Short	1.8%	3.3%	77.5%	22.5%
	T-Stat					**T-Stat**					**T-Stat**					**T-Stat**			
Long/Short	5.70				Long/Short	3.33				Long/Short	1.48				Long/Short	6.04			

Source: J.P. Morgan Quant

Figure 25: Factor Backtests – Standard Earnings Momentum – Monthly Information Co-efficient



Source: J.P. Morgan Quant

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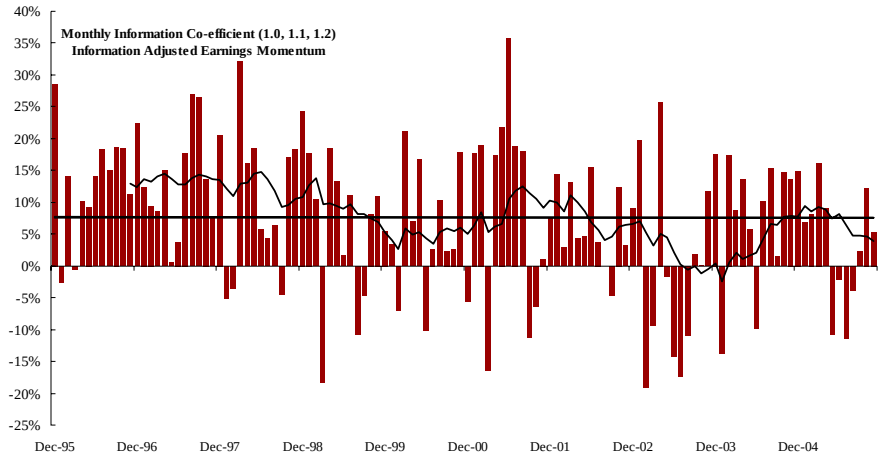
Figure 26: Factor Backtests –Information Uncertainty Adjusted Earnings Momentum – Performance History

Information Adjusted Earnings Momentum (1.0, 1.1, 1.2)
Factor Performance Statistics: 1MthFwd

3 Years to Dec-1999 Quintile Statistics					3 Years to Dec-2002 Quintile Statistics					3 Years to Dec-2005 Quintile Statistics					Dec-1995 to Dec-2005 Quintile Statistics				
Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.
1	2.15%	4.6%	77%	23%	1	0.67%	4.1%	69%	31%	1	2.46%	3.1%	64%	36%	1	1.80%	4.1%	71%	29%
2	1.31%	3.6%	58%	42%	2	0.34%	3.3%	61%	39%	2	2.06%	2.2%	50%	50%	2	1.24%	3.2%	57%	43%
3	0.66%	3.9%	50%	50%	3	-0.18%	3.7%	47%	53%	3	2.22%	2.2%	50%	50%	3	0.88%	3.5%	49%	51%
4	0.26%	3.4%	35%	65%	4	-0.03%	3.7%	64%	36%	4	1.70%	2.8%	36%	64%	4	0.61%	3.4%	44%	56%
5	-0.30%	4.9%	25%	75%	5	-1.66%	6.8%	25%	75%	5	1.73%	4.0%	31%	69%	5	-0.10%	5.5%	27%	73%
Significance Statistics					**Significance Statistics**					**Significance Statistics**					**Significance Statistics**				
Significant Positive T-Stats (%)			46%		Significant Positive T-Stats (%)			36%		Significant Positive T-Stats (%)			28%		Significant Positive T-Stats (%)			38%	
Significant Negative T-Stats (%)			2%		Significant Negative T-Stats (%)			3%		Significant Negative T-Stats (%)			11%		Significant Negative T-Stats (%)			5%	
Average T-Stat			1.43		Average T-Stat			1.00		Average T-Stat			0.51		Average T-Stat			1.02	
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**				
Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.
Long/Short	2.5%	2.9%	85.4%	14.6%	Long/Short	2.3%	4.3%	77.8%	22.2%	Long/Short	0.7%	2.6%	66.7%	33.3%	Long/Short	1.9%	3.4%	77.5%	22.5%
	T-Stat					**T-Stat**					**T-Stat**					**T-Stat**			
Long/Short	5.78				Long/Short	3.23				Long/Short	1.67				Long/Short	6.13			

Source: J.P. Morgan Quant

Figure 27: Factor Backtests – Information Adjusted Earnings Momentum – Monthly Information Co-efficient



Source: J.P. Morgan Quant

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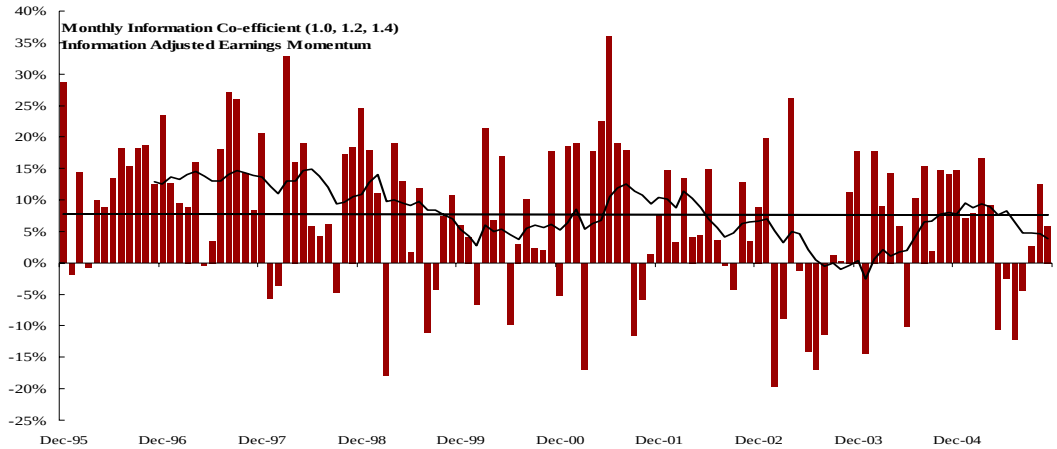
Figure 28: Factor Backtests –Information Adjusted Earnings Momentum – Performance History

Information Adjusted earnings Momentum (1.0, 1.2, 14)
Factor Performance Statistics: 1MthFwd

3 Years to Dec-1999 Quintile Statistics					3 Years to Dec-2002 Quintile Statistics					3 Years to Dec-2005 Quintile Statistics					Dec-1995 to Dec-2005 Quintile Statistics				
Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.
1	2.13%	4.7%	77%	23%	1	0.56%	4.0%	72%	28%	1	2.50%	3.0%	64%	36%	1	1.77%	4.1%	72%	28%
2	1.30%	3.5%	63%	38%	2	0.31%	3.5%	58%	42%	2	2.07%	2.2%	44%	56%	2	1.24%	3.2%	56%	44%
3	0.68%	3.8%	52%	48%	3	0.04%	3.5%	53%	47%	3	2.19%	2.2%	47%	53%	3	0.94%	3.4%	51%	49%
4	0.37%	3.5%	35%	65%	4	-0.07%	3.6%	64%	36%	4	1.65%	2.8%	31%	69%	4	0.62%	3.4%	43%	58%
5	-0.39%	5.0%	25%	75%	5	-1.70%	6.9%	28%	72%	5	1.76%	4.0%	31%	69%	5	-0.14%	5.5%	28%	73%
Significance Statistics					**Significance Statistics**					**Significance Statistics**					**Significance Statistics**				
Significant Positive T-Stats (%)			48%		Significant Positive T-Stats (%)			39%		Significant Positive T-Stats (%)			28%		Significant Positive T-Stats (%)			39%	
Significant Negative T-Stats (%)			2%		Significant Negative T-Stats (%)			3%		Significant Negative T-Stats (%)			11%		Significant Negative T-Stats (%)			5%	
Average T-Stat			1.44		Average T-Stat			1.02		Average T-Stat			0.51		Average T-Stat			1.04	
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**				
Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.
Long/Short	2.5%	2.9%	87.5%	12.5%	Long/Short	2.3%	4.4%	72.2%	27.8%	Long/Short	0.7%	2.7%	66.7%	33.3%	Long/Short	1.9%	3.4%	76.7%	23.3%
	T-Stat					**T-Stat**					**T-Stat**					**T-Stat**			
Long/Short	6.08				Long/Short	3.05				Long/Short	1.67				Long/Short	6.10			

Source: J.P. Morgan Quant

Figure 29: Factor Backtests – Information Adjusted Earnings Momentum – Monthly Information Co-efficient



Source: J.P. Morgan Quant

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PAPER 3

Combining Fundamental Scorecards

Executive Summary

- A 'Fundamental Scorecard' is created from a selection of balance sheet ratios. The component ratios were introduced in Quant Concepts published 2 March 06.
- The selection of ratios create a very low turnover range of signals which work well independently of other models.
- We ran portfolio simulations, replacing the JPQ Health Score with this Fundamental Scorecard in the well performing JP Morgan Quant model portfolio. The revised model performs well in the near term, however longer term results lag behind the standard model.
- The source papers, reviewed in the final section of this Quant Concepts, are:

  Partha Mohanram, *'Separating Winners from Losers Among Low Book-to-Market Stocks using Financial Statement Analysis'*, Review of Accounting Studies (10), 2005, 133-170.

  Joseph Piotroski, *'Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers'*, Journal of Accounting Research, Vol 38, Supplement 2000, 1- 41.

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Introduction

This paper develops ideas published as Paper 1, “Fundamental Scorecards”, published in Quant Concepts 02 March 2006.

Rather than create a Fundamental Scorecard for the ASX 200 split into two separate Value and Growth universes as was previously done, this paper applies a relevant selection of the ratios across the entire ASX 200 universe. We then take this score as a factor and include it a our well performing JPQ standard model, replacing the JPQ Health Score.

We create a Fundamental Scorecard that scores stocks according fundamental ratios within the following categories of signals:

Category 1: Earnings and Profitability

Category 2: Naïve Extrapolation

Category 3: Source of funds signals

Category 4: Accounting Conservatism

Category 5: Financial Performance Signals: Operating Efficiency

The component ratios are each given binary scores - set to one if the ratio or change in ratio sends a positive signal about future performance of a stock, zero otherwise. Stocks with strong scores are held overweight or in a long portfolio, poor scoring stocks are held underweight or short.

This study is based on ideas from US papers by Partha Mohanram (2005) and Joseph Piotroski (2000).

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Creating the Fundamental Scorecard

The S&P/ASX200 provides the starting point for the universe of stocks we investigated.

Notes on the data:

- The period investigated is the ten years from 30 June 1996 to 30 June 2006
- To avoid look-ahead bias, ratios were calculated using inputs end of March and end of September each year– this ensures that results for December and June reporting seasons were available.

Overview

Across the investment universe we constructed component signals, using interim and final financial statement data. The component signals were grouped into categories of Earnings and Profitability, Naïve Extrapolation, Source of Funds, Accounting Conservatism and Financial Performance.

A company is given a 'Fundamental Score' as the sum across nine binary variables. The component variables are determined next as described in "The Fundamental Scorecard". A score of 1 in any particular area is considered to be a predictor of positive future performance.

We deviated from the academic papers in that many of the ratios, notably when applied to distressed companies, were not relevant when considered in the context of the ASX 200 universe.

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The Fundamental Scorecard

Category 1: Signals based in Earnings and Cash Flow Profitability
FS1: ROA, calculated from earnings, a profitability measure set to 1 if positive, 0 if negative.

ROA = EBIT / Average Total Assets between t = -1 and t = 0

FS1 = 1 if ROA > industry* median,
FS1 = 0 otherwise

FS2: CFROA, ROA calculated with cash from operations rather than earnings, as earnings may be less meaningful than cash flow for growth firms. Set to 1 if positive, 0 if negative.

CFROA = Net Cash from Operations / Average Total Assets between t = -1 and t = 0

FS2 = 1 if CFROA > industry median,
FS2 = 0 otherwise

FS3: Compares Cash flow from Operations against Net income to measure of earnings quality.

CFO/PL = Net Cash flow from operations / Operating Profit/(Loss) before taxation

FS3 = 1 if cash flow > net income
FS3 = 0 otherwise

FS4: Change in ROA. Change in ROA between current period and one year ago, 1 if positive, 0 otherwise.

FS4 = 1 if change in ROA between t = -1 and t = 0 is positive
FS4 = 0 otherwise

Category 2: Signals related to Naïve Extrapolation

FS5: Variability of ROA vs industry median: calculated as the standard deviation of a firm's ROA over the past 3 years. This is intended to measure the predictability of earnings.

ROA variability = Stdev(ROA) vs Median Industry Stdev(ROA)

FS5 = 1 if earnings variability is less than industry median
FS5 = 0 otherwise

FS6: Variability of Sales Growth vs industry median: to measure stability of growth. The standard deviation was calculated over three years.

* Industry relative comparisons are considered relative to Barra Sectors.

Sales Growth Variability = Stdev(sales growth) vs industry median stdev (sales growth)

FS6 = 1 if sales growth variability is less than industry median
FS6 = 0 otherwise

Category 3: Source of funds signal

FS7: Equity offering: set to 0 if the firm raised equity in the year prior to portfolio formation, else 1.

Equity offering may be a signal that the firm cannot raise enough funds internally, is issuing capital when their share price is likely to be depressed and is raising the cost of capital.

FS7 = 0 if placement
FS7 = 1 otherwise

Category 4: Signals related to Accounting Conservatism

We used CAPEX relative to Total Assets as our factor in this category.

FS8: Capital Expenditure scaled by Average Total Assets.

FS8 = 1 if the rate of CAPEX is greater than the industry median
FS8 = 0 otherwise

Category 5: Financial Performance Signals: Operating Efficiency

FS9: Asset Turnover: Change in asset turnover in the year before portfolio formation (1 if increased, 0 otherwise).

Asset Turnover = Operating Revenue (sales) / Average Total Assets between t = -1 and t = 0

FS9 = 1 increased between t = -1 and t = 0
FS9 = 0 otherwise

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The JPQ Fundamental Scorecard: Backtest Results

The backtest results are quite promising, with fairly monotonic quintile spreads and strong T-stats over the entire test period.

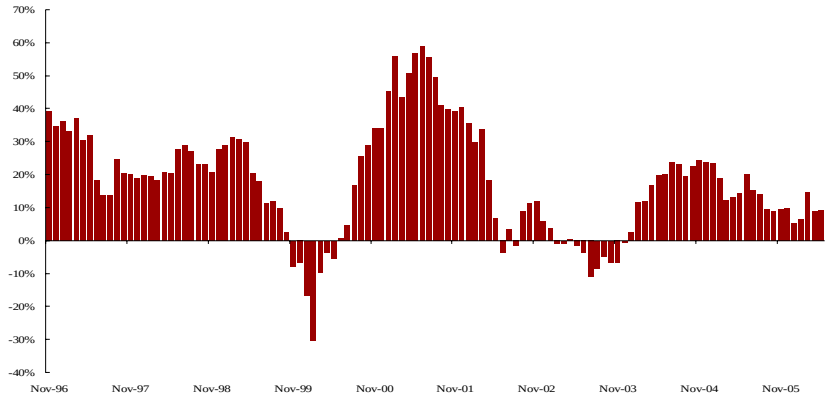
Figure 30: Factor Backtest output – Fundamental Scorecard

Fundamental Scorecard

3 Years to Jun-2000			3 Years to Jun-2003			3 Years to Jun-2006			Dec-1995 to Jun-2006		
Quintile	**Avg Ret**	**% Out Perf.**	**Quintile**	**Avg Ret**	**% Out Perf.**	**Quintile**	**Avg Ret**	**% Out Perf.**	**Quintile**	**Avg Ret**	**% Out Perf.**
1	1.13%	67%	1	0.52%	56%	1	2.40%	64%	1	1.32%	63%
2	1.06%	61%	2	0.31%	58%	2	1.98%	39%	2	1.11%	54%
3	0.28%	26%	3	-0.31%	44%	3	2.01%	58%	3	0.61%	40%
4	0.41%	48%	4	-0.86%	33%	4	2.06%	47%	4	0.52%	44%
5	-0.19%	37%	5	-1.43%	44%	5	1.42%	42%	5	-0.09%	40%
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5			**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**			**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**			**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**		
Strategy	**Avg Ret**	**% Out Perf.**	**Strategy**	**Avg Ret**	**% Out Perf.**	**Strategy**	**Avg Ret**	**% Out Perf.**	**Strategy**	**Avg Ret**	**% Out Perf.**
Long/Short	1.3%	63.0%	Long/Short	2.0%	69.4%	Long/Short	1.0%	72.2%	Long/Short	1.4%	67.5%
	T-Stat			**T-Stat**			**T-Stat**			**T-Stat**	
Long/Short	2.00		Long/Short	2.18		Long/Short	2.92		Long/Short	3.58	

Source: J.P. Morgan Quant

Figure 31: Rolling Twelve Month Performance – Fundamental Scorecard



Source: J.P. Morgan Quant

The objective of this paper is to present the Fundamental Scorecard in the context of a complete Quantitative factor model, so we do not pursue independent portfolio simulations for this factor. We note that prior work on this factor delivered 3% alpha on simulations targeting 4% tracking error, with 15% p.a turnover. (2 March Quant Concepts). This modified version of that paper has similar performance characteristics, due to the strong backtest results presented below. Simulation results of the independent model are not presented, but available on request

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Modifying the Model Portfolio

Our standard model portfolio is constructed from the following Factor Families:

- 20% Price Momentum Family:
- 30% Earnings Momentum Family
- 20% Value Family
- 30% Shareholder Value

The Shareholder Value family has as one of its components a Health Score which is derived along similar principles to the Fundamental Scorecard. We wanted to investigate how the model would perform with the Health Score replaced by the strongly performing Fundamental Scorecard.

The model portfolio is outlined below, with more detail on the components provided in the JPQ Factor Companion.

Price Momentum Family

- 40% Price Mom (avg 1, 3, 6, 12 mth performance)
- 40% 3mth Price Acceleration
- 20% True Market Surprise

Earnings Momentum Family

- 40% Earnings Potential
- 20% One Year Forward Earnings (70% 1 mth, 30% three mth)
- 40% Co-efficient variation / 1 yr fwd Earnings

Value Family

- 50% Forward PE relative to Sector
- 12.5% Value to Growth
- 12.5% Forward PE relative to History
- 25% one year forward PE

Shareholder Value Family

- 30% One year average ROE
- 60% Health Score
- 10% ROE Growth

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What is the Health Score?

The JPQ Health Score, which whose contribution to the model is being evaluated relative to the Fundamental Scorecard, is comprised of the following components:

Altman Z Score	- 35%
Asset Turnover Trend	- 35%
Asset Turnover	- 15%
EBIT Margin Trend	- 15%

The Health Score has performed poorly since 2001 (see JPQ Factor Companion).

Comparing the factor backtest below with that for the Fundamental Scorecard previously suggest that the factors have performed reasonably alike over the test period. The tests demonstrate a slightly better quintile spread for the Fundamental Scorecard, aided by poorer performance of Q5. The Health Score had an IC of around 2% for the test period, whereas the Fundamental Scorecard delivered an IC closer to 4%. The long short result in particular is in favour of the Fundamental Scorecard, with a monthly return of 1.4% compared to 0.6% below, and a T-stat of 3.58 vs 2.91.

Health Score: Backtest Results

Figure 32: Factor Backtest output – Health Score

JPQ Health Score

3 Years to Jun-2000			3 Years to Jun-2003			3 Years to Jun-2006			Dec-1995 to Jun-2006		
Quintile	**Avg Ret**	**% Out Perf.**	**Quintile**	**Avg Ret**	**% Out Perf.**	**Quintile**	**Avg Ret**	**% Out Perf.**	**Quintile**	**Avg Ret**	**% Out Perf.**
1	1.42%	70%	1	0.63%	69%	1	2.17%	61%	1	1.41%	67%
2	0.54%	46%	2	0.25%	58%	2	1.88%	42%	2	0.84%	48%
3	0.66%	43%	3	-0.47%	47%	3	1.99%	53%	3	0.72%	47%
4	0.18%	37%	4	-0.30%	33%	4	1.90%	44%	4	0.53%	38%
5	0.57%	44%	5	-0.38%	44%	5	2.20%	53%	5	0.76%	47%
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5			**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**			**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**			**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**		
Strategy	**Avg Ret**	**% Out Perf.**	**Strategy**	**Avg Ret**	**% Out Perf.**	**Strategy**	**Avg Ret**	**% Out Perf.**	**Strategy**	**Avg Ret**	**% Out Perf.**
Long/Short	0.8%	70.4%	Long/Short	1.0%	63.9%	Long/Short	0.0%	58.3%	Long/Short	0.6%	65.1%
	T-Stat			**T-Stat**			**T-Stat**			**T-Stat**	
Long/Short	2.43		Long/Short	2.65		Long/Short	-0.09		Long/Short	2.91	

Source: J.P. Morgan Quant

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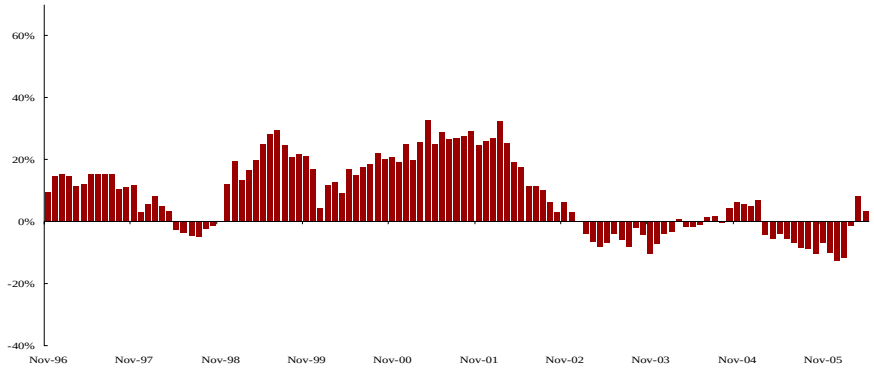
Figure 33: Rolling Twelve Month Performance – Health Score



Source: J.P. Morgan Quant

Portfolio Simulations

The factor backtests were encouraging enough to warrant investigating how the Fundamental Scorecard Factor performs as part of a complete Quantitative Model. We ran portfolio simulations on the model below, with the simulation parameters presented overleaf.

Simulation Parameters

The parameters of the simulation were as follows:

- Period covered: 30/06/1996 to 30/06/2006.
- An ex-ante tracking error target was set at 4%.
- Sector constraints were set at +/- 4%. Sectors were based on GICS, with gold, materials, metal and mining deconstructed.
- Active position sizes relative to the S&P/ASX200 were varied across market capitalisation bands to make some allowance for liquidity. The bands and allowable positions were as follows:

Top 20 :	+/- 5%	
21-50 :		+/- 4%
51-100:		+/- 3%
101-200:	+/- 2%	

BARRA risk factors were constrained to +/- 0.5 standard deviations

- Transaction costs were assumed to be 1% of trade size (50bps each way).
- There were no liquidity constraints on position sizes.
- The portfolio held between 35 and 60 stocks over the simulation period.
- Turnover was limited to 20% per month.

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A summary of the performance statistics for portfolio simulations conducted for periods ending 30 June 2006 is presented below, with a calendar year breakdown and cumulative performance chart on the following pages. The simulation results are supported by Factor Backtests, which were marginally in favour of the Fundamental scorecard in the recent period, but less conclusive over the longer term.

Figure 34: Portfolio Simulation Performance Summary

Periods to 30/06/06	ASX 200	Model incl. FS	Std Model
Last Year	23.8%	33.9%	30.0%
Last Three Years	24.1%	29.9%	29.2%
Last Five Years	12.2%	18.5%	18.3%

Source: J.P. Morgan Quant

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Figure 35: Calendar Year Simulation output

Post Transaction Cost Analysis T-Cost: 0.50%	ASX 200	Excess return with Fundamental Scorecard	Excess return of Standard Model	Model comparison
Entire Period				
Annualised	13.08%	4.36%	4.96%	-0.60%
Tracking Error		4.1%	4.1%	
Information Ratio		1.06	1.20	
2006				
Total	8.80%	5.15%	2.08%	3.07%
Tracking Error		4.4%	3.0%	
Information Ratio		1.16	0.69	
2005				
Total	22.93%	2.22%	1.44%	0.79%
Tracking Error		3.3%	3.5%	
Information Ratio		0.66	0.41	
2004				
Total	28.12%	1.37%	3.50%	-2.13%
Tracking Error		2.9%	3.2%	
Information Ratio		0.48	1.09	
2003				
Total	14.79%	2.47%	2.84%	-0.38%
Tracking Error		4.6%	4.5%	
Information Ratio		0.54	0.63	
2002				
Total	-9.06%	4.08%	3.33%	0.74%
Tracking Error		4.4%	4.4%	
Information Ratio		0.93	0.76	
2001				
Total	10.26%	2.32%	5.19%	-2.87%
Tracking Error		4.1%	3.2%	
Information Ratio		0.57	1.64	
2000				
Total	5.56%	2.41%	5.49%	-3.08%
Tracking Error		4.3%	5.0%	
Information Ratio		0.56	1.09	
1999				
Total	16.07%	6.01%	7.36%	-1.34%
Tracking Error		6.0%	5.7%	
Information Ratio		1.01	1.28	
1998				
Total	10.82%	10.65%	11.29%	-0.64%
Tracking Error		3.9%	3.9%	
Information Ratio		2.75	2.86	
1997				
Total	11.62%	-0.92%	1.31%	-2.23%
Tracking Error		3.6%	4.2%	
Information Ratio		-0.26	0.31	
1996				
Total	9.70%	8.29%	7.62%	0.67%
Tracking Error		3.7%	4.0%	
Information Ratio		2.23	1.92	

Source J.P. Morgan

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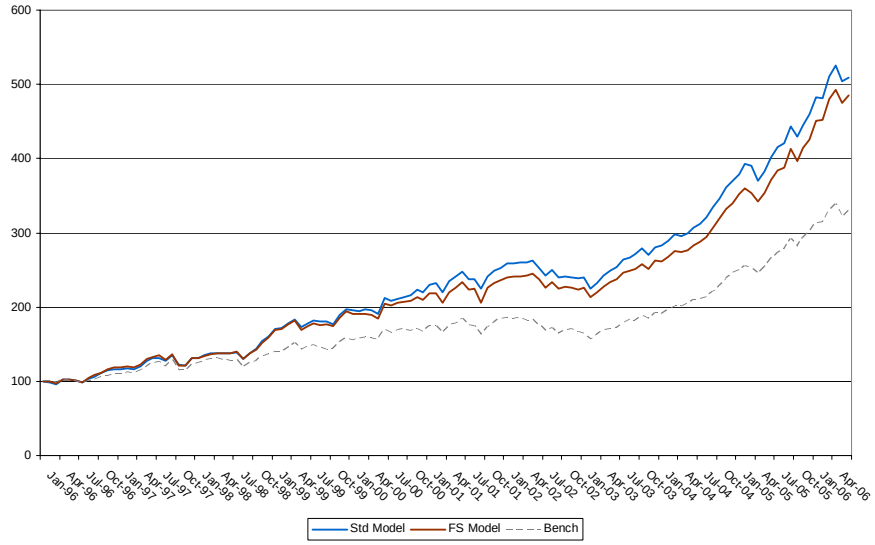
Figure 36: Cumulative Performance of Models



Source J.P. Morgan

Conclusion

The Fundamental Scorecard, relevant for universe of stocks like the ASX200, delivered strong performance in factor backtests. Independently, it is an effective stock selection tool.

When merging this factor into a complete (and well performing) factor model, we found that while the results we stronger over the recent history, longer term the modified model did not perform as well as our standard model.

References

Mohanram, P, 'Separating Winners from Losers among Low Book-to-Market Stocks using Financial Statement Analysis', *Review of Accounting Studies* (10), 2005, 133-170.

Piotroski, J., 'Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers', *Journal of Accounting Research*, Vol 38, Supplement 2000, 1- 41.

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Figure 37: Factor Backtest output – Standard JPQ Model

Standard Model
Factor Performance Statistics: 1MthFwd

3 Years to Jun-2000 Quintile Statistics					3 Years to Jun-2003 Quintile Statistics					3 Years to Jun-2006 Quintile Statistics					Dec-1995 to Jun-2006 Quintile Statistics				
Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.
1	1.93%	3.8%	78%	22%	1	1.48%	3.4%	81%	19%	1	2.54%	3.3%	69%	31%	1	1.97%	3.5%	76%	24%
2	1.01%	3.8%	61%	39%	2	0.57%	3.2%	67%	33%	2	2.05%	2.9%	42%	58%	2	1.18%	3.4%	57%	43%
3	0.77%	3.5%	50%	50%	3	0.35%	3.7%	56%	44%	3	1.66%	2.6%	44%	56%	3	0.91%	3.3%	50%	50%
4	0.48%	3.7%	44%	56%	4	-0.31%	3.8%	42%	58%	4	2.12%	2.6%	58%	42%	4	0.72%	3.6%	48%	52%
5	-0.74%	5.2%	20%	80%	5	-2.07%	7.4%	22%	78%	5	1.75%	3.1%	31%	69%	5	-0.41%	5.6%	24%	76%
Significance Statistics					**Significance Statistics**					**Significance Statistics**					**Significance Statistics**				
Significant Positive T-Stats (%)			54%		Significant Positive T-Stats (%)			53%		Significant Positive T-Stats (%)			17%		Significant Positive T-Stats (%)			43%	
Significant Negative T-Stats (%)			4%		Significant Negative T-Stats (%)			8%		Significant Negative T-Stats (%)			8%		Significant Negative T-Stats (%)			6%	
Average T-Stat			1.71		Average T-Stat			1.72		Average T-Stat			0.62		Average T-Stat			1.40	
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**				
Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.
Long/Short	2.7%	3.0%	83.3%	16.7%	Long/Short	3.6%	5.4%	75.0%	25.0%	Long/Short	0.8%	2.2%	75.0%	25.0%	Long/Short	2.4%	3.8%	78.6%	21.4%
	T-Stat					**T-Stat**					**T-Stat**					**T-Stat**			
Long/Short	6.46				Long/Short	3.95				Long/Short	2.16				Long/Short	7.01			

Source: J.P. Morgan Quant

Figure 38: Factor Backtest output – Standard JPQ Model with Fundamental Scorecard replacing the Health Score

Standard Model with Fundamental Scorecard
Factor Performance Statistics: 1MthFwd

3 Years to Jun-2000 Quintile Statistics					3 Years to Jun-2003 Quintile Statistics					3 Years to Jun-2006 Quintile Statistics					Jan-1996 to Jun-2006 Quintile Statistics				
Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Quintile	Avg Ret	St Dev	% Out Perf.	% Under Perf.
1	1.85%	3.8%	79%	21%	1	1.32%	3.5%	78%	22%	1	2.63%	3.2%	67%	33%	1	1.92%	3.6%	75%	25%
2	0.87%	3.6%	51%	49%	2	0.64%	2.8%	64%	36%	2	2.15%	2.8%	58%	42%	2	1.17%	3.2%	57%	43%
3	0.70%	3.6%	57%	43%	3	0.57%	3.3%	64%	36%	3	1.85%	2.5%	42%	58%	3	0.99%	3.2%	54%	46%
4	0.27%	3.7%	40%	60%	4	-0.44%	4.3%	42%	58%	4	1.70%	2.9%	31%	69%	4	0.48%	3.8%	38%	62%
5	-0.75%	5.3%	26%	74%	5	-2.09%	7.5%	33%	67%	5	1.79%	3.2%	36%	64%	5	-0.40%	5.7%	31%	69%
Significance Statistics					**Significance Statistics**					**Significance Statistics**					**Significance Statistics**				
Significant Positive T-Stats (%)			49%		Significant Positive T-Stats (%)			61%		Significant Positive T-Stats (%)			22%		Significant Positive T-Stats (%)			45%	
Significant Negative T-Stats (%)			6%		Significant Negative T-Stats (%)			8%		Significant Negative T-Stats (%)			8%		Significant Negative T-Stats (%)			7%	
Average T-Stat			1.62		Average T-Stat			1.72		Average T-Stat			0.66		Average T-Stat			1.37	
Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**					**Long Short Strategy Statistics Portfolio(s) 1 less Portfolio(s) 5**				
Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.	Strategy	Avg Ret	St Dev	% Out Perf.	% Under Perf.
Long/Short	2.6%	3.1%	84.9%	15.1%	Long/Short	3.4%	5.4%	72.2%	27.8%	Long/Short	0.8%	2.6%	69.4%	30.6%	Long/Short	2.3%	3.9%	76.8%	23.2%
	T-Stat					**T-Stat**					**T-Stat**					**T-Stat**			
Long/Short	6.14				Long/Short	3.79				Long/Short	1.94				Long/Short	6.68			

Source: J.P. Morgan Quant

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Paper 4

Recommendations Analysed

2002 saw the US broking and investment bank community came under a lot of pressure:

" … the evidence showed … publicly stated assessment of stocks was often false, and did not represent the privately stated opinions of the firm's analysts" and "analysts writing reports at times functioned essentially as sales representatives for the firm's investment bankers…"

Testimony of New York State Attorney General, Eliot Spitzer, June 26, 2002.

With this as a global backdrop, the buy-side community may serve their clients well by being critically sceptical of the value of sell-side analyst's research. However,

"Evidence of significant abnormal returns implies that recommending brokers have stock picking ability."

Aitken, Muthuswamy and Wong, 2000 *"The Impact of Brokers' Recommendations: Australian Evidence" UNSW*

With such diverse views, we wanted to see if Analysts' Buy/Sell Recommendations in Australia had merit stand-alone strategy, and if we could use Recommendations to improve existing quantitative signals. We felt perhaps analysts could provide guidance in the choice between *value* and *value-for-reason* stocks, and filter the quality of Earning Revisions signals.

Similar to Jeegadeesh et al. (2004) in the US, who found "the quarterly change in consensus recommendations is a robust predictor that appears to contain information that is orthogonal to a large range of other predictive variables", we find ***there is value in Changes in Analyst Buy/Sell Recommendations***. This value is best captured when Changes in Analysts Buy/Sell Recommendations act as a confirmation or filter of other signals.

- Quantitative managers may find signal strength is improved if Analyst Buy/Sell Recommendations are used as a sort or filter on an existing signal.
- Fundamental Mangers may find Changes in Analyst Buy/Sell Recommendations act as confirmation of their insights.

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Introduction

This paper attempts to strengthen existing quantitative signals using Analyst Recommendation changes as a filter or confirming signal. We investigate the following topics:

- Has there been a change in the Distribution of Analyst Recommendations, especially post-Spitzer?
- Does the Level of Analyst Buy/Sell Recommendations have information content, especially in the past few years as a result of greater focus on them?
- Do Changes in the Level of Analyst Buy/Sell Recommendations have information content?
- Can Changes in the Analyst Buy/Sell Recommendations improve a Valuation signal?
- Can Changes in the Analyst Buy/Sell Recommendations improve an Earnings based signal?

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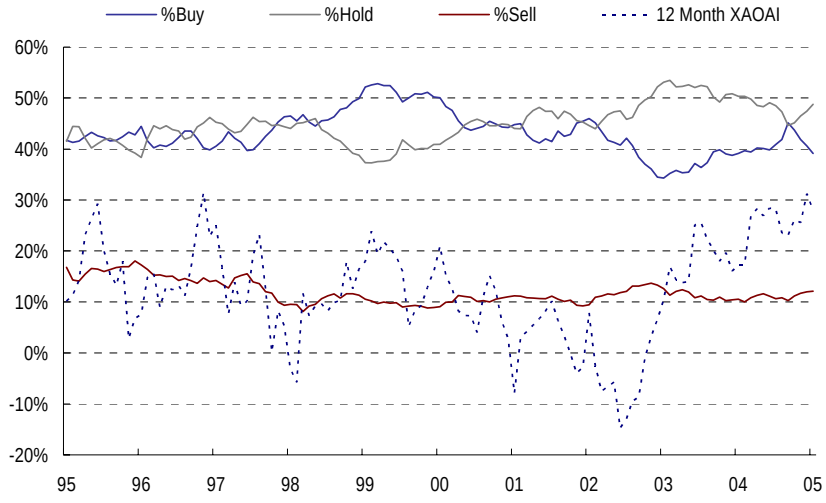
1. Has there been a change in the Distribution of Analyst Recommendations?

The figures below provide a graph of the distribution of analyst forecasts. We present the aggregate level of Buy/Hold/Sell Recommendations as monthly observations, with the 12 month return of the All Ordinaries Accumulation Index overlaid. We also looked at the percentage of Recommendations being increased or decreased each month (not shown). Given the volatility of the series, there does not appear to have been a significant change in the overall shape in the distribution of Analyst Buy/Sell Recommendations distributions.

However, the Spitzer report came out 26 June 2002. In the twelve months following the level of buy recommendations decreased from 45% to 35%, with the level of hold recommendations taking up the slack. Just as the twelve month return for the All Ords was bottoming around Feb/Mar 03 at -14.7%, the level of Buy Recommendations was trending down from 46% in September 02 to 34% in September 03. As the market began to pick up, so too did the level of Buy Recommendations. Without over emphasizing a short sample period, during this time sell recommendations increased from 9.5% to 13.7%

Its hard to say whether the change in Recommendations lags the market or not, anecdotally the observation is arguable. Our objective is stock specific guidance rather than market timing, and the following studies address stock selection. (We note that the level of buy recommendations is approaching post of '02 lows, perhaps due to high levels of valuation - a precursor of poor returns?)

Figure 39: Percentage of BUY/HOLD/SELL recommendations in the market measured at month end.



Source: IRESS, IBES Consensus Data

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2. Does the Level of Analyst Buy/Sell Recommendations have information content?

The absolute Level of Analyst Buy/Sell Recommendations DO NOT have information content

Below we present a table of the results when five portfolios are created from the ASX200 sorted by the Level of Analyst Recommendations, and held for one month. The recommendation categories spanned the spectrum from Strong Buy, Buy, Hold, Sell to Strong Sell. We transformed the data so that "Strong Buys" would appear in Quintile 1 and "Strong Sells" in Quintile 5.

The results from portfolios created using only the Level of Analyst Recommendations were poor. The quintile performance spread was not consistent nor monotonic from 1 to 5. The Level of Analysts Recommendations were not good predictor of return when used in this way.

We also created a long/short portfolio by taking stocks in the top quintile less stocks in the bottom quintile (Quintile 1 long, Quintile 5 short). T-stats changes sign between 1 and 5 years for this strategy. We also present a ten year history of twelve month rolling returns.

The results of portfolios constructed from the level of Analyst Recommendations were poor. We felt these did not warrant further investigation.

Jegadeesh et al (2004) on US data found "the *level* of the consensus recommendation adds value only among stocks with favourable quantitative characteristics (ie., value stocks and positive momentum stocks)." After they controlled for the predictive power of other characteristics, the marginal predictive power of recommendations was weak.

Table 1: Mean Recommendation Level

	Quintile Statistics (Average Monthly Return)		
Quintile	Last Year	Last Three Years	Last Five Years
1	4.0%	2.7%	0.9%
2	3.8%	2.4%	1.3%
3	4.1%	2.6%	1.7%
4	2.8%	2.2%	1.4%
5	3.2%	2.4%	1.5%
Long/Short Strategy (Quintile 1 - Quintile 5)	0.7%	0.3%	-0.6%
Long/Short Strategy (*t*-Stat)	1.16	0.69	-1.42

Source: IRESS, IBES, JP Morgan

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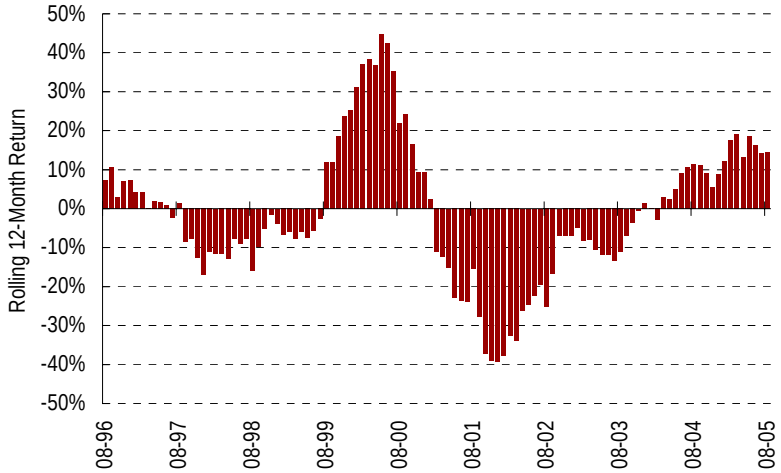
Figure 40: Rolling 12 Month Performance – P1 less P5



Source: IRESS, IBES, JP Morgan

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J.P.Morgan

3. Do Changes in the Level of Analyst Buy/Sell Recommendations have Information Content?

Changes in Analyst Recommendations DO have information content…

Each month we created portfolios of the top and bottom quintiles based on Changes in the Mean Level of Analyst Buy/Sell Recommendations over three months – a long/short strategy formed from Quintile 1 less Quintile 5 as before.

Our test results are presented in Table 2 below. The performance of Changes in the Level of Buy/Sell Recommendations as a stand-alone signal, while not statistically significant at the 5% level, is quite strong. This suggests that Changes in the Mean Level of Analyst Buy/Sell Recommendations has had some information content over the last five years.

Figure 41: Rolling 12 Performance of Long/Short formed from Quintile 1 less Quintile 5 graphs a ten year history of rolling twelve month returns, Figure 42: Information Coefficient - Changes in Level of Recommendation over 3 months shows an average IC over the period = 2.2%. Figure 43 presents Cumulative Performance of Quintile 1 *and* Quintile 5, while Figure 44 shows the hit ratio.

Table 2: 3-Month Change in Mean Recommendation; Summary Performance Statistics

	Quintile Statistics (Average Monthly Return)		
Quintile	Last Year	Last Three Years	Last Five Years
1	4.1%	2.7%	1.5%
2	3.6%	2.3%	1.5%
3	3.3%	2.1%	1.3%
4	3.2%	2.3%	1.2%
5	3.2%	2.5%	1.0%
Long/Short Strategy (Quintile 1 - Quintile 5)	0.8%	0.3%	0.6%
Long/Short Strategy (*t*-Stat)	1.77	0.88	1.45

Source: IRESS, IBES, JP Morgan

Figure 41: Rolling 12 Performance of Long/Short formed from Quintile 1 less Quintile 5

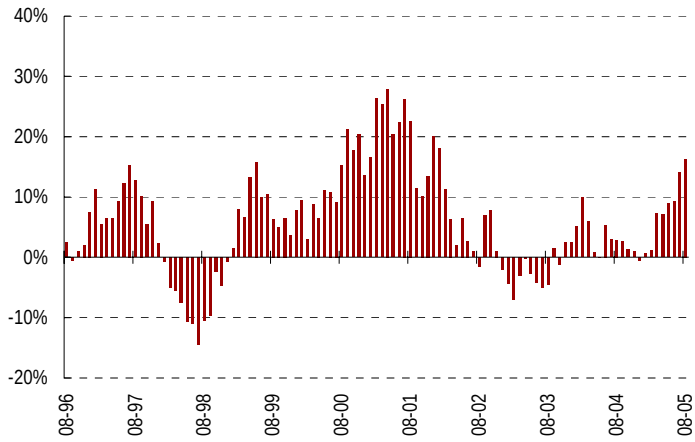

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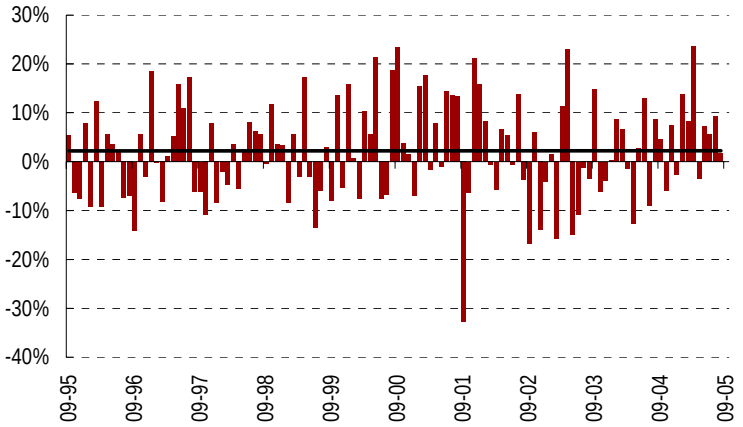
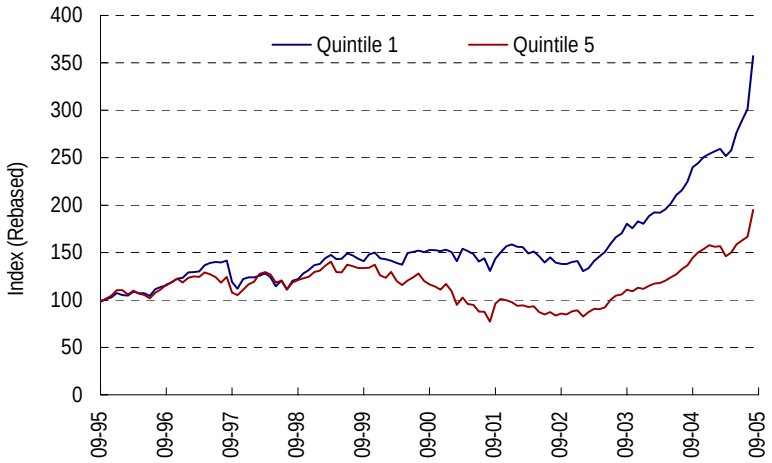
Figure 42: Information Coefficient - Changes in Level of Recommendation over 3 months



Source: IRESS, IBES, JP Morgan

Figure 43: Changes Mean Level Of Recommendations (3 month) - Quintile 1 *and* Quintile 5 Cumulative Performance



Source: IRESS, IBES, JP Morgan

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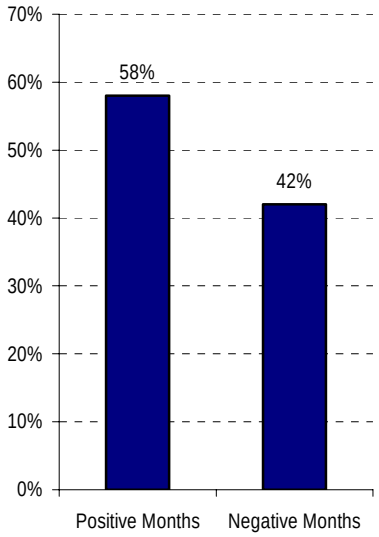
Figure 44 - Percentage of Months Long-Short Strategy is Positive



Source: IRESS, IBES, JP Morgan

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4. Can Changes in the Level of Analyst Buy/Sell Recommendations improve a Valuation signal?

We tested a Sector Relative One Year Forward PE Valuation measure, with and without sorting by Three Month Changes in Mean Analyst Buy/Sell Recommendations.

Firstly we created six equally sized portfolios from the ASX200, sorted purely on Sector Relative Forward PE. We then took the top and bottom portfolios sorted by this measure, P1 and P6, and created a long/short portfolio as "P1 less P6". These were rebalanced at each month end. This provides the control group (Val only) for the second part of the study.

For the study group of portfolios we created terciles of the ASX 200 sorted by Sector Relative Forward PE. Further we sorted each tercile into two portfolios by Three Month Changes in Analyst Buy/Sell Recommendation. This then created six equally sized portfolios.

We then created a long/short portfolio as "P1 less P6" of the twice sorted list. We've called this group "Val by RC", short for Valuation measure sorted by Recommendation Changes.

In Table 3 below we present monthly average returns for one year, three year and five year periods ending 30 September. ***Sector relative one year fwd PE is made significantly stronger when augmented with Changes in Analyst Recommendations.***

Table 3: Control fwd PE Portfolios vs. Fwd PE Sorted by Recommendation Changes – Summary Performance Statistics

	Results of long/short strategy created from P1 less P6			
Year Ending	Val only Avg Monthly Return	Val with RC Avg Monthly Return	Val only t-statistics	Val with RC t-statistics
30/09/2005	-0.69%	0.70%	0.86	1.56
30/09/2004	-0.22%	0.48%	0.40	0.92
30/09/2003	1.49%	1.12%	1.50	1.54
30/09/2002	3.79%	3.20%	4.19	2.60
30/09/2001	3.75%	5.03%	2.12	2.50
30/09/2000	-1.57%	1.24%	0.74	0.83
30/09/1999	-0.73%	0.46%	0.59	0.47
30/09/1998	0.29%	1.31%	0.25	1.12
30/09/1997	2.49%	2.42%	3.09	4.63
30/09/1996	1.55%	1.08%	1.35	1.19
Sum	*10.17%*	*17.04%*		
Three Year Results				
30/09/2005	0.19%	0.77%	0.40	2.34
30/09/2002	1.99%	3.15%	1.93	3.36
30/09/1999	0.69%	1.40%	1.05	2.59
Sum	*2.87%*	*5.32%*		
Five Year Results				
30/09/2005	1.63%	2.11%	3.06	3.86
30/09/2000	0.41%	1.30%	0.66	2.80
Sum	*2.03%*	*3.41%*		

Source: IRESS, IBES, JP Morgan

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Below we present cumulative returns of P1 and P6. The long side (P1) is stronger and the short side is weaker (P6) when the valuation measure augmented by Changes in the Level of Analyst Recommendations. While both sides are strengthened, the long side benefited roughly twice as much as the short side from the additional information.

Figure 45: P1 and P6 Cumulative Returns, Fwd PE signal only

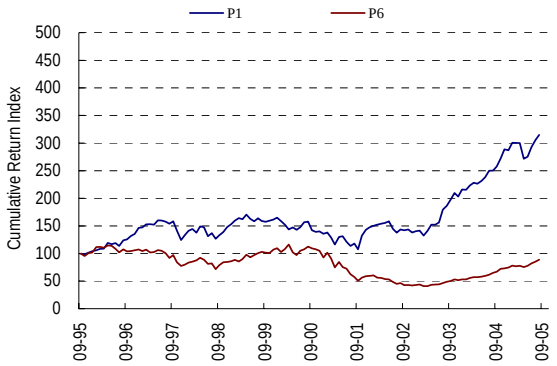


Figure 46: P1 less P6 Cumulative Returns Fwd PE signal sorted with Recommendation Changes

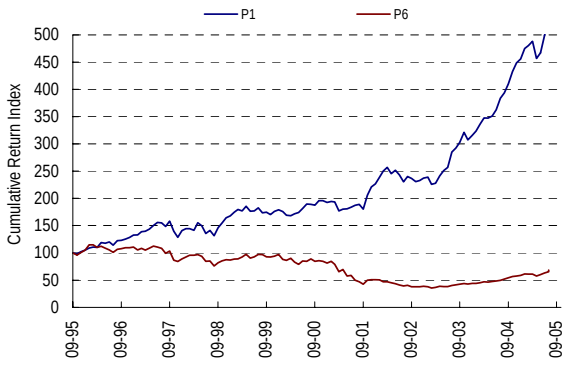


Figure 47: Rolling 12 Month Long/Short Return Fwd PE signal only

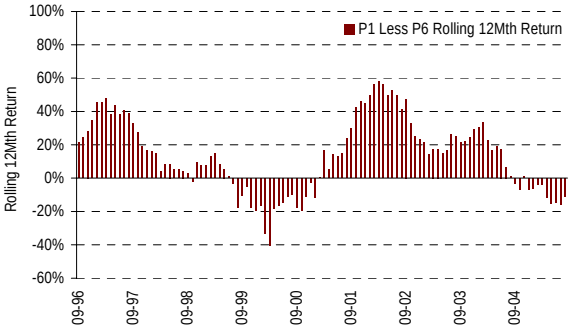
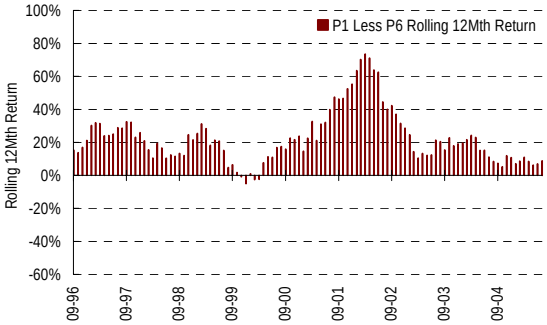


Figure 48: Rolling 12 Month Long/Short Return Fwd PE signal sorted with Recommendation Changes



Source: IRESS, IBES, JP Morgan

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5. Can Changes in the Level of Analyst Buy/Sell Recommendations improve the Earnings Revisions signal?

Company initiated changes in accounting practices and the move to IFRS may make Earnings Revisions unduly 'noisy', even after allowing for goodwill. We felt that Analysts may act as a *filter* on the Earnings Revisions, providing a confirming signal or rejecting stocks with poor quality revisions.

The Earnings definition that we used was consensus Earnings Revisions from IBES, before goodwill (post-goodwill prior 2000)

Over the following pages we present the results of the ASX200 sorted by Earning Revisions (the control group), and then ***filtered*** by Changes in Analyst Buy/Sell Recommendations (the study group). Our portfolio creation process was as follows:

The Control Group - ASX 200 sorted into six equally sized portfolios by Earning Revisions

The Study Group - the ASX 200 is firstly ***sorted*** by Three Month Earnings Revisions into Terciles. Each tercile is ***filtered*** according to whether Recommendation Changes confirms or rejects the exception from Earnings Revisions. Analyst Recommendation changes in effect act as an exclusion signal when considering allowing a stock into P1 or P6. This meant that P1 and P6 were not necessarily of equal size.

In the US Jegadeesh (2004) find that recommendation changes add value to characteristic-based investment strategies that include 12 other predictive variables."

We found that the results of Three Month Earnings Revisions, which were already quite strong, were not made consistently more robust or stronger when filtered by Consensus Buy/Sell Recommendation Changes.

IFRS is new to the Australian market place, and Analysts have not yet developed a track record in adding value in this environment. Our thesis was that Analysts would filter the quality of the Earning Revisions, and we have yet to have a long enough history to draw fair conclusions. Statistically, last year the results of Earnings Revisions are made are more robust (slightly higher T-stat) when filtered with Analysts Recommendation changes, however this came at a cost of some return.

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Table 4: Earnings Revisions vs Earnings Revisions Filtered by Recommendation Changes - Summary Long/Short Performance Statistics

One Year Statistics	Earnings Revisions Only	Earnings Revision Filtered by Recommendation Changes	Earnings Revisions Only	Earnings Revision Filtered by Recommendation Changes
Year Ending	Avg Monthly Return	Avg Monthly Return	t-stat	t-stat
30/09/2005	1.80%	1.34%	2.80	2.94
30/09/2004	0.79%	0.88%	1.54	2.41
30/09/2003	0.10%	-0.09%	0.07	0.10
30/09/2002	0.29%	-0.91%	0.17	0.58
30/09/2001	5.55%	5.72%	2.89	3.22
30/09/2000	2.13%	2.19%	1.95	1.63
30/09/1999	1.67%	2.21%	1.20	2.00
30/09/1998	4.89%	3.21%	3.38	2.60
30/09/1997	3.59%	2.67%	4.81	3.67
30/09/1996	3.00%	1.94%	3.95	5.56
Sum	*23.81%*	*19.16%*		
Three Year Results				
30/09/2005	0.89%	0.71%	1.62	2.02
30/09/2002	2.66%	2.33%	2.71	2.35
30/09/1999	3.38%	2.70%	4.64	4.58
Sum	6.94%	5.74%		
Five Year Results				
30/09/2005	1.71%	1.39%	2.62	2.38
30/09/2000	3.06%	2.44%	6.00	5.51
Sum	4.76%	3.83%		

Source: IRESS, IBES, JP Morgan

Figure 49 - Cumulative Performance of P1-P6 (Earnings Revisions only)

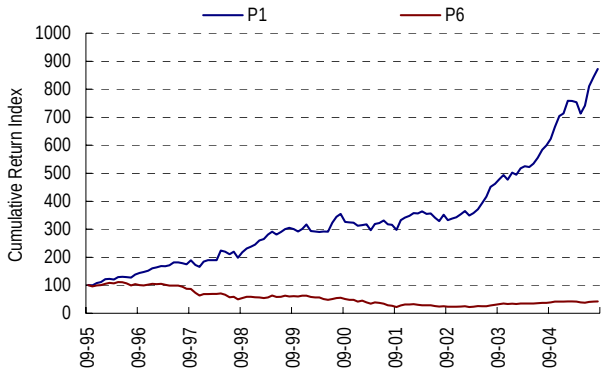
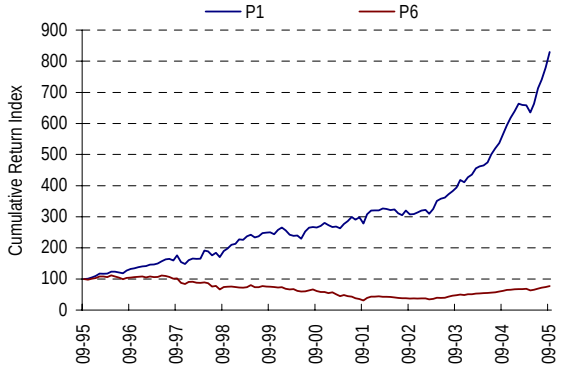


Figure 50 - Cumulative Performance of P1-P6 (Earnings Revisions filtered)



Source: IRESS, IBES, JP Morgan

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Figure 51 - Rolling 12m return P1-P6 (Earnings Revisions only)

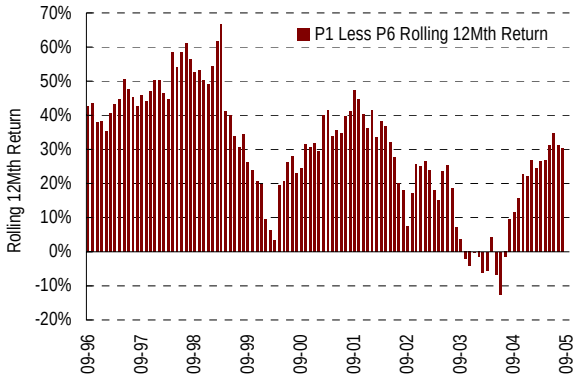
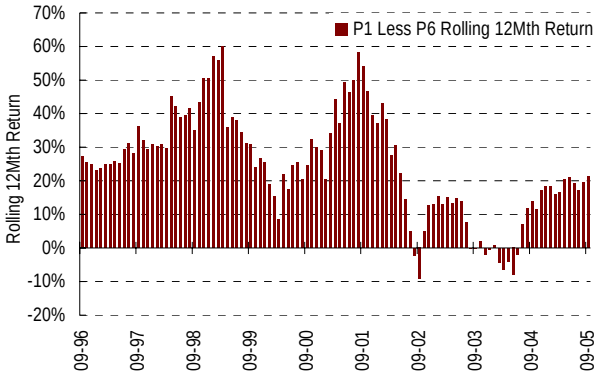


Figure 52 - Rolling 12m return P1-P6 (Earnings Revisions Filtered)



Source: IRESS, IBES, JP Morgan

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Conclusion

To summarise:

- Has there been a change in the Distribution of Analyst Recommendations, especially post-Spitzer?

  Post-Spitzer there was a slight reduction in the level of buy recommendations, however they have reverted to levels pre-Spitzer, and were perhaps more a reflection of market returns prevalent at the time.

- Does the Level of Analyst Buy/Sell Recommendations have information content, especially in the past few years as a result of greater focus on them?

  The performance of Changes in the Level of Buy/Sell Recommendations as a stand-alone signal, while not statistically significant at the 5% level, is quite strong. This suggests that Changes in the Mean Level of Analyst Buy/Sell Recommendations has some information content.

- Can Changes in the Analyst Buy/Sell Recommendations improve a Valuation signal?

  Sector relative one year fwd PE is made significantly stronger when augmented with Changes in Analyst Recommendations.

- Can Changes in the Analyst Buy/Sell Recommendations improve an Earnings based signal?

  We found that the results of Three Month Earnings Revisions, which were already quite strong, were not made consistently more robust or stronger when filtered by Consensus Buy/Sell Recommendation Changes If Analysts can improve the quality of this signal post IFRS, it will take more time for this to be brought out in the data..

References

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PAPER 5

The Effect of Imputation

Executive Summary

- This paper is a reference document that builds upon the 2 March 2006 edition of Quant Concepts, where we introduced the Gross Accumulation Index series ("Grossing up the Index").

- In this sequel paper we update performance statistics of the Gross indices and compare factor tests across a broad suite of factors on both a Net and Gross return basis.

- We present tables which contain a Factor Summary quantifying the effect of imputation credits on the returns of a suite of factors. We also provide a Complete Factor Analysis as an appendix.

- The 'Gross less Net' Quintile returns in factor back tests are not static around 1.6% (the franking yield of the ASX 200), which implies ***some factors have a bias with regard to imputation credits***.

- The quintile spread along the Value composite is the steepest and most monotonic, suggesting that ***Shareholder Value and Value factors focus on Imputation credits as a measure of value***

  Funds management would be more Value orientated.if imputation credits were measured

- The difference between Gross and Net returns for the Price Momentum factor is fairly uniform across the quintile spreads, suggesting ***stock returns for Momentum are not biased systematically with regard to imputation credits***. It may be that the strong nature of capital return overwhelms any dividend consideration in trading decisions.

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The Gross Index

In March 2006 J.P. Morgan Quant created a series of indices which "gross-up" dividends for Franking/Imputation Credits.

In Figure 53: ASX200 Index Return below we show the price returns, standard (net) accumulation returns and gross accumulation returns for the S&P/ASX 200 index over the last three years and recent relevant sub-periods. Figure 54: Decomposition of Gross Return we breakdown the Gross Return to determine how much return came from capital appreciation, net dividends and imputation credits.

Figure 53: ASX200 Index Return

Year Ended	ASX 200 Price Return	ASX 200 Net Accum	ASX 200 Gross Accum
June	1.44%	2.11%	2.24%
Quarter Ended June	-1.09%	-0.20%	0.01%
Financial year to date	6.52%	8.81%	9.43%
Year Ended…			
30/06/2006	18.62%	23.93%	25.54%
30/06/2005	21.08%	26.35%	27.98%
30/06/2004	16.72%	21.61%	23.21%

Source: IRESS, JPM Quant

Figure 54: Decomposition of Gross Return

	Capital Growth	Dividend Effect	Imputation Effect
June	1.44%	0.67%	0.13%
Quarter Ended June	-1.09%	0.89%	0.21%
Financial year to date	6.52%	2.29%	0.62%
Year Ended…			
30/06/2006	18.62%	5.31%	1.61%
30/06/2005	21.08%	5.28%	1.62%
30/06/2004	16.72%	4.89%	1.60%

Source: IRESS, JPM Quant

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Factor Summary – The Effect of Imputation Credits

The following graph and table present the difference between quintile returns on a gross and net basis. These differences highlight that factors have biases with regard to imputation credits.

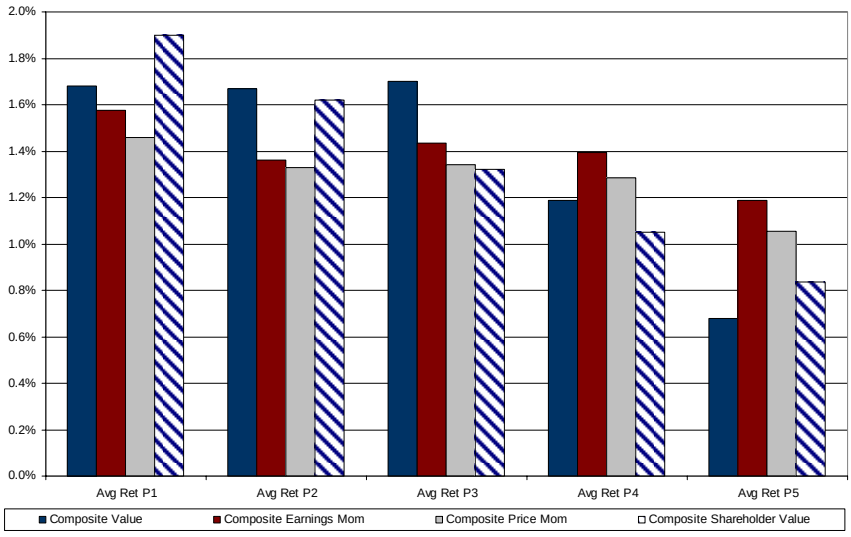
If there was no bias in factors towards imputation credits then you would expect to see a static (1.6%) difference between Gross less Net Quintile returns along the entire Quintile spread.

The quintile spread along the Shareholder Value and Value composite is the steepest and most monotonic, suggesting that these Value factors focus on Imputation credits as a measure of value.

The difference between Gross and Net returns for the Price Momentum factor is fairly uniform across the quintile spreads, suggesting stock returns for Momentum are not biased systematically towards imputation credits. It may be that the strong nature of capital return overwhelms any dividend consideration in determining momentum.

We have not made allowance for the 45 day rule, so the results are at the upper boundary of what may be expected in a portfolio setting.

Figure 55: Spread between Gross and Net Returns



Source: JPM Quant

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Figure 56: Spread between Gross and Net Returns

Factor	*Gross less Net Accumulation Returns*				
	Avg Ret P1	Avg Ret P2	Avg Ret P3	Avg Ret P4	Avg Ret P5
Historical P/E	1.75%	1.85%	1.57%	1.22%	0.43%
Historical Dividend Yield	1.48%	1.69%	1.82%	1.25%	0.56%
Historical Price to Cash Flow	1.49%	1.72%	1.53%	1.26%	0.75%
Historical Price to Book Value	1.07%	1.57%	1.64%	1.36%	1.03%
One-Year Forward P/E	1.59%	1.90%	1.54%	1.30%	0.59%
Forward P/E Relative to Sector	1.80%	1.58%	1.60%	1.16%	0.64%
Forward P/E Relative to History	1.22%	1.32%	1.80%	1.65%	1.11%
Value to Growth	1.37%	1.56%	1.50%	1.59%	0.75%
Value to Risk	1.81%	1.79%	1.67%	1.22%	0.50%
Momentum Factors					
Price Momentum	1.46%	1.35%	1.50%	1.32%	1.07%
Net Money Flows	1.51%	1.44%	1.40%	1.03%	1.34%
True Market Surprise	1.70%	1.21%	1.31%	0.95%	1.21%
Earnings Momentum	1.36%	1.72%	1.44%	1.57%	0.94%
Risk Adjusted Earnings Momentum	1.40%	1.60%	1.26%	1.43%	1.25%
Shareholder Value					
One-Year Avge ROE	1.67%	1.87%	1.64%	1.17%	0.48%
ROE Growth	1.18%	1.67%	1.44%	1.30%	1.27%
Consistent ROE Growth Rate	1.54%	1.77%	1.52%	1.36%	1.24%
Asset Turnover	2.22%	1.24%	1.28%	1.05%	0.58%
Asset Turnover Trend	1.11%	1.18%	1.21%	1.33%	1.24%
Asset EBIT Margin Trend	1.40%	1.13%	1.15%	1.15%	1.33%
JPMQ Health Score	1.88%	1.53%	1.35%	0.87%	1.21%
JPMQ Altman Z-Score	2.20%	1.52%	1.25%	0.94%	0.55%
Composites					
Composite Value	1.68%	1.67%	1.70%	1.19%	0.68%
Composite Earnings Mom	1.57%	1.36%	1.43%	1.39%	1.19%
Composite Price Mom	1.46%	1.33%	1.34%	1.29%	1.05%
Composite Shareholder Value	1.90%	1.62%	1.32%	1.05%	0.84%

Source: JPM Quant

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Appendix Paper 3: Factor Analysis for the ten years ending 31-Decemeber 2005.

Accum.	*Factor*	*Statistics*				*Factor Returns (p.a)*						*Gross less Net Accumulation Returns*					
		Avg IC	T-Stat	Hit Rate	Turnover	Avg Ret LS	Avg Ret P1 Long	Avg Ret P2	Avg Ret P3	Avg Ret P4	Avg Ret P5 Short	Avg Ret LS	Avg Ret P1 Long	Avg Ret P2	Avg Ret P3	Avg Ret P4	Avg Ret P5 Short
	Value Factors																
Net	Historical P/E	3.1%	3.21	62%	11%	14.94%	14.37%	15.45%	13.76%	10.54%	-0.51%						
Gross	Historical P/E	3.3%	3.44	62%	11%	16.20%	16.12%	17.30%	15.33%	11.77%	-0.08%	1.26%	1.75%	1.85%	1.57%	1.22%	0.43%
Net	Historical Dividend Yield	3.7%	2.99	57%	10%	17.55%	13.33%	14.93%	16.40%	12.90%	-3.64%						
Gross	Historical Dividend Yield	3.9%	3.12	58%	10%	18.40%	14.81%	16.63%	18.22%	14.15%	-3.08%	0.85%	1.48%	1.69%	1.82%	1.25%	0.56%
Net	Historical Price to Cash Flow	3.3%	3.44	60%	10%	16.23%	17.68%	12.94%	12.08%	11.49%	1.27%						
Gross	Historical Price to Cash Flow	3.4%	3.54	63%	10%	16.85%	19.17%	14.66%	13.61%	12.75%	2.01%	0.62%	1.49%	1.72%	1.53%	1.26%	0.75%
Net	Historical Price to Book Value	0.2%	0.18	47%	11%	0.84%	10.47%	11.13%	11.79%	8.96%	9.56%						
Gross	Historical Price to Book Value	0.1%	0.19	46%	11%	0.87%	11.55%	12.70%	13.43%	10.31%	10.59%	0.03%	1.07%	1.57%	1.64%	1.36%	1.03%
Net	One-Year Forward P/E	4.4%	3.30	68%	15%	16.45%	17.41%	16.35%	10.46%	10.42%	0.83%						
Gross	One-Year Forward P/E	4.6%	3.45	68%	15%	17.35%	19.00%	18.25%	12.00%	11.72%	1.43%	0.90%	1.59%	1.90%	1.54%	1.30%	0.59%
Net	Forward P/E Relative to Sector	3.0%	2.46	64%	15%	10.91%	14.02%	13.44%	15.36%	10.08%	2.82%						
Gross	Forward P/E Relative to Sector	3.2%	2.67	65%	15%	11.98%	15.82%	15.02%	16.97%	11.23%	3.47%	1.06%	1.80%	1.58%	1.60%	1.16%	0.64%
Net	Forward P/E Relative to History	-1.4%	-1.56	47%	21%	-5.92%	7.28%	13.25%	15.46%	14.63%	13.95%						
Gross	Forward P/E Relative to History	-1.5%	-1.50	47%	21%	-5.77%	8.50%	14.58%	17.27%	16.28%	15.06%	0.15%	1.22%	1.32%	1.80%	1.65%	1.11%
Net	Value to Growth	3.4%	1.43	58%	20%	5.82%	9.48%	14.89%	13.80%	15.82%	3.47%						
Gross	Value to Growth	3.5%	1.55	60%	20%	6.38%	10.86%	16.45%	15.30%	17.41%	4.23%	0.56%	1.37%	1.56%	1.50%	1.59%	0.75%
Net	Value to Risk	6.2%	4.56	70%	18%	24.10%	19.13%	16.37%	14.89%	10.04%	-4.08%						
Gross	Value to Risk	6.5%	4.73	71%	18%	25.35%	20.94%	18.16%	16.56%	11.27%	-3.58%	1.25%	1.81%	1.79%	1.67%	1.22%	0.50%
	Momentum Factors																
Net	Price Momentum	8.8%	4.48	73%	15%	33.55%	26.07%	17.57%	11.00%	6.54%	-5.73%						
Gross	Price Momentum	8.8%	4.48	72%	15%	33.62%	27.54%	18.92%	12.50%	7.86%	-4.66%	0.07%	1.46%	1.35%	1.50%	1.32%	1.07%
Net	Net Money Flows	2.0%	3.65	66%	38%	11.11%	17.85%	11.93%	9.26%	8.12%	6.12%						
Gross	Net Money Flows	1.9%	3.66	65%	38%	11.15%	19.35%	13.37%	10.67%	9.14%	7.45%	0.03%	1.51%	1.44%	1.40%	1.03%	1.34%
Net	True Market Surprise	5.3%	4.65	71%	25%	16.72%	19.28%	13.73%	12.46%	7.96%	2.22%						
Gross	True Market Surprise	5.3%	4.70	72%	25%	17.02%	20.98%	14.94%	13.77%	8.91%	3.43%	0.30%	1.70%	1.21%	1.31%	0.95%	1.21%
Net	Earnings Momentum	8.3%	5.67	78%	46%	30.61%	24.43%	18.27%	15.02%	6.05%	-4.83%						
Gross	Earnings Momentum	8.3%	5.68	79%	46%	30.78%	25.79%	19.99%	16.46%	7.63%	-3.90%	0.17%	1.36%	1.72%	1.44%	1.57%	0.94%
Net	Risk Adjusted Earnings Momentum	7.1%	6.96	78%	51%	24.52%	24.42%	16.38%	8.94%	8.26%	-0.08%						
Gross	Risk Adjusted Earnings Momentum	7.0%	6.91	78%	51%	24.39%	25.82%	17.98%	10.20%	9.69%	1.17%	-0.13%	1.40%	1.60%	1.26%	1.43%	1.25%

Source: JPM Quant

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Accum.	Factor	Statistics				Factor Returns (p.a)						Gross less Net Accumulation Returns					
		Avg IC	T-Stat	Hit Rate	Turnover	Avg Ret LS	Avg Ret P1 Long	Avg Ret P2	Avg Ret P3	Avg Ret P4	Avg Ret P5 Short	Avg Ret LS	Avg Ret P1 Long	Avg Ret P2	Avg Ret P3	Avg Ret P4	Avg Ret P5 Short
	Shareholder Value																
Net	One-Year Avge ROE	4.5%	3.95	61%	6%	17.18%	15.11%	16.01%	12.66%	10.52%	-1.79%						
Gross	One-Year Avge ROE	4.8%	4.18	63%	6%	18.32%	16.79%	17.88%	14.30%	11.69%	-1.31%	1.14%	1.67%	1.87%	1.64%	1.17%	0.48%
Net	ROE Growth	1.0%	2.40	58%	10%	6.65%	12.50%	16.07%	15.11%	7.85%	5.52%						
Gross	ROE Growth	0.9%	2.36	59%	10%	6.49%	13.68%	17.74%	16.55%	9.15%	6.79%	-0.15%	1.18%	1.67%	1.44%	1.30%	1.27%
Net	Consistent ROE Growth Rate	2.0%	1.47	58%	9%	4.58%	14.62%	14.65%	15.73%	14.43%	9.64%						
Gross	Consistent ROE Growth Rate	2.2%	1.54	56%	9%	4.81%	16.16%	16.43%	17.24%	15.79%	10.88%	0.23%	1.54%	1.77%	1.52%	1.36%	1.24%
Net	Asset Turnover	3.6%	3.61	63%	5%	17.15%	18.61%	8.56%	9.95%	9.29%	1.26%						
Gross	Asset Turnover	4.0%	3.91	61%	5%	18.67%	20.82%	9.80%	11.23%	10.34%	1.84%	1.52%	2.22%	1.24%	1.28%	1.05%	0.58%
Net	Asset Turnover Trend	1.4%	1.79	54%	7%	6.34%	13.33%	14.24%	8.97%	10.54%	6.61%						
Gross	Asset Turnover Trend	1.3%	1.73	54%	7%	6.15%	14.45%	15.43%	10.18%	11.87%	7.86%	-0.19%	1.11%	1.18%	1.21%	1.33%	1.24%
Net	Asset EBIT Margin Trend	1.0%	1.03	58%	7%	3.32%	15.61%	10.41%	9.80%	7.65%	11.93%						
Gross	Asset EBIT Margin Trend	1.0%	1.04	58%	7%	3.34%	17.01%	11.54%	10.94%	8.80%	13.26%	0.03%	1.40%	1.13%	1.15%	1.15%	1.33%
Net	JPMQ Health Score	2.4%	2.91	66%	7%	8.21%	17.85%	10.69%	8.74%	5.84%	8.97%						
Gross	JPMQ Health Score	2.6%	3.09	67%	7%	8.74%	19.73%	12.23%	10.08%	6.71%	10.18%	0.53%	1.88%	1.53%	1.35%	0.87%	1.21%
Net	JPMQ Altman Z-Score	5.0%	3.45	59%	5%	18.66%	17.09%	14.46%	8.71%	10.87%	-1.34%						
Gross	JPMQ Altman Z-Score	5.4%	3.73	60%	5%	20.23%	19.29%	15.98%	9.96%	11.81%	-0.79%	1.57%	2.20%	1.52%	1.25%	0.94%	0.55%
	Composites																
Net	Composite Value	3.2%	2.24	62%	16%	10.36%	13.38%	15.71%	12.60%	10.52%	2.76%						
Gross	Composite Value	3.4%	2.41	62%	16%	11.27%	15.06%	17.38%	14.30%	11.70%	3.44%	0.91%	1.68%	1.67%	1.70%	1.19%	0.68%
Net	Composite Earnings Mom	7.5%	6.05	78%	47%	24.45%	24.09%	15.75%	10.74%	6.82%	-0.30%						
Gross	Composite Earnings Mom	7.5%	6.03	78%	47%	24.57%	25.66%	17.11%	12.18%	8.21%	0.89%	0.12%	1.57%	1.36%	1.43%	1.39%	1.19%
Net	Composite Price Mom	8.8%	5.40	70%	27%	32.83%	25.83%	17.42%	12.75%	5.86%	-5.39%						
Gross	Composite Price Mom	8.8%	5.39	71%	27%	32.92%	27.28%	18.75%	14.09%	7.15%	-4.34%	0.09%	1.46%	1.33%	1.34%	1.29%	1.05%
Net	Composite Shareholder Value	3.8%	4.18	65%	7%	14.60%	18.08%	11.18%	9.15%	10.34%	3.07%						
Gross	Composite Shareholder Value	4.1%	4.43	68%	7%	15.52%	19.98%	12.80%	10.47%	11.39%	3.91%	0.92%	1.90%	1.62%	1.32%	1.05%	0.84%

Source: JPM Quant

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LITERATURE REVIEW 6

The 52- Week High and Momentum Investing

Subject: Price anchoring and the impact on behavioural biases.
Author: T. George, C-Y Hwang
Publication: Journal of Finance, Volume 59 No 5.
Date of Article: October 2004

J.P. Morgan Comment

The article provides interesting insight into momentum strategies. It suggests that the market has an anchor-and-adjust bias, finding that some common momentum strategies can be improved by considering the nearness of a stock to its 52-week high.

The article suggests that the phenomena driving positive and negative momentum may be different, implying different models may improve the returns available to investors.

Article Abstract

When coupled with a stock's current price, a readily available piece of information – the 52-week high price – explains a large portion of the profits from momentum investing. Nearness to the 52-week high dominates and improves upon the forecasting power of past returns (both individual and industry returns) for future returns. Future returns forecast using the 52-week high do not reverse in the long run. These results indicate that short-term momentum and long term reversals are largely separate phenomena, which presents a challenge to current theory that models these aspects of security returns as integrated components of the market's response to news.

Article Summary

The paper examines the 52-week high because models predict that traders are slow to react, or overreact, to good news. A stock whose price is near its 52 week high is one for which good news has recently arrived so may be at a time that any biases as to how traders react to news are at their highs, hence profits to momentum investing may be at their peaks.

The authors find that nearness to the 52-week high is a better predictor of future returns than past returns, and nearness to 52-week high has predictive power whether or not stocks have experienced extreme past returns.

"The results indicate that short-term under reaction is best characterised as an anchoring bias that the market resolves with the overcorrection that results in long-term reversals. The explanation for long-term reversals lies elsewhere, suggesting that separate theories of short and long term predictability in prices may be more descriptive than a theory that integrates both phenomena into a 'life cycle' of the market's response to news."

The authors then test various combinations of momentum strategies to highlight the power of the 52-week high phenomena.

Profits from (6,6) momentum strategies

The authors use three methodologies to form momentum portfolios:

52-week strategy: Stocks are ranked on $P_{i,t-1}$ / high $_{I,t-1}$, where $P_{i,t-1}$ is price of stock i at the end of month t-1. $High_{i,t-1}$ is the highest price of stock i during the 12-month period that end on the last day of the month t-1.

Jegadeesh and Titman (JT). Stocks are ranked according to past 6 month returns, and held for 6 months.

Maskowitz and Grinbaltt (MG). Past performance is 6 month value weighted industry return. Stocks are ranked according to their industries' performance. Top and bottom 30% of stocks within industries form equally weighted winner and loser portfolios.

When comparing the three strategies from Jan 1963 to Dec 2001, all three measures return approximately 45bp p.m for a (winner – loser strategy), with some January effect observed.

Pairwise comparisons

The authors then conduct pairwise nested comparisons of profits from the 52-week high strategy with the other two strategies. These tests identify whether the JT or MG tests have power conditional on the rankings of the 52-week high model, and vice versa as follows:

1. JT and 52 Week High

   Within the JT winner and loser groups, the 52-week high strategy still retains its profitability.

   Within 52-week high winner and loser portfolios, sorting stocks by JT's gives results that are not statistically significant.

   The results indicate that extremes of the distribution of 52-week high performance measures are better than JT's at predicting performance.

2. MG and 52 Week High

   When comparing 52 week high and the MG momentum strategy, both strategies retain similar profitability within groups sorted on the other strategy.

   The two strategies are independent enough to improve profits to momentum investing if they are combined.

Regressions

The authors then use a Fama-MacBeth style cross-sectional regressions, controlling for the effects of size and bid-ask bounce, to simultaneously compare the three (6,6) momentum strategies. They find that the coefficients of the 52-Week High strategy dominate those of the MG and JT strategies.
Results from a (6,12) strategy are quantitatively similar as those of the (6,6) strategy. The 52-Week High strategy dominates the others in magnitude and statistical significance, especially outside January, and the dominance is even greater when returns are risk-adjusted.

The results suggest that a momentum theory in which price level relative to anchor plays a role may be more descriptive of the data than existing theories based on overconfidence, conservatism, or slow diffusion of information. This also raises the question of whether theories of long term reversals that are built into existing theories should be part of a theory based on anchor-and-adjust bias.

Long term reversals

For the 52-week high strategy there is no evidence of reversals for winners or losers – the longer term (12-24 month post portfolio formation) coefficients are generally small and insignificant. If predictability is associated with anchor-and-bias these findings suggest that traders get it right when they finally do correct the initial bias in how they react to news.

There is evidence of reversal in the JT and MG momentum strategies, suggesting the momentum they identify is temporary.

The findings suggest that separate theories of short and long-term predictability in prices will be more descriptive of the data than a theory in which these phenomena are integrated.

Robustness

The authors compared the strength of the 52-week look back against various length of the JT and MG momentum strategies. It was found that the 52-week look back period dominated the return of the two alternates across the board.

Conclusion

After controlling for the size effect and the impact of the bid-ask bounce, returns associated with winners and losers from a 52-week high strategy are about twice as large as those from strategies based purely on individual return measures (Jegadessh

and Titman), or those based on winners and losers within industries (Moskowitz and Grinblatt).

These results suggest that there is opportunity to develop models where past returns predict future returns. Furthermore the authors found that long term reversals did not occur when measured on the basis of performance relative to the 52-week high. This implies that short term momentum and long term reversals are not likely to be components of the same phenomena.

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J.P.Morgan

Information Uncertainty and Stock returns

Subject: The effect of information uncertainty on investors' behavioural bias.
Author: X. Frank Zhang
Publication: Journal of Finance, Volume 61 No 1, pp 105-137
Date of Article: February 2006

J.P. Morgan Comment

The author finds that information uncertainty is positively correlated to future excess returns resulting from well known factors of earnings revisions and price momentum.

The results of the paper suggest that factors based on earnings revisions or price momentum may be improved by incorporating proxies for information uncertainty in the construction of the signals.

'Size' - the paper finds that firm size behaves more like a proxy for uncertainty than a risk factor. There may be more downside opportunity in small names than large cap names for a number of reasons, including the limited ability of long-only funds to underweight small securities (this may diminish with the popularity of long short funds and derivations). . For the S&P/ASX 200 we note that there are around 150 stocks have less than 50bp index weight, and around 80 names with an index weight of 10bp or less. This makes it difficult to take meaningful underweight positions and exploit information that may have negative implications for the stocks for much of the index. Overlay on top of this potential bias in analyst coverage to large or positive news names, and one finds quite a strong argument for small, bad news stocks having slow information assimilation.

Combining a normalized 'alpha factor' with a normalized 'information uncertainty' factor with some reasonable weighting may produce better factor returns. Testing the idea (see Paper 1) was to sorts stocks into Information Uncertainty bands.

Article Abstract

There is substantial evidence of short-term stock price continuation, which the prior literature often attributes to investor behavioral biases such as underreaction to new information. This paper investigates the role of information uncertainty in price continuation anomalies and cross-sectional variation in stock returns. If short-term price continuation is due to investor behavioral biases, we should observe greater price drift when there is greater information uncertainty. As a result, greater information uncertainty should produce relatively higher expected returns following good news and relatively lower unexpected returns following bad news. The author's evidence supports this hypothesis.

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Article Summary

Introduction

Results from behavioural finance literature include:

- price continuation is attributable to gradual market response to information (1996 Chan, Jegadeesh, Lakonishok)
- psychological biases are increased when there is more uncertainty (Hirshleifer 2001, Daniel, Hirshleifer and Subrahmanyam 1998, 2001)

The paper combines these two results and tests the hypothesis: "If post-analyst revision drift, momentum and other short-term anomalies are due to investor psychological biases such as overconfidence, we should observe greater investor behavioural biases and stronger price drifts when there is greater information uncertainty."

If the slow market response to information is due to psychological biases such as overconfidence, these biases will be larger and the price response slower when there is more ambiguity about the implications of information for a firm's value.

Proxies for uncertainty:

1. firm size (mv)
2. firm age (years)
3. analyst coverage (number of analysts covering firm in the previous year)
4. dispersion in analyst's forecasts (s.d of forecasts scaled by prior y.e price)
5. return volatility (s.d weekly excess return over last year)
6. cash flow volatility (s.d of CFfO past 5 years (min 3))

News 'events':

- Good News: upward (1 month) earnings revisions and past winners (11 month momentum)
- Bad News: downward earnings revisions or past losers

Contributions to literature:

1. price continuation following public signals increases with proxies for ambiguity
2. the effect of good and bad news offset each other in unsigned analysis. More transparent accounting disclosure might reduce information uncertainty and speed the absorption of new information into stock prices
3. firm size behaves more like a proxy for uncertainty than a risk factor

Momentum strategies should work particularly well when limited to high–uncertainty stocks.

Greater uncertainty leaves more room for psychological biases, as investors are more overconfident when firms are hard to value.

Uncertainty should delay the impact of information into price. There should be little news-based return predictability for low-uncertainty stocks.

Sample Data and Summary Statistics

Sample period: Jan 1983 – Dec 2001
Universe: Stocks on NYSE, ANEX, Nasdaq, price > $5, age > 1yr

Firm size, age and analyst coverage are positively correlated with each other, and negatively correlated with stocks volatility and cash flow volatility. These relationships support the idea that these factors capture the same phenomenon.

Portfolio Effects on Information Uncertainty

Size: 'Market participants under-react more to new information for small firms than for large firms.' As a result, small firms have relatively lower returns following bad news and relatively higher returns following good news.

Momentum: past winners imply good news and past losers imply bad news. The prediction is that greater uncertainty predicts relatively lower future returns for past losers and relatively higher returns for past winners. Negative momentum returns are significantly different for young firms vs old firms, as are positive momentum returns between old and young firms. Other information proxies return similar results and support the hypothesis.

The author finds that the magnitude of excess returns around earnings announcements increases with the level of information uncertainty.

Conclusion

The author examines the role of information uncertainty in the short term price continuation anomalies and cross-sectional variations of stock returns.

The author uses analyst forecast revisions and price momentum to distinguish between good and bad news. Information uncertainty is proxied by firm size, age, analyst coverage, dispersion in analyst forecasts, stock volatility and cash flow volatility.

The author finds the initial market reaction to news is incomplete, and the incompleteness increases with the level of information uncertainty. *As a result, greater information uncertainty produces lower future returns following bad news and higher positive returns following good news.*

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J.P.Morgan

Separating Winners from Losers among Low Book-to-Market Stocks using Financial Statement Analysis

Subject: Identifying ex-post outperformers/underperformers among growth stocks

Author: Partha S. Mohanram

Publication: Columbia Business School

Date of Article: April 2004

J.P. Morgan Quant Comment

Based on US stock data, there does appear to be an exploitable Long/Short strategy involving fundamental ratios for growth firms. Turnover is low, with portfolios held for two years after release of financial statements, and the results appear robust to risk factors and other explanatory return variables.

The strategy is more effective in identifying potential losers or torpedo stocks than in identifying winners. This implies that at implementation stage the short side would be very important. Are the flagged stocks able to be shorted, or if for a long-only mandate, are under weights in sufficient number and/or size to allow meaningful underweight positions?

We found the contextual nature of the signals in this paper appealing – fundamental ratios relevant for growth stocks applied to a growth universe.

While the paper's suggested methodology used binary scores as a ranking system, an alternative approach would be to standardize the ratios then combine them in any applicable weighting structure. This lends considerable flexibility to the main concepts of this paper.

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Article Abstract

The paper tests whether a strategy based on financial statement analysis of low book-to-market (growth) stocks is successful in differentiating between future winners and losers in terms of future stock performance. The author creates an index ('***G-Score***') by combining traditional fundamental ratios he considers appropriate for growth firms.

The author finds a strategy based on buying high '***G-Score***' firms and shorting low '***G-Score***' firms consistently earns significant excess returns. The results are robust across partitions based on size, stock price, analyst following, exchange listing and prior performance and are not affected by the inclusion or omission of IPO firms.

The excess returns persist after controlling for risk and anomaly factors such as momentum, book-to-market, accruals and size.

The author suggests the stock market in general and analysts in particular are much more likely to be positively surprised by firms whose growth oriented fundamentals are strong, indicating that the stock market fails to grasp the future implications of current fundamentals

Research Design

The paper reviews three categories of industry relative fundamental ratios:

Category G1: Signals based in Earnings and Cash Flow Profitability

G1: ROA, calculated from earnings, as a profitability measure, compared to industry median
G2: ROA calculated with cash from operations rather than earnings compared to industry median. Relevant as earnings may be less meaningful than cash flow for growth firms
G3: Compares Cash flow from Operations against Net income to measure earnings quality (accruals)

Category G2: Signals related to Naïve Extrapolation

G4: Variability of ROA vs industry median: calculated as variance of firms ROA over the past 5 years to measure the predictability of earnings.
G5: Variability of Sales growth vs industry median: to measure stability of growth

Category G3: Signals related to Accounting Conservatism

G6, G7 and G8 compare a firms R&D, capital expenditure and advertising intensity against the industry median. These variables may depress current earnings and book values, but lead to future growth.

Each stock scores 0 or 1 depending on where a company ranks on the measured variables G1:G8. A '1' is allocated to highlight firms whose score would be indicative of strong future returns.

G1:G8 are aggregated into a single ***'G-Score'***, akin to having a stock screen or checklist. The author then creates a long portfolio of firms that score 6, 7 or 8 on the binary G1:G8 measures, with short portfolios created from portfolios that score 0 or 1.

Results

The paper shows that for US firms a high minus low hedge strategy based on '***G-Score***' is very effective in aggregate. There is a difference of 21.4% between the high and low '***G-Score***' groups one year after portfolio formation. Summary results are presented in the table below.

Table 1: Returns to an Investment Strategy Based on Growth Fundamental Signals

	One Year Forward Average Return	One Year Forward Median Return	% with positive returns
Long Portfolio	17.4%	8.0%	60.0%
Short Portfolio	-4.0%	-19.3%	34.4%
Long - short	21.4%	27.0%	
t-stat	10.71	21.51	

The results are robust to size-adjustment. The author notes that the high scoring group earns low positive size-adjusted returns, however the low scoring group earns large negative size adjusted returns. As such the strategy is more effective in identifying potential losers than in identifying winners. Reviewing the results two years after portfolio formation suggests that '***G-Score***' is very effective in picking winners beyond the first year.

The results are also robust to analyst coverage, suggesting even sophisticated investors can be susceptible to ignoring the implications of profitability, conservatism and extrapolation.

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Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers

Subject: Identifying ex-post outperformers/underperformers among value stocks

Author: Joseph D. Piotroski

Publication: Journal of Accounting Research (Volume 38), Supplement

Date of Article: 2000

J.P. Morgan Quant Comment

The contextual nature of the signals was appealing – fundamental ratios relevant for value stocks were applied to the value space. It seemed that the approach of this paper was used in Partha Mohanram's growth stock paper, also reviewed in this Quant Concepts.

While the paper's suggested methodology uses binary scores, an alternative approach would be to standardize the ratios, then combine them with any weighting structure. This would add considerable flexibility to the methodology of this paper.

Based on US stock data, there does appear to be an exploitable Long/Short strategy involving fundamental ratios for value firms. Turnover is relatively low, and the results appear robust to risk factors and other explanatory return variables.

The author finds most of the benefit accrued among small to medium sized firms, companies with low share turnover and with no analyst coverage.

Article Abstract

The paper tests whether accounting based fundamental analysis can shift the distributions of returns available to investors. The mean return able to be earned by a value investor can be increased by 7.5% p.a through selecting financially strong high BM firms. A Long/Short strategy can be expected to earn 23% annually between 1976 and 1996.

Within the high BM firms, the benefits to financial statement analysis are concentrated in small and medium-sized firms, companies with low-share turnover and firms with no analyst following (slow information dissemination environments).

Overall, the evidence suggests that the market does not fully incorporate historical financial information into prices in a timely manner.

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Article review

Value stocks offer a unique opportunity to investigate the ability of simple fundamental analysis statistics to differentiate firms.

7. Value stocks tend to be neglected by analysts and are plagued by low levels of investor interest.

8. Analyst forecasts and stock recommendations are unavailable for these firms.

9. High BM firms tend to be 'financially distressed', as a result valuation of these firms concentrates on fundamentals such as leverage, liquidity, profitability trends and cash flow adequacy.

10. Poor prior performance may lead to credibility issues in company originated forecasts, suggesting financial statements present the most reliable and accessible source of information for these firms.

By focusing on value firms, the benefits to financial statement analysis

1. are investigated in an environment where historical financial reports represent the best and most relevant source of financial condition and
2. are maximized through the selection of relevant measures given the underlying economic characteristics of the high B:M firms.

The article attempts to separate ultimate winners from losers through the identification of a firm's intrinsic value and/or systematic errors in market expectations.

Research Design

The paper chooses nine signals to measure three areas of the firm's financial condition. The signals are scored 1 or 0 pending on whether the result is 'good' or 'bad' for future performance. As some of the measures are ambiguous on the future performance of a firm across the market, one must remember that the variables are being considered in the context of 'financially distressed' firms.

The aggregate signal measure, "F-score", is the sum of the nine binary variables.

Category F1: Profitability Signals

F1: ROA, calculated from earnings, as a profitability measure (set to 1 if positive, 0 otherwise)
F2: CFROA calculated with cash from operations rather than earnings (set to 1 if positive, 0 otherwise)
F3: Change in ROA (1 if positive, 0 otherwise)
F4: Compares Cash flow from Operations against Net income to measure of earnings quality (1 if CFO > Net income)

Category F2: Financial leverage, liquidity and source of funds signals

F5: Leverage: change in firm's long term debt levels in the year before portfolio formation
F6: Liquidity: change in the firm's current ratio (current assets/current liabilities) in the year preceding portfolio formation.
F7: Equity offering: set to 1 if the firm did not have an equity raising in the year prior to portfolio formation as it may be a signal that firms cannot raise enough funds internally, and is issuing capital when their share price is likely to be depressed, raising the cost of capital.

Category F3: Financial Performance Signals

F8: Margins: Change in gross margin in the year before portfolio formation
F9: Asset Turnover: Change in asset turnover in the year before portfolio formation (total sales/total assets beg of year)

The final F-score is calculated as the sum for each firm across the nine variables, and this aggregate is used for portfolio formation.

Results

The paper found that the return available to high BM value investor can be increased by 7.5% annually through the selection of financially strong high BM firms. A Long/Short portfolio could be expected to return 23% annually between 1976 and 1996, robust over time and to controls for alternate investment strategies.

The results suggest that financial markets are slow to incorporate public historical information into prices and that the sluggishness appears to be concentrated in low-volume, small and thinly followed firms.

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Analysing the Analysts: When Do Analysts Add Value?

Subject: An Examination of the Impact and Value of Analyst Recommendations.

Author: Narasimhan Jegadeesh, Joonghyuk Kim, Susan Kirsche, Charles Lee.

Publication: *Journal of Finance*, Vol. 59, No. 3, pages 1083-1123.

Date of Article: June, 2004.

J.P. Morgan Comment

Of the conclusions drawn from this study (and there are many), the conclusion 'the reason for poor analyst performance was the failure of the analyst to quickly downgrade stocks that have been rejected by other investment signals' is the most pertinent to Quantitative Analysis. The implications of this conclusion are two-fold. Firstly, it is that there appears to be an inherent bias (corporate, physiological, procedural) intertwined with analysts ratings that limit the analysts ability to identify conflicting signals. Secondly, and to this end, we are faced with the necessity for continual quantitative analysis as a method to complement analyst opinion with the reality of raw numerical representation.

From an investment viewpoint, of particular note is the authors' determination that there is little value to be yielded from *levels* of recommendation. Rather, only 'true' value can be derived from *changes* in type of recommendation.

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Article Abstract

"We show that analysts from sell-side firms generally recommend 'glamour' (*i.e.* positive momentum, high growth, high volume, relatively expensive) stocks. Naive adherence to these recommendations can be costly, because **the level of the consensus recommendation adds value only among stocks with favourable quantitative characteristics** (*i.e.* value stocks and positive momentum stocks). In fact, among **stocks with unfavourable quantitative characteristics, higher consensus recommendations are associated with worse subsequent returns.** In contrast, we find that **the quarterly change in consensus recommendations is a robust return indicator** that appears to contain information orthogonal to a large range of other predictive variables."

Article Aims

The authors clearly define their study in order to address two clear questions. Firstly, to investigate the source of the investment value provided by (i) analysts recommendations and, (ii) changes in analysts recommendations. Secondly, to analyse the extent to which analysts make full use of available information when formulating stock recommendations.

Article Method

The study is achieved through analysis of 12 key variables. Five variables were used to describe momentum and trading volume. Two variables each were used to describe (i) relative value, (ii) short and long term growth, and (iii) accounting fundamentals. One variable was used to describe firm size. These were

- *Momentum and Trading Volume*

Underlying thesis of Momentum and Trading Volume indicators;

a. 'If Analysts base their recommendation on PRICE and EARNINGS momentum, then stocks which exhibit high PRICE and EARNINGS would receive positive recommendations.'

b. 'If Analyst base their recommendation on TRADING VOLUMES, then stocks which have high volumes would receive negative recommendations.'

Indicators

RETP	Cumulative market adjusted return in months t_0-1 to t_0-6 preceding the last month (t_0) of the recommendation quarter.
RET2P	Cumulative market adjusted return in months t_0-7 to t_0-12 preceding the last month (t_0) of the recommendation quarter.
FREV	Earnings forecast in the previous 6 months prior to the end of the recommendation quarter computer as a rolling sum and scaled by price.
SUE	Unexpected earnings for the most recent reported earnings scaled by its time-series standard deviation over preceding 8 quarters.
TURN	Average daily stock turnover during the six months prior to the last month of the recommendation quarter.

- *Valuation*

Underlying thesis of Valuation indicators;

'If Analysts are affected by Valuation Multiples, then stocks with high EP and BP ratios would expect to receive higher position recommendations.'

Indicators

EP	Earnings to Price Ratio.
BP	Book to Price Ratio.

- *Growth*

Underlying thesis of Growth indicators;

'If Analysts are more attracted to the 'Glamour Stocks', then stocks with high SG and LTG scores will receive high recommendations.'

Indicators

LTG	The mean forecast for long-term Earnings growth.
SG	The growth rate over the past 12 months.

- *Accounting Fundamentals*

Underlying thesis of Accounting Fundamentals indicators;

'If Analysts favour TA and CAPEX stocks, they will have higher recommendations because they represent higher growth stocks.'

TA	Total Accruals/Total Assets
CAPEX	Capital Expenditure/Total Assets

- *Size*

Underlying thesis of Size indicators;

'Previous studies have shown that smaller firms have generally earned higher returns than larger firms'. The use of a size indicator in this study acts as a control.

SIZE	The natural logarithm of the firm's market capitalisation at the end of the most recent fiscal quarter.

Sample Universe

The universe consisted of all stocks in the Zacks Investment Research Database (1='Strong Buy' to 5='Strong Sell') for the period 1985 through to 1998. For a stock to be incorporated in the study, it was required for price information to be listed on the CRSP database, accompanying earnings forecasts to available on I/B/E/S, and merged quarterly accounting statements to be presented on the COMPUSTAT. For each stock, a *consensus recommendation level* (CON) and the *consensus recommendation change* (CHGCON) were calculated at the end of each quarter. Adherence to the specified selection criteria yielded, on average, 971.4 observations per quarter for the 56 quarters under examination.

Article Results

In general, the authors find that sell-side firms display a preference for recommending 'glamour' stocks over 'value' stocks. Glamour stocks are defined as those stocks which display positive momentum (both price and earnings), high growth, high volume (high turnover ratio), and which are relatively expensive. These stocks tend also to exhibit greater past sales growth, and are expected to grow their earnings faster in the future. In addition, these stocks tend to have higher valuation multiples, more positive accounting accruals, and less capital expenditure as a proportion of their total assets.

In addition, the authors found that

(i) stocks that were favourably recommended by analysts, in general, outperformed stocks that were unfavourably recommended. However, it was also found that the absolute *level* or the rating (as opposed to the rating *type*) derived its

value from a tilt towards high momentum stocks, and that the predictability of analyst level recommendations was largely marginal.

(ii) a key reason for the poor performance of analyst recommendations was the analysts failure to quickly downgrade stocks that had been previously rejected by other investment signals. Specifically, it was found that favourably recommended stocks with poor investment signals significantly underperformed unfavourably recommended stocks.

(iii) upgraded stocks *outperformed* downgraded stocks. Specifically, it was found that the *level* of recommendation only adds value when used in conjunction with strong signals from other factors, namely value and positive momentum.

(iv) analysts recommendations may be partly driven by economic incentives that are not entirely aligned with the investment performance of their recommendations.

(v) when combined with poor value signals, a high consensus level of recommendation is associated with worse subsequent returns.

(vi) a quarterly change in recommendation is the most robust indicator of performance.

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