

Nomura Securities Co Ltd, Tokyo  
Global Quantitative Research

**NOMURA**

**Global Quantitative Investment Strategies  
Conference 2008**

**Recent quant factor performance in Japan**  
**Unintended negative correlation of value and revision**

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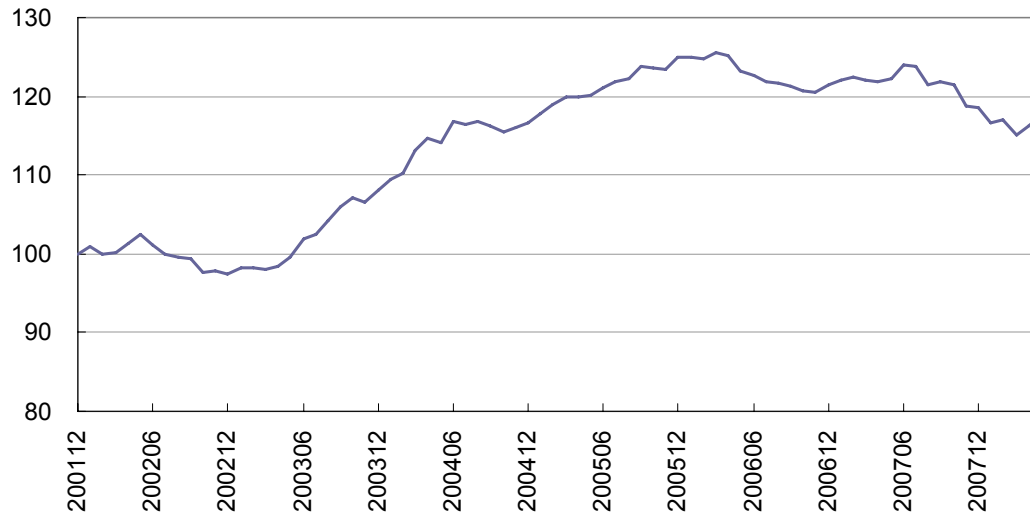
**17 June 2008**

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analyst certifications on pages 26-28. [gl](#)

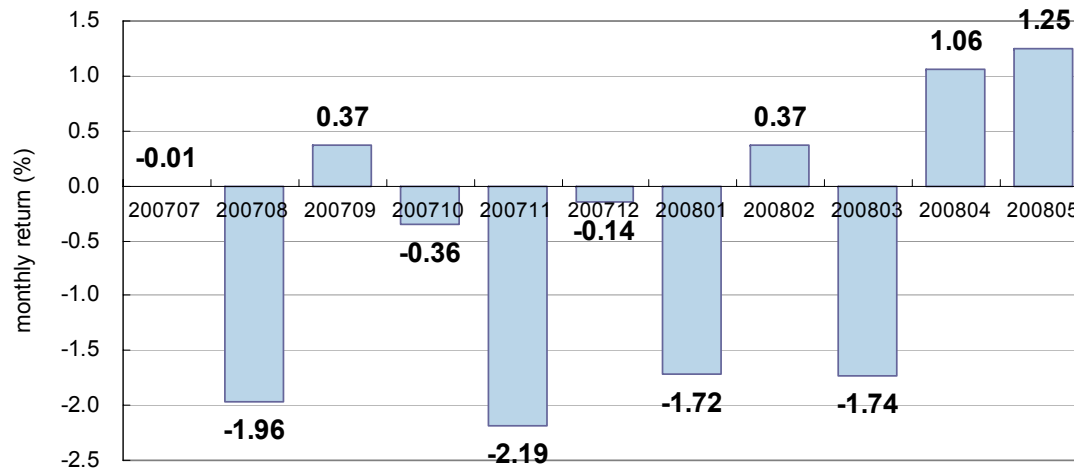
## Summary

- **Japanese quant funds have performed poorly for nearly a year. In short, value factors have underperformed, while risk-aversion factors have outperformed.**
- **The poor performance of value is obviously closely related to the risk-aversion trend. However, observing the recent behavior of VIXs globally, the trend seems to be calming down.**
- **A recent problem for Japanese quant funds is the unintended negative correlation between value factors and estimate revision. Possibly, this correlation is caused by the tendency for the upward revision group to contain a larger number of low-risk stocks.**
- **We think quant factors in Japanese equities should return to normal range because (1) VIXs are calming down, (2) value factor return is expected to be positive, and (3) the unintended negative correlation has diminished.**

## Performance of typical quant funds in Japan



- We estimate that the average performance of Japanese quant funds since last summer has been generally undesirable
- Returns in April and May were positive, but still not robust enough

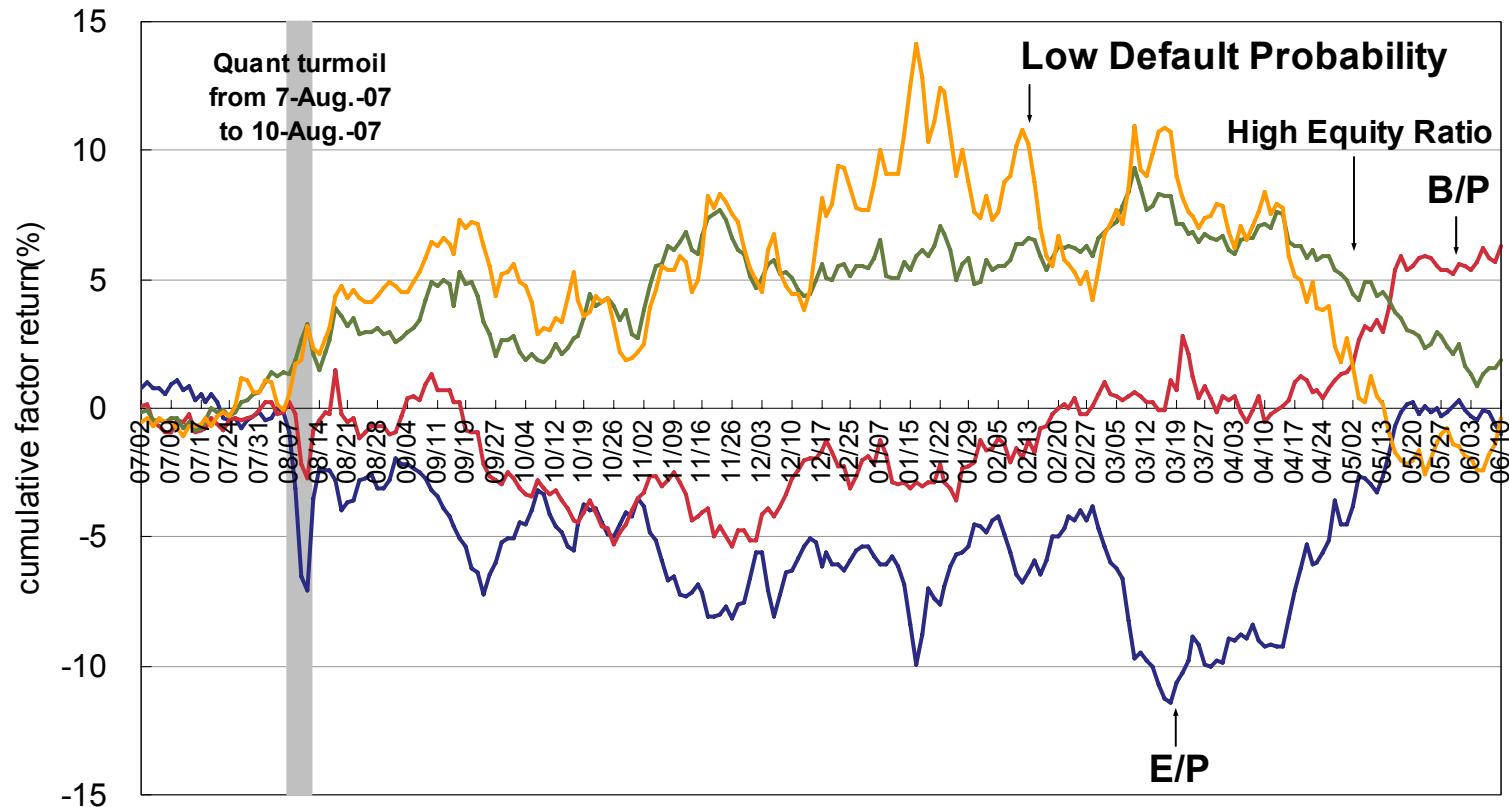


Note: (1) Universe consists of 26 funds classified into the Fundmark "long/short" by NRI.  
 (2) Money funds used for switching, etc., are excluded from market neutral, long/short and others.  
 (3) The lower graph shows the average monthly return of the universe from July 2007 to May 2008.

Source: Nomura

# Quant factor performance since last summer

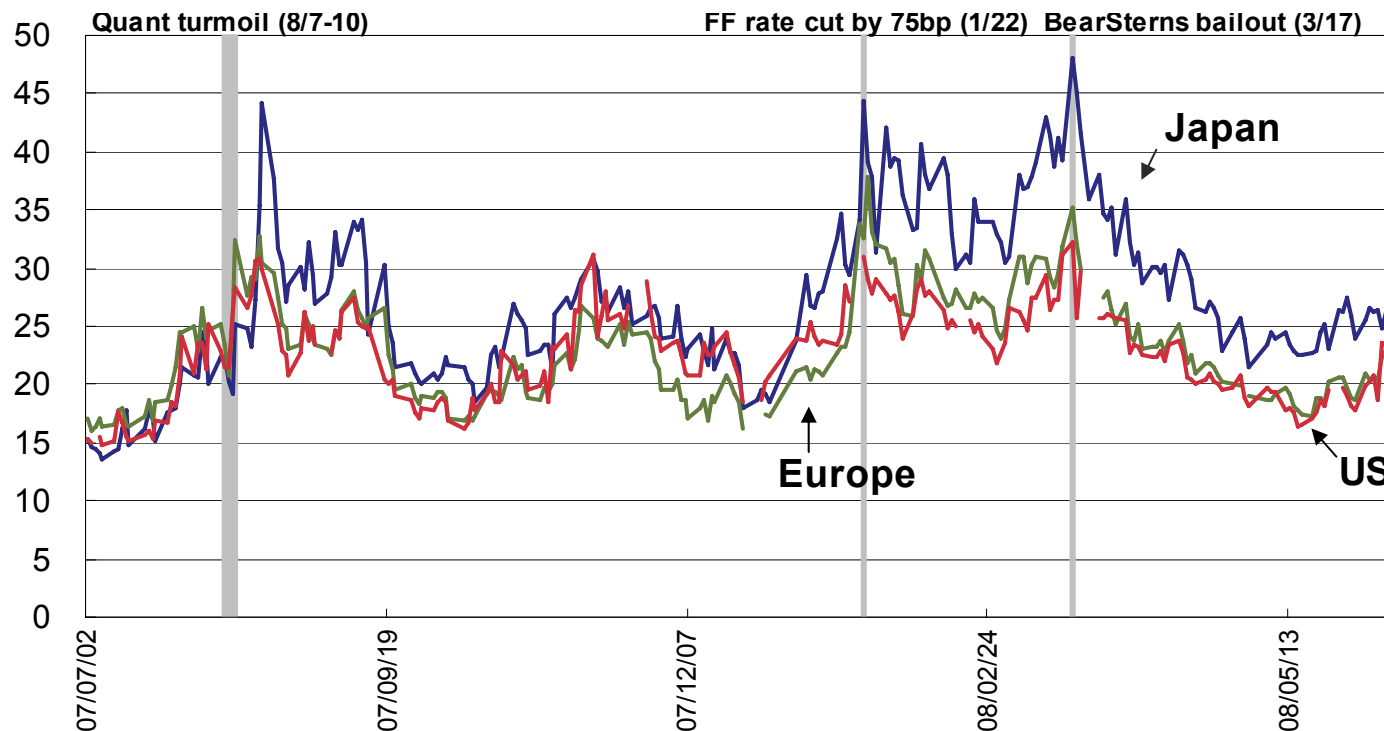
- Value has underperformed, while risk-aversion has outperformed



Note: (1) The universe, consisting of TSE1 stocks in Nomura's coverage, is divided into five groups by factor values.  
 (2) Groups are rebalanced monthly (at the start of each month). 19 Nomura sector classification is employed for sector diversification.  
 (3) Returns are based on spread returns, or the difference between the return for group 5 and group 1. (For Low default probability, the difference is calculated as group 1 minus group 5; for the other factors, differences are obtained by subtracting group 5 from group 1.) Last data as of 10 June 2008. E/P and B/P are "value" factors and others are "risk aversion" factors.

## What about the risk-aversion trend?

- VIXs for Japan, Europe and US are showing similar behavior
- VIXs have been calming down since March

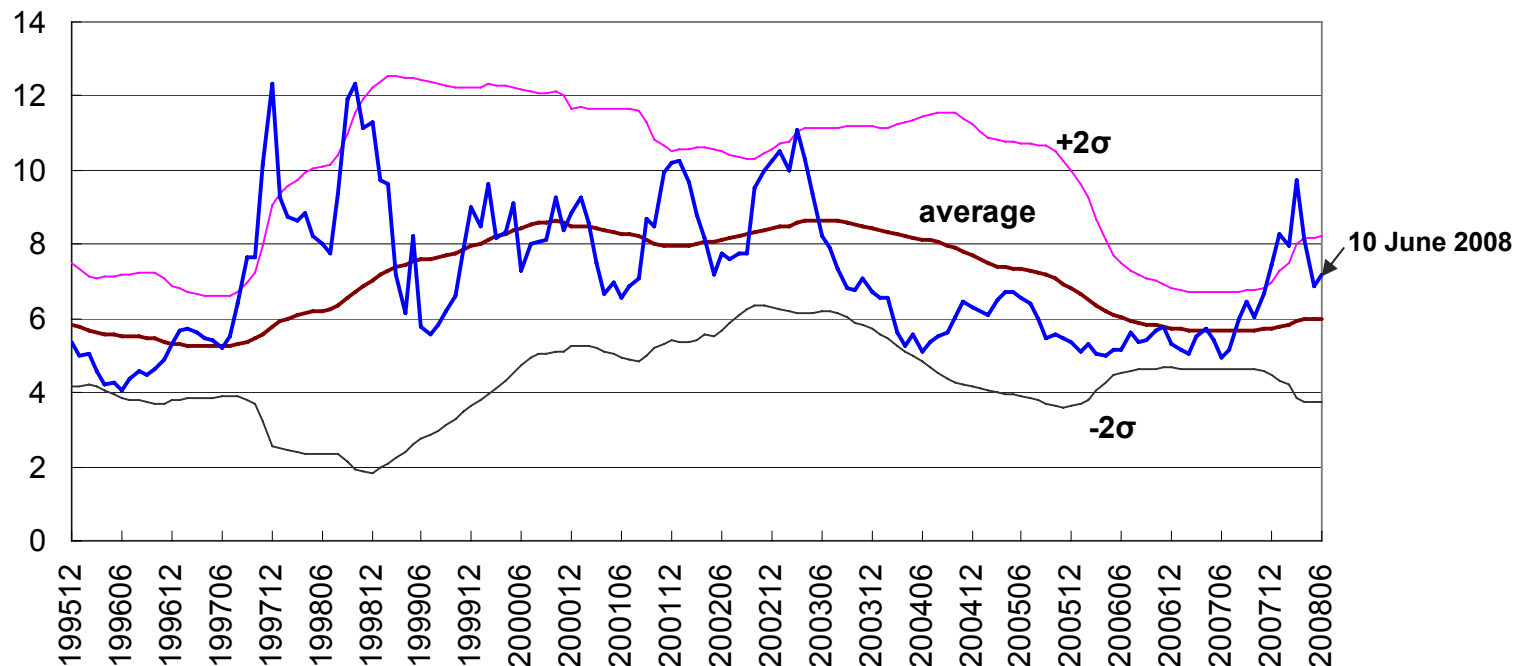


Note: VIX (volatility index) indicates “model-free” implied volatilities. US VIX is provided by CBOE. Japan and Europe VIXs are calculated by Nomura using similar methodology used in CBOE VIX. The underlying indices of US, Japan, and Europe are S&P500, Nikkei 225, and DJ Euro Stoxx 50, respectively. Last data as of 10 June 2008.

Source: CBOE, Nomura

## Value spread

- Cohen et al. (2003) argued that the value spread is positively related to the future return of the value factor
- The spread on 10 June 08 is narrower than that in March. But it is still wider than the 36-month moving average



Note: (1) The universe, consisting of TSE1 stocks in Nomura's coverage, is divided into five groups by E/P factor values.  
 (2) The spread is the difference between group 5 and group 1.  
 (3) Moving averages and standard deviations are based on past 36-month data.

Source: Nomura

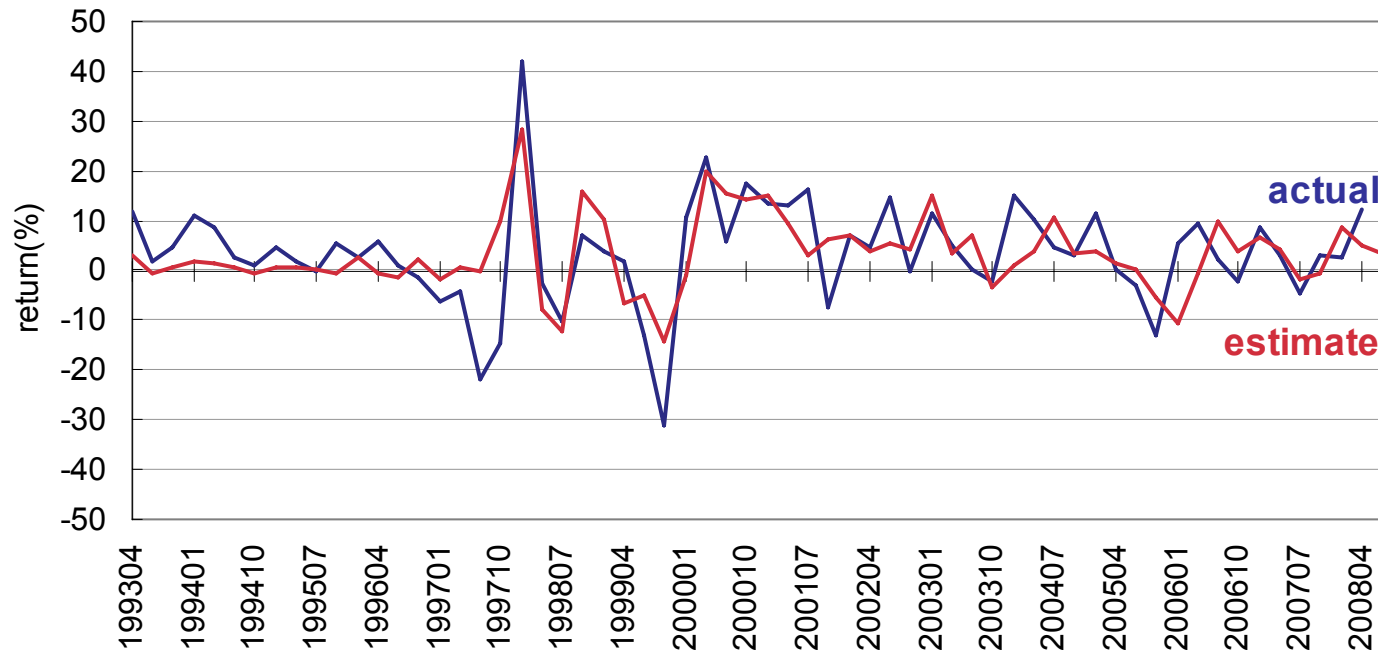
## B/P factor return estimation model

$$\text{B/P factor return} = 3.57 + 2.97 \times \text{value spread} + 6.36 \times \text{change in momentum} + 6.54 \times \text{change in bankruptcy probability}$$

(2.97) (2.41) (4.81) (4.19)

$$R^2 = 0.471$$

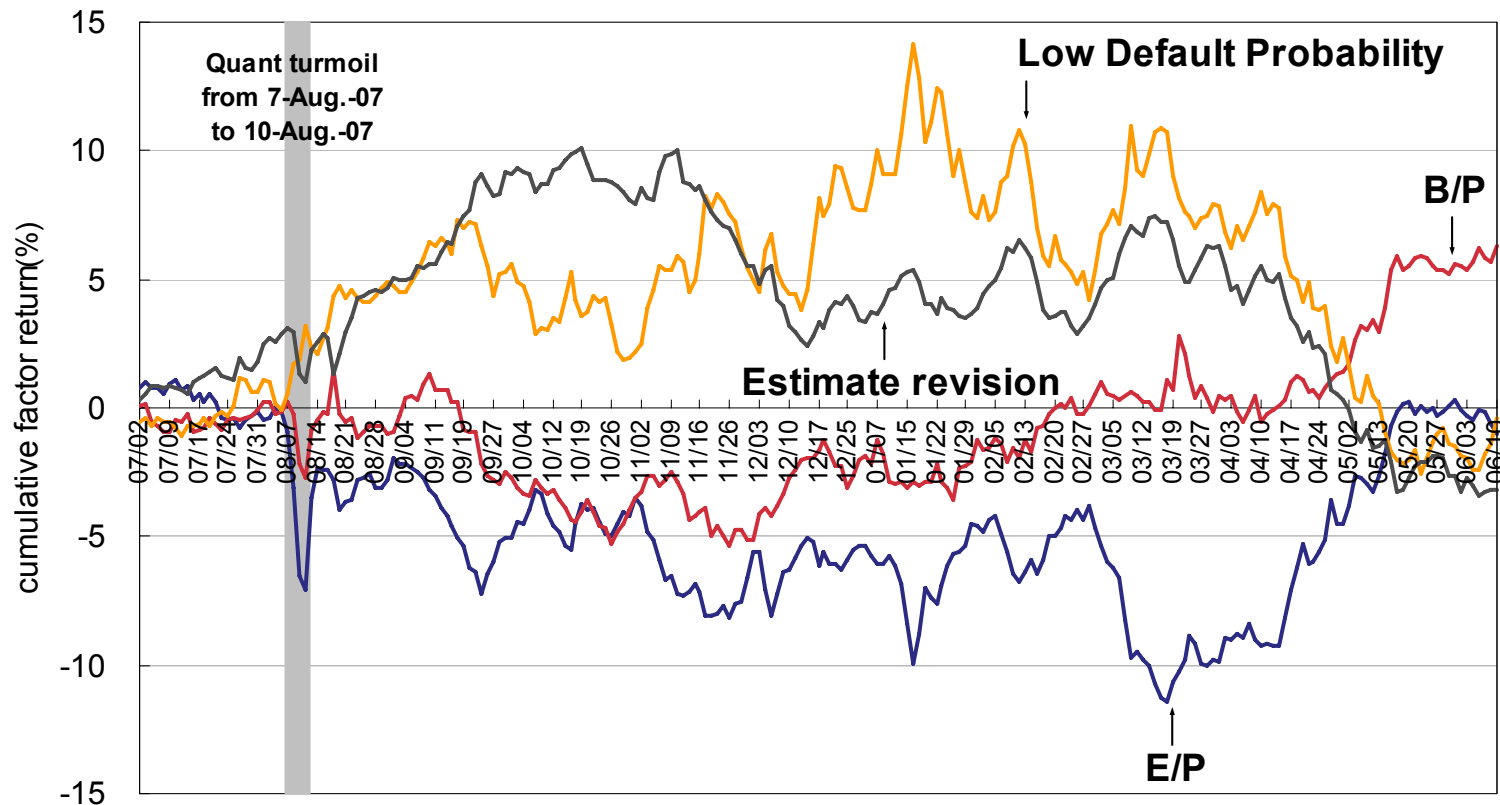
- The estimated B/P return for Q3 2008 is +3.37% (as of 10 June 2008)



Note: The B/P factor return (the explained variable of the model) is based on spread returns of the top and bottom quintiles in the universe of TSE-1 stocks covered by Nomura. The estimates were calculated using regression coefficients based on the data from 1993 Q2 through 2005 Q4 with explanatory variables of (1) B/P value spread; (2) change in style momentum; and (3) change in bankruptcy probability. Latest estimates are for 2008 Q3 and input data are as of 10 June 2008. Refer to Tamura (2006) for details.

# What is the recent problem for quants?

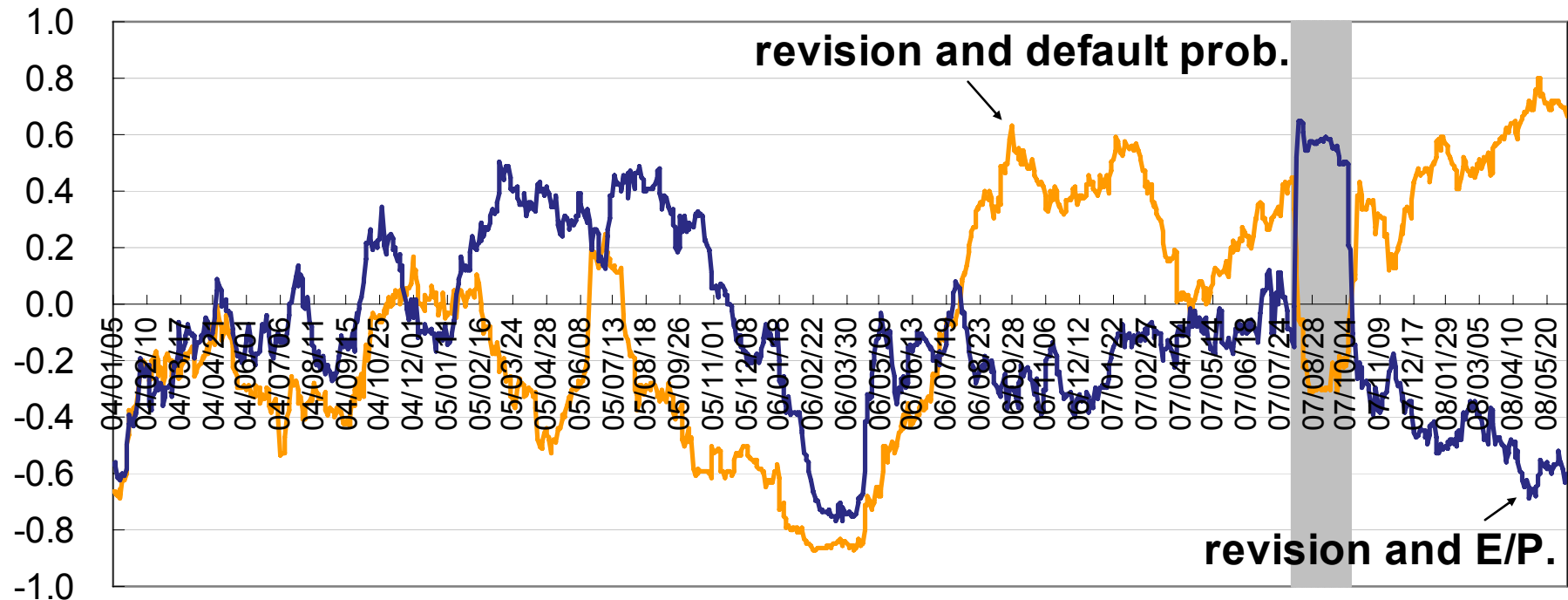
- Value has recovered, but estimate revision is showing negative factor return



Note: (1) The universe, consisting of TSE1 stocks in Nomura's coverage, is divided into five groups by factor values.  
 (2) Groups are rebalanced monthly (at the start of each month). 19 Nomura sector classification is employed for sector diversification.  
 (3) Returns are spread returns, or the difference between the return for group 5 and group 1. (For Low default probability, the difference is calculated as group 1 minus group 5; for the other factors, the differences are obtained by subtracting group 5 from group 1.) Last data as of 10 June 2008. E/P and B/P are "value" factors and others are "risk aversion" factors.

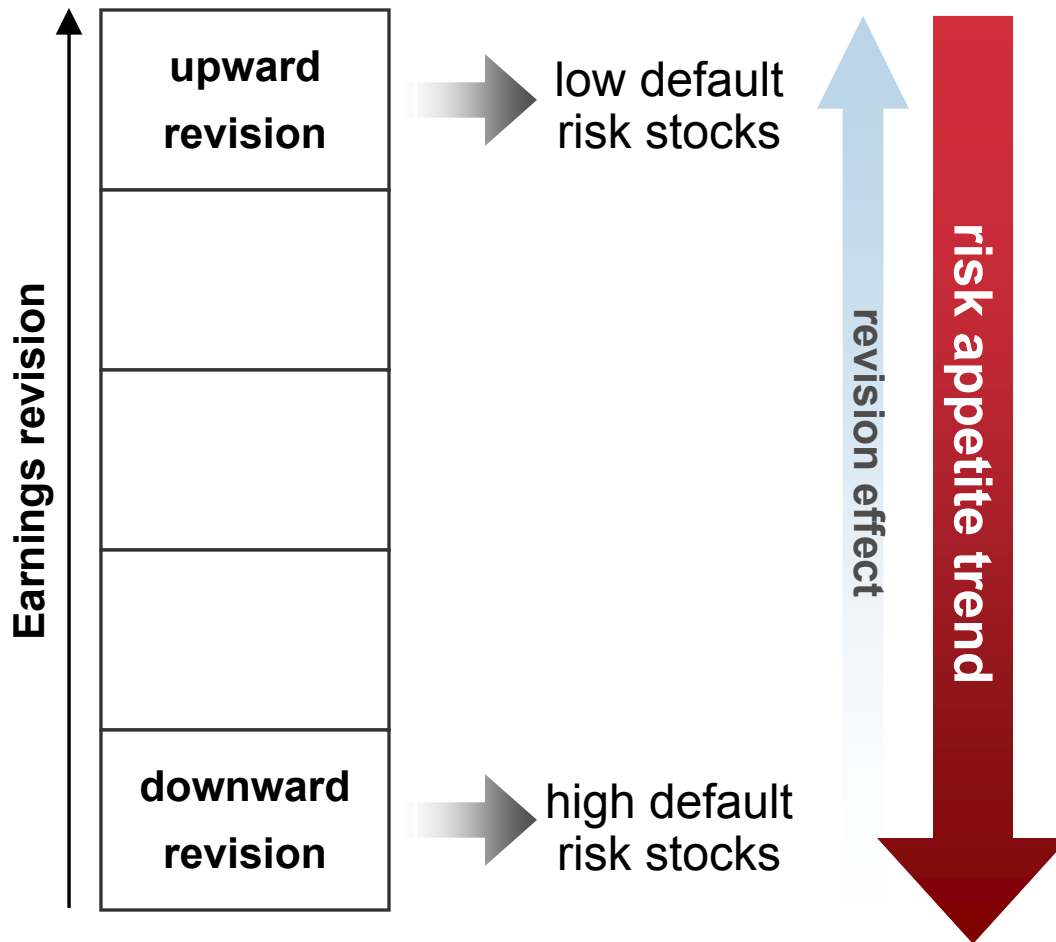
## Correlation of value and estimate revision

- The correlation between estimate revision and value is becoming negative  
At the same time, the correlation with default probability is tending to be more positive



Note: The correlation coefficients of daily factor returns are calculated. The period of calculation is 40 business days. The coefficient is plotted at the end of calculation period. Last data as of 10 June 2008. The shaded part indicates quant turmoil period (7-10 August 2007) and data in this period are included in calculation of the correlation coefficient.

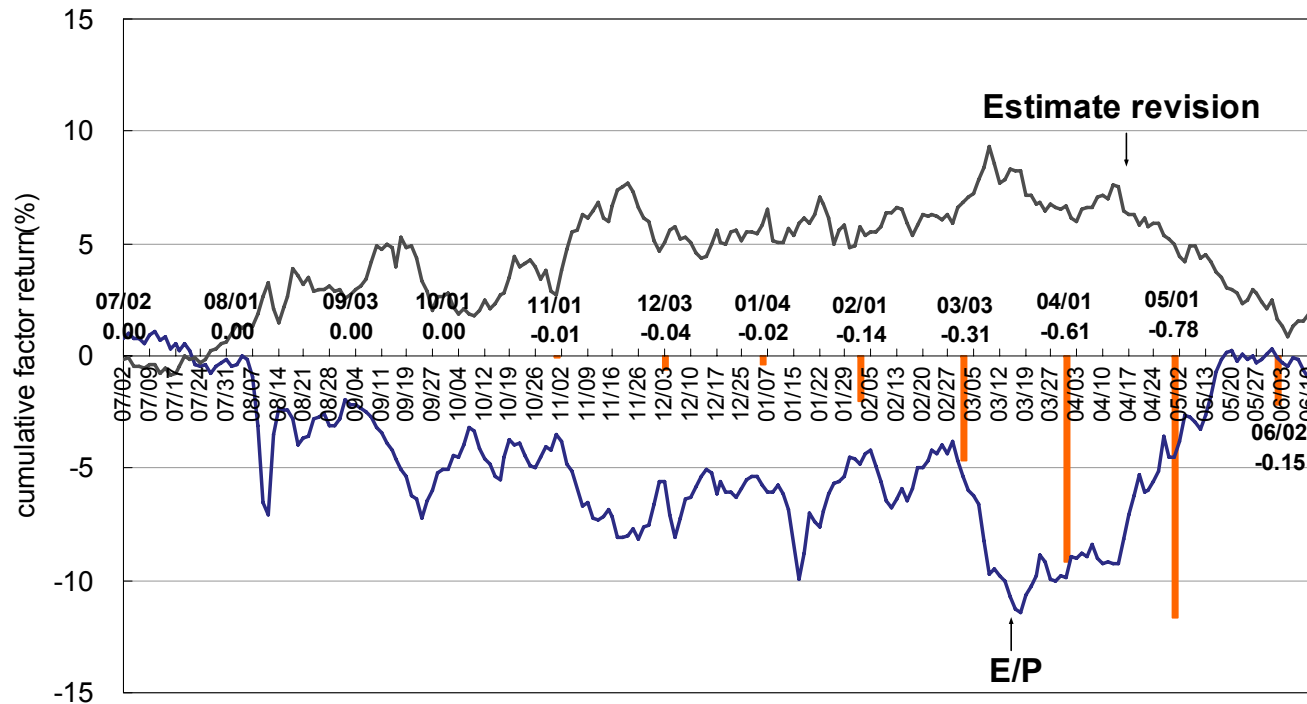
## Explanation for the unintended negative correlation (1)



- Over the last couple of months, the upward revision group has contained more low-risk stocks
- The risk appetite trend was stronger than the revision effect
- Thus, the estimate revision and default risk factors seemed to be highly correlated

## Explanation for the unintended negative correlation (2)

- The bar chart shows the difference of default probability medians between estimate revision group 5 and group 1
- As the difference shows a larger negative value, the correlation between E/P and estimate revision becomes higher

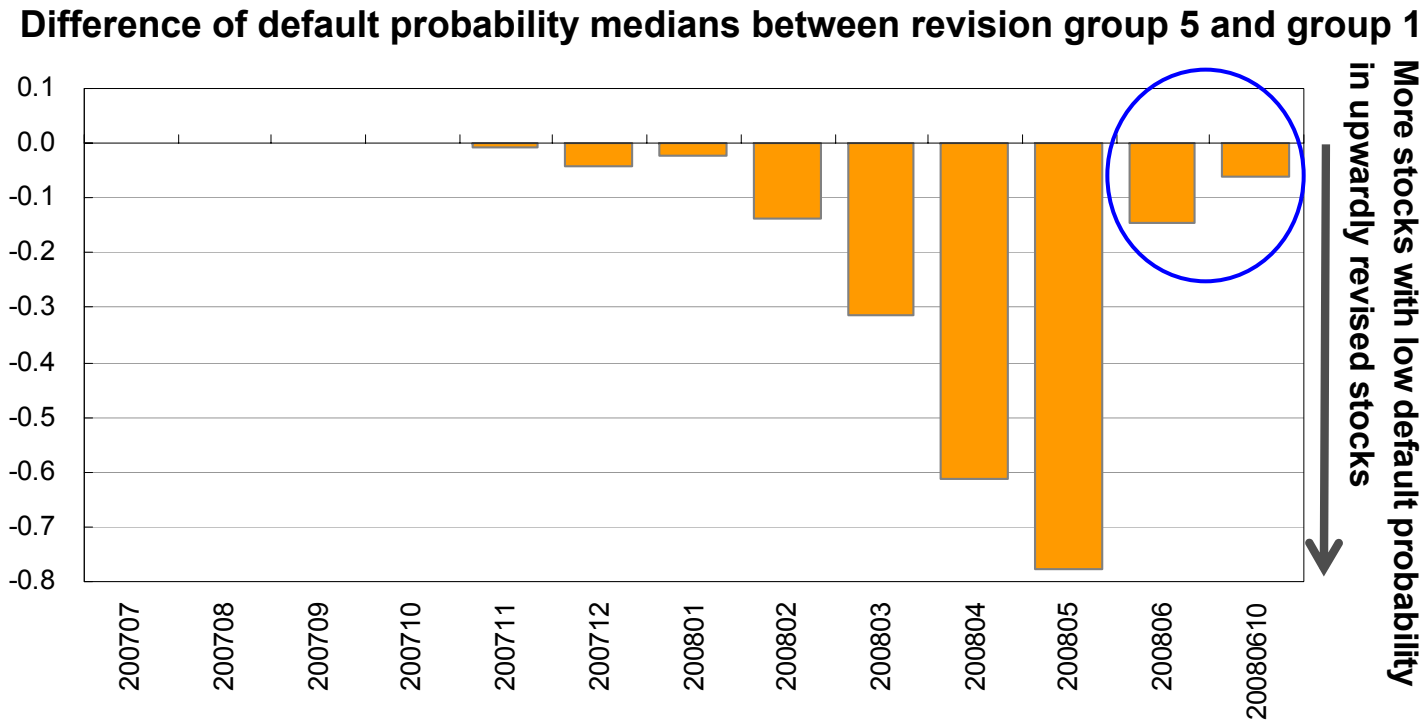


Note: (1) The universe, consisting of TSE1 stocks in Nomura's coverage, is divided into five groups by factor values.  
 (2) Groups are rebalanced monthly (at the start of each month). 19 Nomura sector classification is employed for sector diversification.  
 (3) Returns are based on spread returns, or the difference between the return for group 5 and group 1. Last data as of 10 June 2008.  
 E/P is "value" factor and estimate revision is "risk aversion" factor.

Source Nomura

## Will this correlation continue?

- We think it probably will not continue, because the difference of medians is becoming smaller



Note: Shows the difference of medians of default probabilities between group 5 and group 1. Analysis period: July 2007 – June 2008. Last data as of 10 June 2008.

Source: Nomura

## Summary view for Japanese quant factors in the near future

Risk-aversion  
trend

Judging from global  
VIXs, the trend is  
calming down

Value

Although value spread is  
not extremely high,  
positive effect is still  
expected

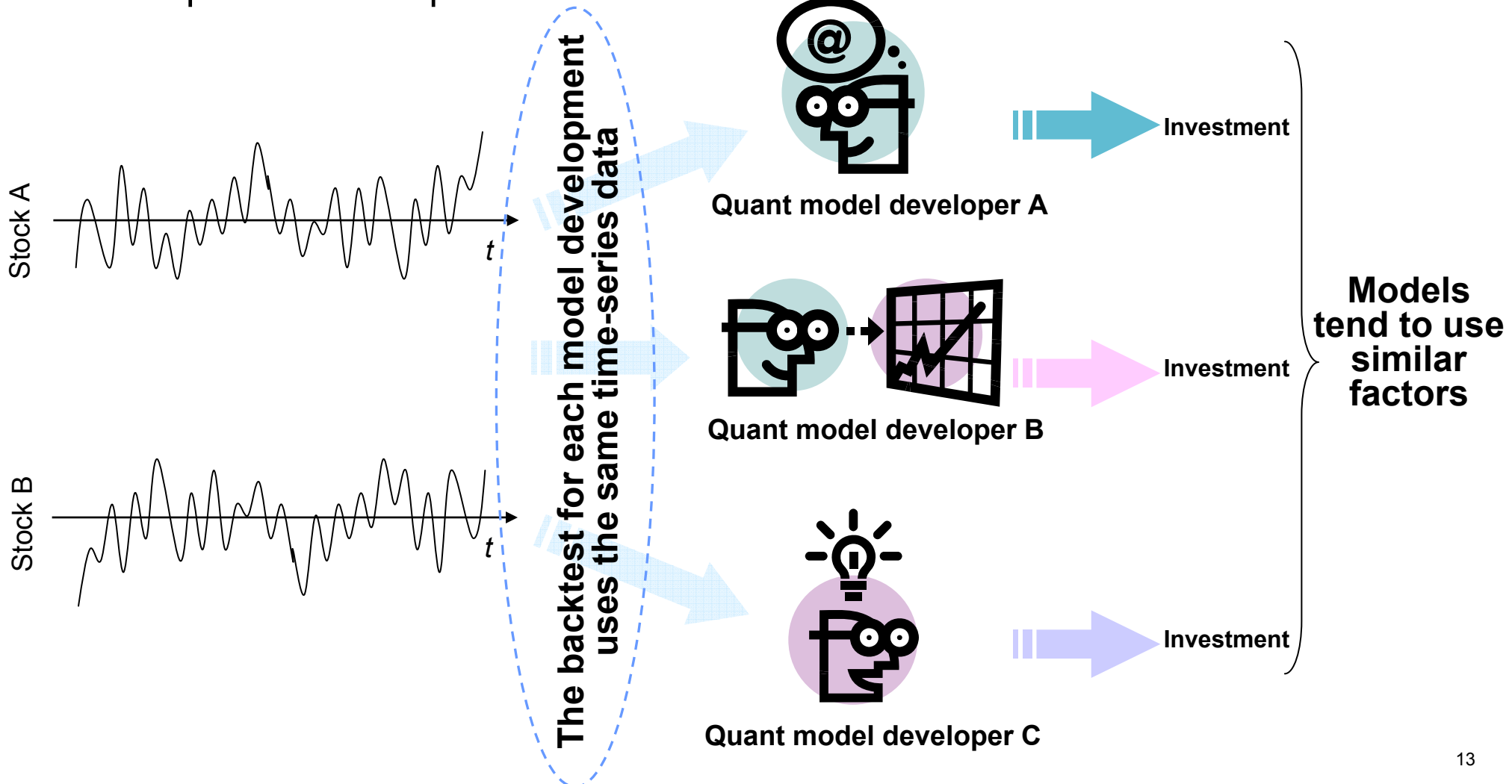
Revision

No unintended correlation  
with risk average  
Normal revision effect is  
expected

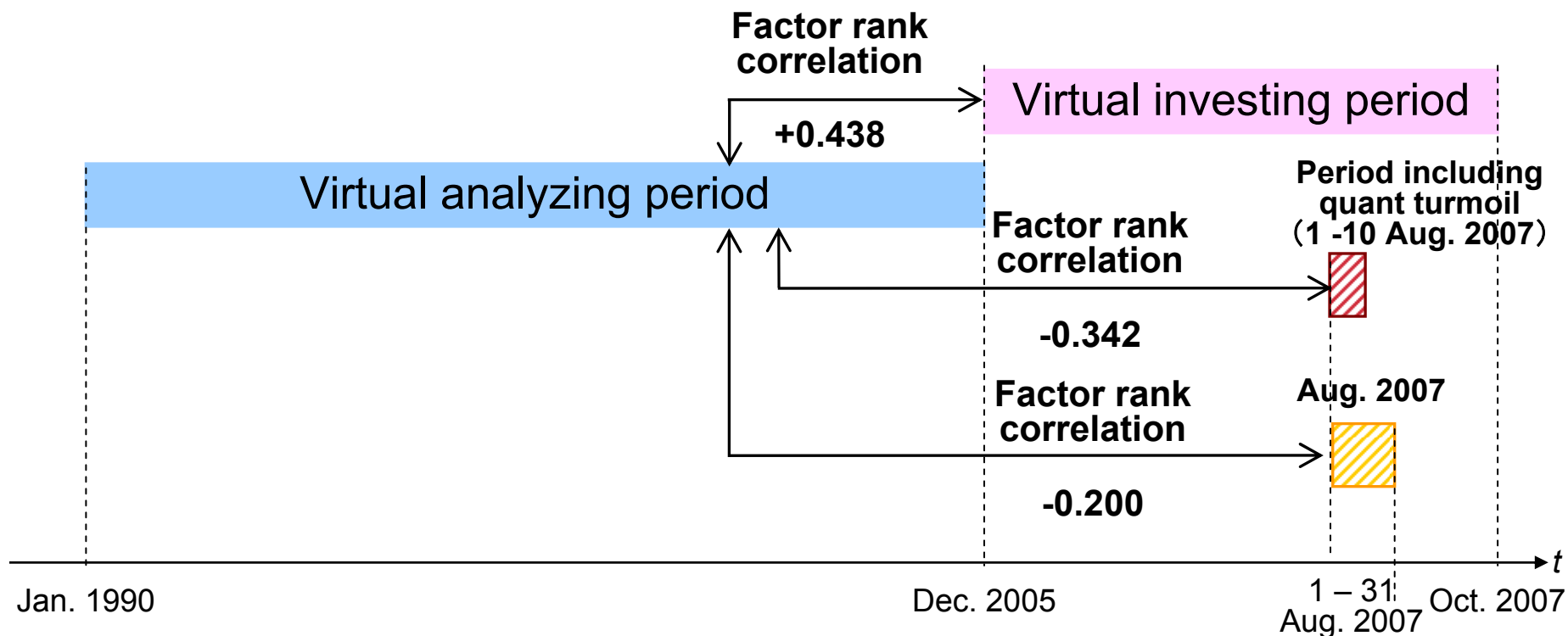
**Japanese quant factors  
should go back to  
normal range**

# What was the underlying cause of quant turmoil? (1)

## ■ A trap inherent in quant models



## What was the underlying cause of quant turmoil? (2)



Note: The universe, consisting of TSE1 stocks in Nomura's coverage, is divided into five groups by factor values for grouping simulation since January 1990. The groups are rebalanced monthly and sectors are diversified based on the 19 Nomura sector classification. The spread returns with equal number of stocks are calculated normally by subtracting group 1 from group 5 and subtracting group 5 from group 1 for negative values. Then the factor return rank correlation of each period is calculated. The ranks during the virtual analyzing period and virtual investing period use  $r/\sigma$  and  $r$  is used in August 2007 and the turmoil period.

Source: Nomura

- By observing factor rank correlations, the factors effective in the backtest period performed unfavorably in the turmoil period
- Differentiation from other models is essential

## Recent quant ideas by Nomura

### ■ StarMine's Predicted Surprise (PS)

- The predicted surprise has positive impact globally. We propose an idea of using PS to improve the I/B/E/S revision effect.

### ■ Application of segment information (SHHI)

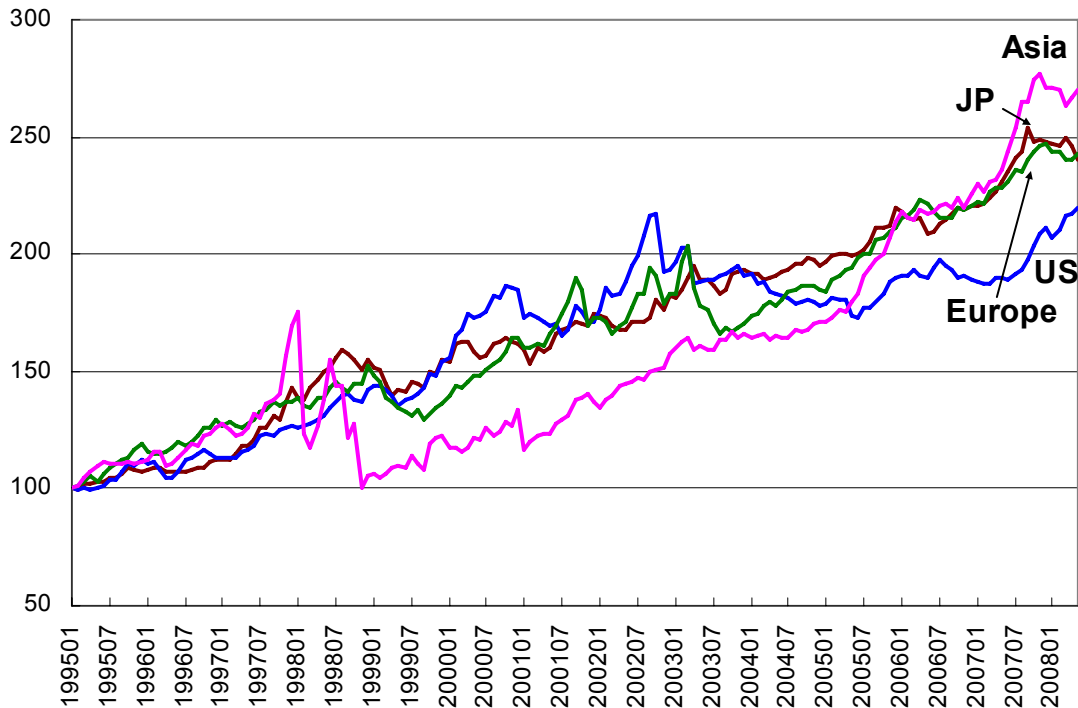
- The segment data of Japanese companies are useful, but almost no quant has utilized it. We propose a methodology to calculate “share” indicator and utilize it in investment process.

### ■ Pan Asian pairs trading

- Pairs trading with Asian and Japanese stocks have started to appear recently. This new strategy focuses on the growth potential of Asian stocks and liquidity of Japanese stocks.

## StarMine's Predicted Surprise (PS) (1)

Cumulative factor returns in Japan, US, Europe, and Asia



Note: Each universe is defined as TSE1 stocks in Nomura's coverage for Japan, S&P500 for US, MSCI-Europe for Europe, and Nomura AP General for Asia. Each universe is divided into five groups based on Predicted Surprise factor values for grouping simulation. Shows cumulative returns calculated from the difference between the returns for group 1 and group 5. Analysis period is February 1995 – October 2007. Groups are rebalanced monthly (at the start of each month). Sector dispersion is considered and cost is not considered. Returns are calculated based on yen in Japan and US dollar in other regions.

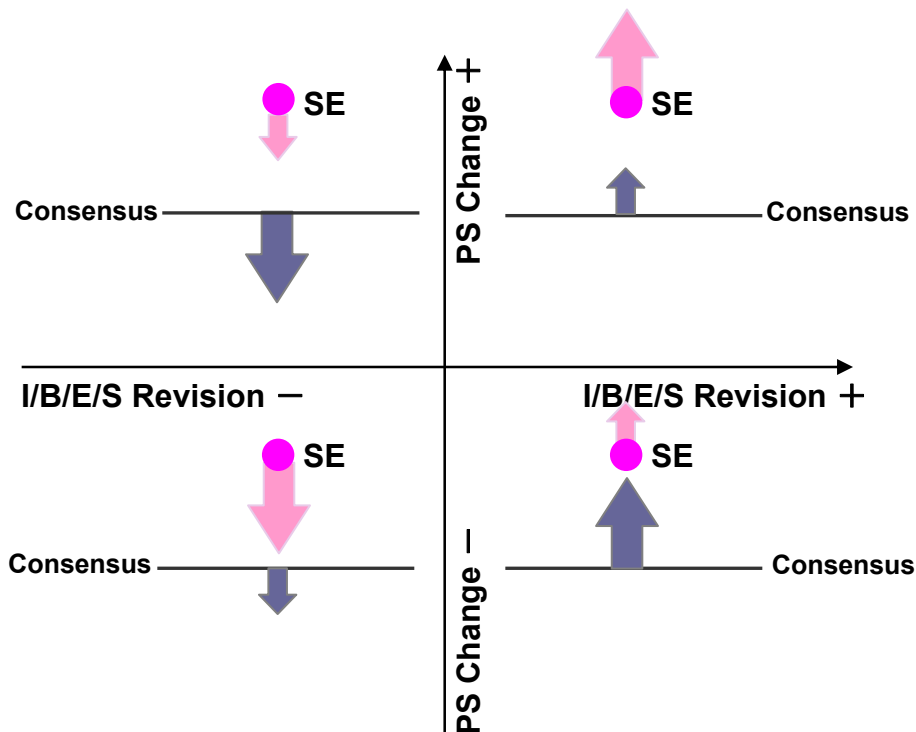
Source: Nomura

- PS factor has shown a positive effect globally. Its recent performance in Europe, Asia, the US, and Japan is also favorable. The factor appears to be worth paying attention to
- However, Nomura's analysis indicates that the PS factor is effective mainly among low-covered groups. Focusing on “change of PS” might be an idea to seek  $\alpha$  in larger stocks

## StarMine's Predicted Surprise (2)

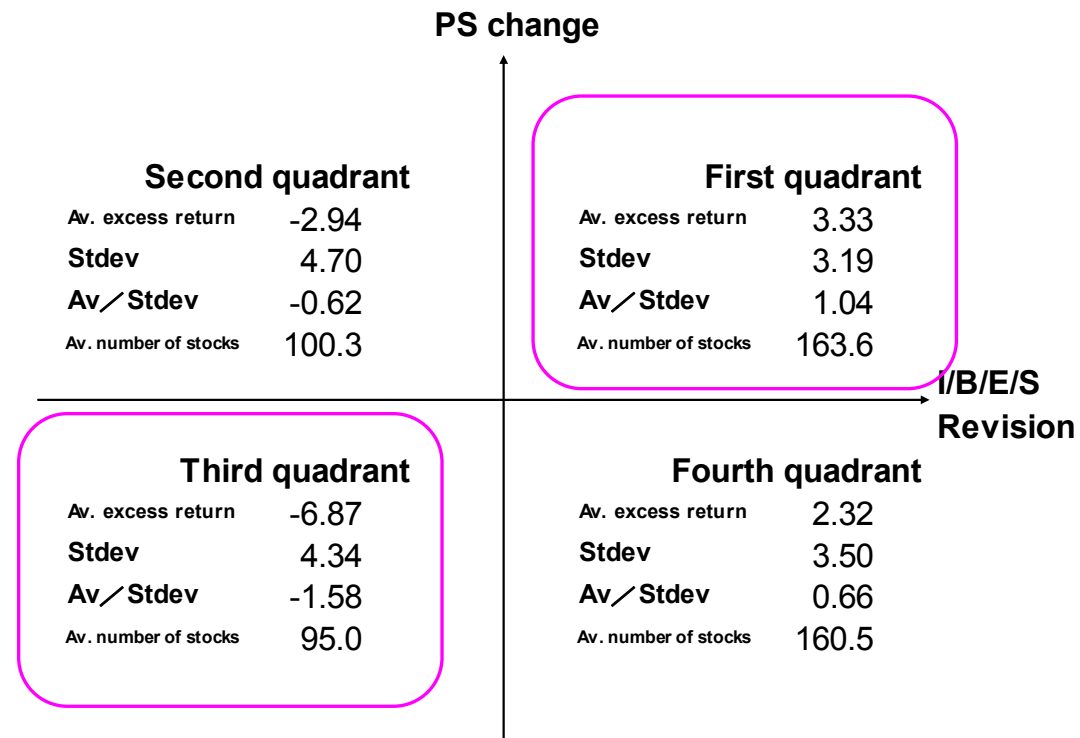
### ■ Concept

- Distinguish the cause of PS change, whether by consensus or by SmartEstimate



### ■ Analysis method and result

- Performance of each quadrant is observed by monthly analysis between Feb 1995 – Oct 2007.



Note: Return and Stdev are annualized.

Source: Nomura

# Application of segment information (1)

Toshiba (6502) FY ended March 2007

Nikkei NEEDS Classification											
Classification	1	2	3	Sales	Operating Income	Assets	Depreciation	Capital Investment	Major Product1	Major Product2	Major Product3
Consolidated				7,116,350	258,364	5,931,962	292,875	409,797			
Elimination				-554,673	-2,327	-63,614					
Total				7,671,023	260,691	5,995,576	292,875	409,797			
Details											
Digital Products	Personal computer	Communication device	Video device	2,805,490	15,784	1,242,567	42,493	40,526	Personal computer and accessory	Cell-Phone	Video machinery
Electronic device	Semiconductor	Electric instrument		1,657,301	119,750	1,449,764	169,113	269,654	Semiconductor	Liquid crystal display	X-ray tube
Social Infrastructure	Heavy industrial electric machinery	General industrial machinery	Medical machinery	2,067,666	96,760	2,385,297	41,782	58,750	Power generation machinery	Industrial machinery	Medical machinery
Home Appliance	Consumer electric machinery			748,930	9,676	438,793	18,307	24,744	Refrigerator	Laundry machine	Air conditioner
Others	Real estate leasing			391,636	18,721	479,155	21,180	16,123	Real estate		

Currency unit : Yen million

- SHHI (Sum-up Herfindahl-Hirschman Index) is calculated for evaluating the degree of monopolization
- When SHHI is higher, higher performance is expected

$$SHHI_i = \frac{\sum_{j=1}^J Sales_{i,j} \times s_{i,j} \times HHI_j}{\sum_{j=1}^J Sales_{i,j}} \times 100 \quad HHI_j = \sum_{i=1}^I (s_{i,j})^2 \quad s_{i,j} = \frac{Item_{i,j}}{\sum_{i=1}^I Item_{i,j}}$$

$SHHI_i$  : i company's Sum – up Herfidahl – Hirschman Index

$HHI_j$  : j industry's Herfidahl – Hirschman Index

$Item_{i-j}$  : Accounting data of i company in j industry (Sales, Operating profit, Capital expenditure)

$s_{i,j}$  : Share of i company in j industry I : No.of companies J : No.of industries

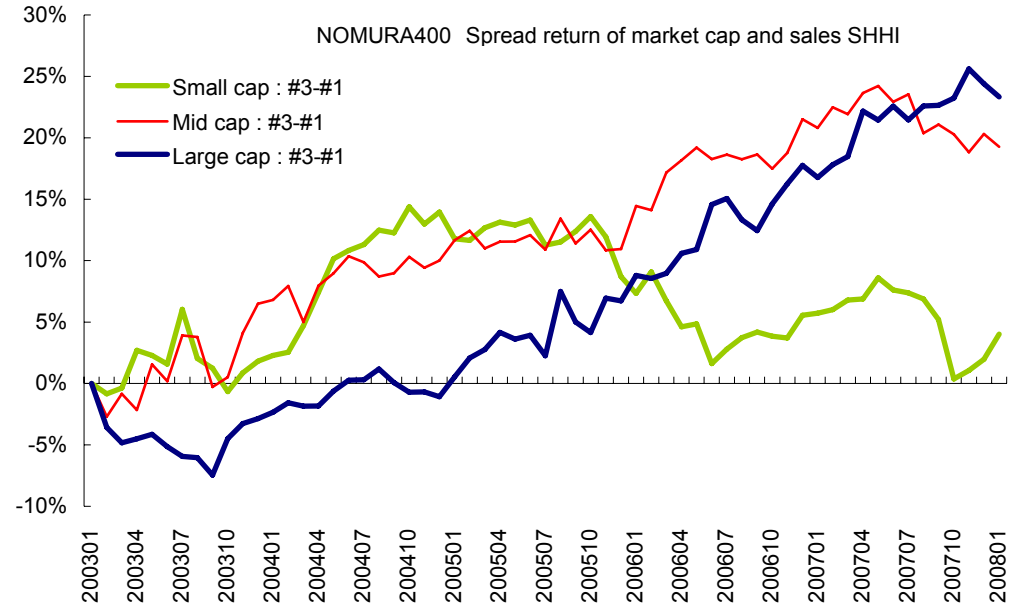
# Application of segment information (2)

		Market Cap			Spread	
		Group 1	Group 2	Group 3	#3-#1	
Market Cap	Group1	Return	1.10%	3.19%	5.90%	<b>4.80%</b>
		Risk	2.88%	3.67%	4.17%	<b>4.87%</b>
		R/R	0.38	0.87	1.41	<b>0.99</b>
	Group2	Return	-1.78%	-0.34%	-1.16%	<b>0.62%</b>
		Risk	2.28%	3.45%	3.07%	<b>3.48%</b>
		R/R	-0.78	-0.10	-0.38	<b>0.18</b>
	Group3	Return	-2.71%	-1.80%	-2.12%	<b>0.59%</b>
		Risk	4.61%	4.58%	3.52%	<b>5.58%</b>
		R/R	-0.59	-0.39	-0.60	<b>0.11</b>

		Sales SHHI			Spread	
		Group 1	Group 2	Group 3	#3-#1	
Market Cap	Group1	Return	-0.24%	1.98%	7.36%	<b>7.60%</b>
		Risk	3.35%	2.87%	4.61%	<b>5.84%</b>
		R/R	-0.07	0.69	1.60	<b>1.30</b>
	Group2	Return	-3.11%	-0.13%	-0.58%	<b>2.54%</b>
		Risk	3.79%	3.14%	3.11%	<b>5.19%</b>
		R/R	-0.82	-0.04	-0.19	<b>0.49</b>
	Group3	Return	-1.85%	-0.31%	-4.44%	<b>-2.59%</b>
		Risk	3.77%	4.26%	4.12%	<b>5.48%</b>
		R/R	-0.49	-0.07	-1.08	<b>-0.47</b>

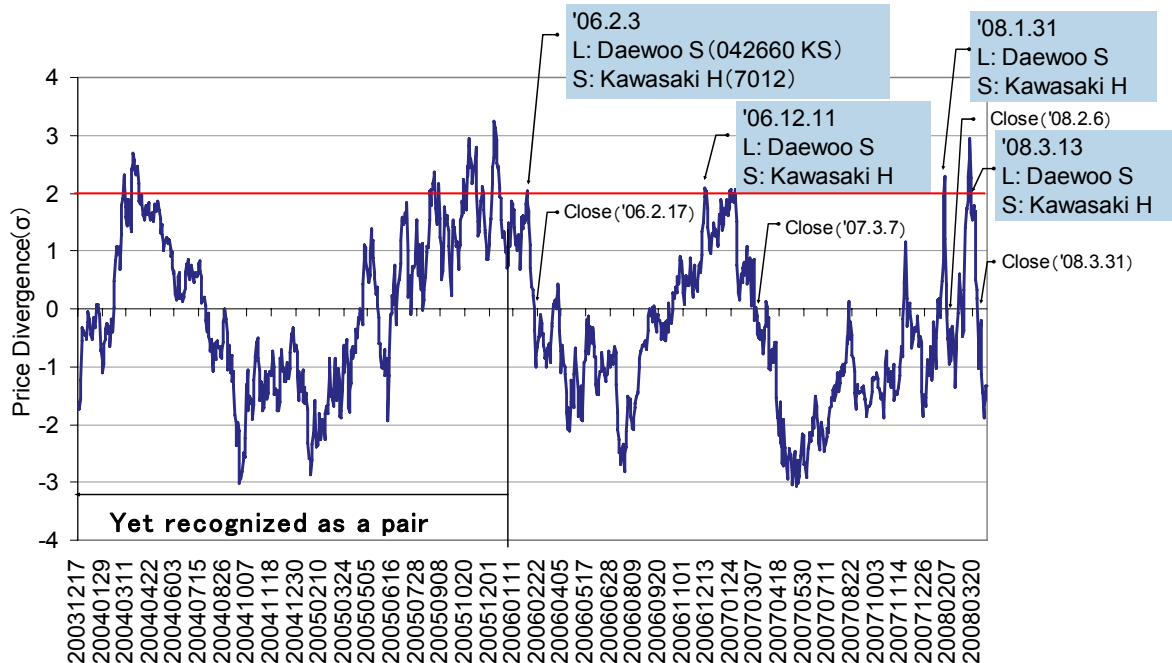
Note: Universe: NOMURA 400 ex financial sector  
Analysis period: February 2005 – January 2008

Source: Nomura



- The universe is divided into three groups by market cap first, then each group is further divided into three groups by SHHI
- The spread return (group 3 – group 1) for each market cap group is calculated
  - Large cap stocks of more than 250 billion yen exhibit favorable performance

# Pan Asian pairs trading (1)



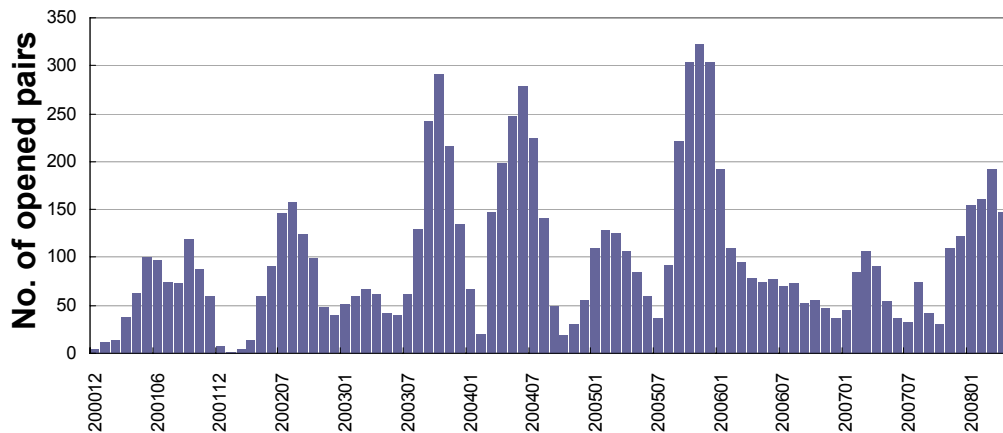
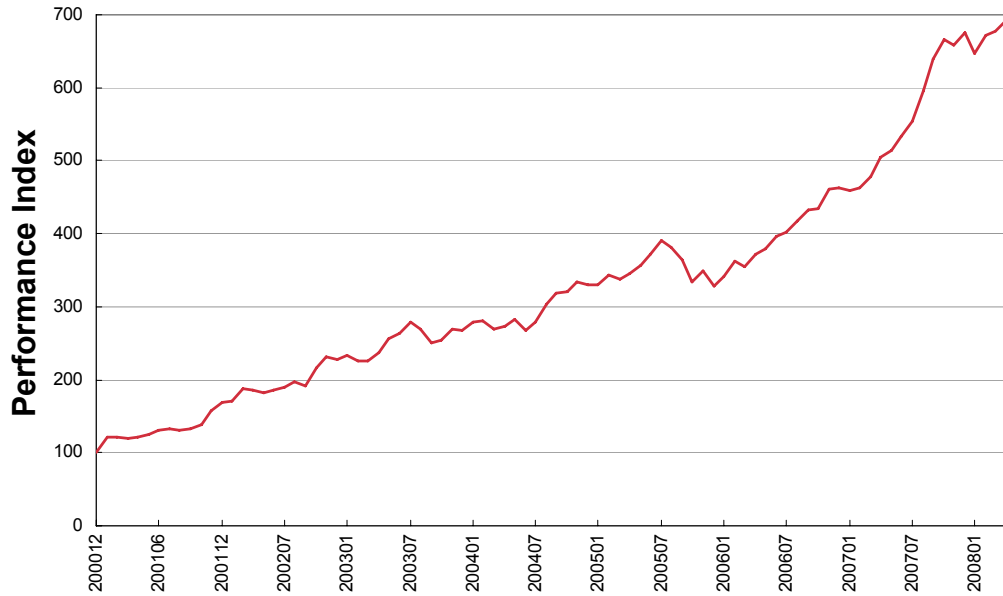
	date	sigma	exp.ret(%)	act.ret(%)
BEGIN	20060203	2.04	29.19	
END	20060217	-0.37		30.98
BEGIN	20061211	2.08	17.14	
END	20070307	-0.2		9.66
BEGIN	20080131	2.3	25.74	
END	20080206	-0.53		31.53
BEGIN	20080313	2.29	17.8	
END	20080331	-0.53		20.89

- The idea is to take long positions for Asian stocks and short positions for Japanese stocks
- The pair is selected based on normalized price distance in the same sub-sector
- When the moving average divergence reaches more than  $2\sigma$ , the pair is opened
- When the divergence decreases to negative, the pair is closed

Note: "exp.ret" (expected return) is the return under the assumption that divergence is converged to zero in no time.

Source: Nomura

## Pan Asian pairs trading (2)



- On a monthly basis, the profit realized from pairs closed during the month and the profit/loss calculated for pairs still open at month end are averaged and accumulated
- Time series performance has been satisfactory

Average return(%)	Month	2.32
	Year	27.86
St. Dev.	Month	4.53
	Year	15.70
Av./St. Dev.	Month	0.51
	Year	1.77

Note: For determining the pairs, price data for three years are used. After determining pairs, the simulation period is started. Short side consists of Japanese stocks. Prices are in US dollars and cost is neglected. Analysis period is December 2000 – 15 April 2008. Realized profit of the pairs closed in a month and appraised P/Ls of the pairs still opened at the end of the month are averaged and accumulated.

Source: Nomura

## Conclusions

- **Quant factors in Japanese equities should go back to their normal range because**
  - VIXs are calming down
  - Value factor return is expected to be positive
  - The unintended negative correlation has been diminishing
  
- **Considering underlying causes of the quant turmoil, we need to pay attention to new quant ideas continuously. We are currently focusing on:**
  - Modification of StarMine's Predicted Surprise
  - Application of segment information (SHHI)
  - Pan Asian pairs trading

## References

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# Appendix 1: Ranking of factor performance

## Factor Return Ranking (%)

rank		(direction)	#5-#1 (#1-#5) 1 month	#5-#1 (#1-#5) 3 months	#5-#1 (#1-#5) 6 months	#5-#1 (#1-#5) 12 months
1	Merton's default probability	-	1.11	-8.45	-7.39	-0.16
2	Volume momentum	+	1.07	1.25	4.68	11.51
3	YoY growth in quarterly earnings	+	0.88	-0.85	-4.73	-0.05
4	Change of Consensus Rating	+	0.79	-3.35	-2.32	-0.73
5	Downside beta	+	0.73	1.18	3.42	6.97
6	Consensus to Rating	-	0.68	0.05	-4.01	-0.37
7	B/P	+	0.67	6.73	8.65	6.86
8	Predicted Surprise (StarMine)	+	0.62	-4.65	-3.95	1.47
9	Bullishness of Company Earnings Forecast	+	0.52	1.75	4.08	3.05
10	Return Reversal	-	0.46	14.15	15.63	11.63
11	I/B/E/S EPS Revision	+	0.41	-5.39	-5.87	-2.71
12	Time normalized E/P	+	0.41	8.20	3.20	5.06
13	Announcement Shock	-	0.36	1.81	5.18	1.49
14	I/B/E/S FY1 Revision	+	0.32	-4.72	-7.25	-5.82
15	Target Price Deviation	+	0.14	9.91	3.71	6.28
16	Volume Change	+	0.13	3.46	6.27	14.85
17	Analyst Forecast Dispersion	-	0.00	-1.49	-4.51	-2.44
18	Sales growth	-	-0.14	0.89	4.20	1.60
19	Change of Nomura rating	+	-0.24	-2.83	0.31	-1.93
20	Nomura RP Revision	+	-0.35	-5.57	-3.79	-2.79
21	Analyst coverage grps	-	-0.39	-2.16	1.48	-3.05
22	Contrarian against Rating	+	-0.68	-0.06	4.08	0.14
23	Accruals	-	-0.82	2.50	6.49	7.35
24	E/P	+	-1.34	9.48	4.23	-1.35
25	Price Momentum	+	-1.55	-13.19	-13.18	-14.15

Data as of 20080610

Note: (1) The universe, consisting of TSE1 stocks in Nomura's coverage, is divided into five groups by factor values.

(2) Groups are rebalanced monthly (at the start of each month). 19 Nomura sector classification is employed for sector diversification.

(3) Returns are based on spread returns, or the difference between the return for group 5 and group 1 (the difference between the return for group 1 and group 5 when the sign is negative). For definitions of these factors, see Appendix 2.

Source: Nomura

## Appendix 2: factor definitions

Factors	Definition
Downside $\beta$	$\beta$ in months with TOPIX down - $\beta$ in months with TOPIX up
Return Reversal	Total return in the previous month
Price Momentum	Last 3 month return less the last 1 month return
Annoucement Shock	( Actual recurring profit - Estimated recurring profit at the biginning of the year ) / Market cap
Volume Change	Volume turnover normalized over past 12 months
I/B/E/S EPS Revision	( # of up analyst revisions - # of down analyst revisions ) / # of analysts
Consensus Rating	I/B/E/S Consensus Rating (1 to 5; 1=strong buy)
Change of Consensus Rating	(# of upward of rating - # of downward of rating) / # of analysts
Change of Nomura rating	Current rating - average rating for past 3 months
Predicted Surprise (StarMine)	( SmartEstimate - I/B/E/S consensus ) / I/B/E/S consensus x 100
Volume momentum	one-month trading volume / average for past 3 month - 1
YoY growth in quarterly earnings	Latest actual quarter earnings / last year's same quarter's earnings - 1
B/P	Inverse of actual P/B
E/P	Inverse of forward P/E (based on Nomura estimates where available, otherwise Toyo Keizai estimates)
Time normalized E/P	Forward E/P normalized over past 36 months
Nomura revision	Nomura RP estimate / past 3 months average -1
Sales growth	Forecast sales (FY2)/actual sales - 1
Merton's default probability	Based on stock volatility, debt/equity ratio, other factors
Target Price Deviation	IFIS Target Price / Moving Average Price for 4 weeks -1
Analyst coverage grps	Number of Analysts Covers, RANK1: 1 or 2, RANK2: 3 or 4, RANK3: 5 or 6, RANK4:7 or 8 RANK5: Over 8
Bullishness of Company	(I/B/E/S)
Earnings Forecast	Company forecast - I/B/E/S forecast (ROE basis)
Accruals	Total Accruals- Normal Accruals estimated by Modified Jones Model
I/B/E/S FY1 Revision	Current I/B/E/S FY1 forecast - average for past 3 months (ROE basis)
ROE	Net profit estimate / actual shareholders' equity
Log market cap	log (market cap)
EBITDA/EV	$\frac{\text{Net profit estimate} + \text{Actual interest expense} + \text{Actual depreciation}}{\text{Market cap} + \text{Interest-bearing debt} - \text{Cash} - \text{Short-term marketable securities}}$

## ANALYST CERTIFICATIONS

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