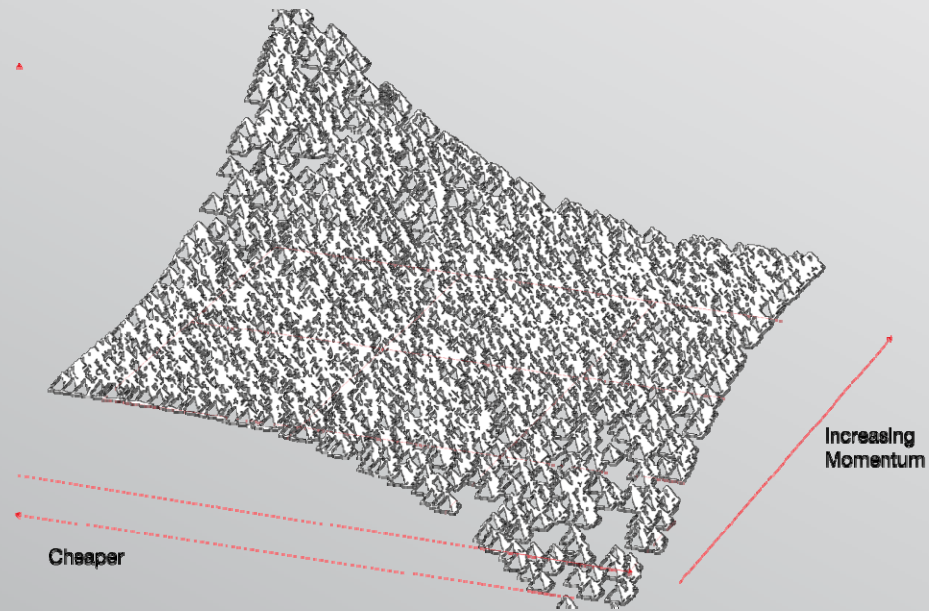


Interaction
Score



Nomura Global Quantitative Equity Conference in London

NOMURA

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Quantitative Equity Strategy

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Contents

- Performance of quant models in the current environment
- The factor outlook
- Four views on current areas of quant development:
 - 1. Is there a case for minimum variance?
 - 2. Improving performance through timing of screening
 - 3. Factor rotation
 - 4. Non-linear interaction factors have been working recently

Nomura Global Quant Benchmark index relative to market

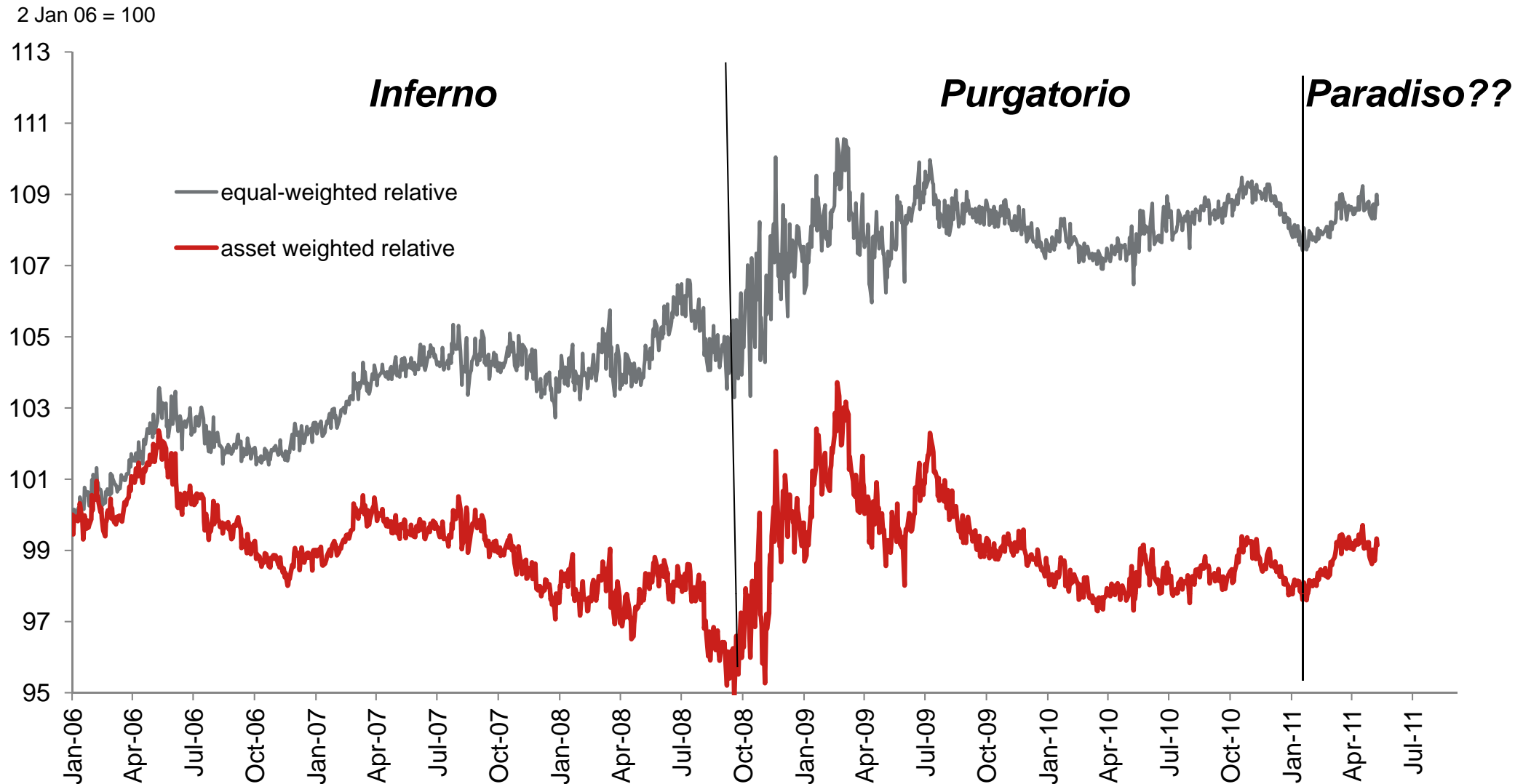


Figure shows the performance of equal-weighted and asset-weighted quant fund indices relative to the global market and also the absolute return of the Hedge Fund Research Equity Market Neutral index.
 Source: Hedge Fund Research, Bloomberg, Nomura Equity Strategy research

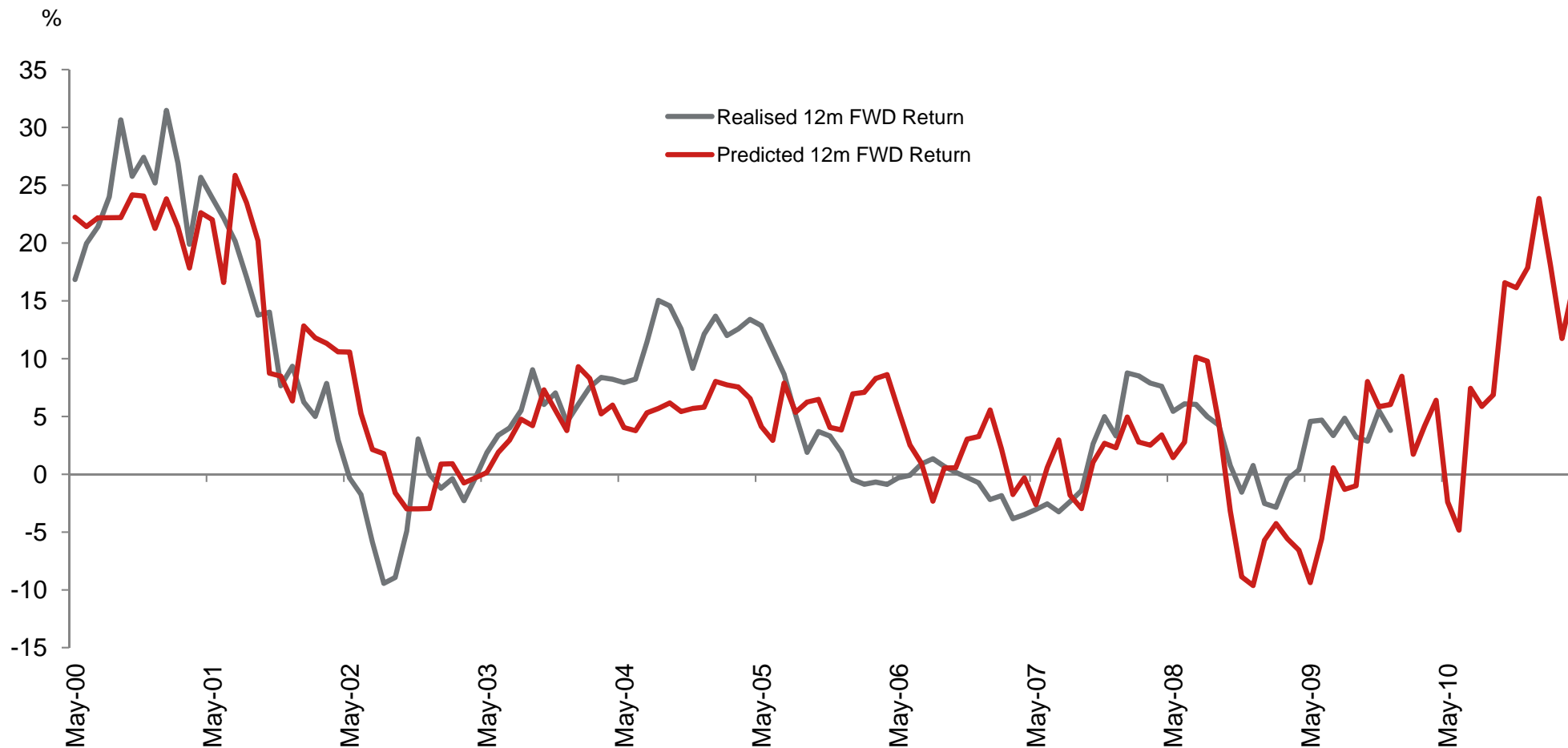
Meta Model

$$r_{t:t+\delta} = \alpha + \beta_1 \text{Correl}_t + \beta_2 \text{Value}_t + \beta_3 \text{Growth}_t + \beta_4 \text{Momentum}_t + \varepsilon$$

Where *Correl* is the average pairwise correlation between stocks. *Value*, *Growth* and *Momentum* all refer to the *dispersion* of these factors across the market.

	β	s.e.	t-statistic
Correlation	-48.2	11.3	-4.3
Value	-17.1	9.6	-1.8
Growth	2.8	0.4	6.7
Momentum	-0.6	0.5	-1.2
Constant	-10.6	8.1	-1.3
R ²	0.7		

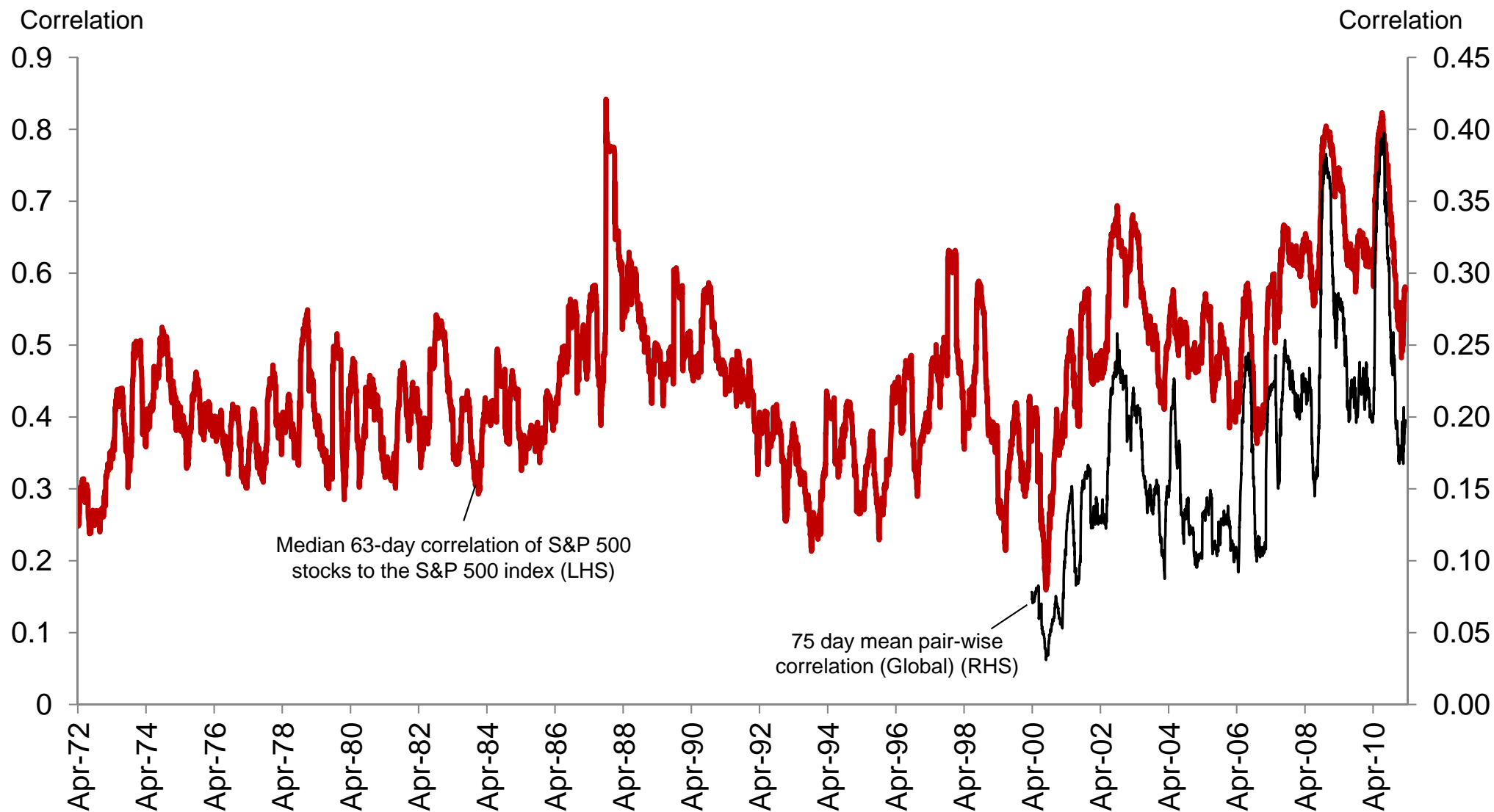
Predicted quant returns



The quant proxy for which we are forecasting 12 -month forward return (r) is the Nomura Quant Benchmark . Before 2006, we use a sector-neutral blend of P/E and 12 -month price momentum combined using a simple average approach for the quant proxy. We use a regression based approach to forecast the 12 -month forward returns using average pairwise correlation between global stocks and dispersion of value, growth and momentum as detailed in *Quant and Existentialism* , 9 October 2010.

Source: Nomura Strategy Research

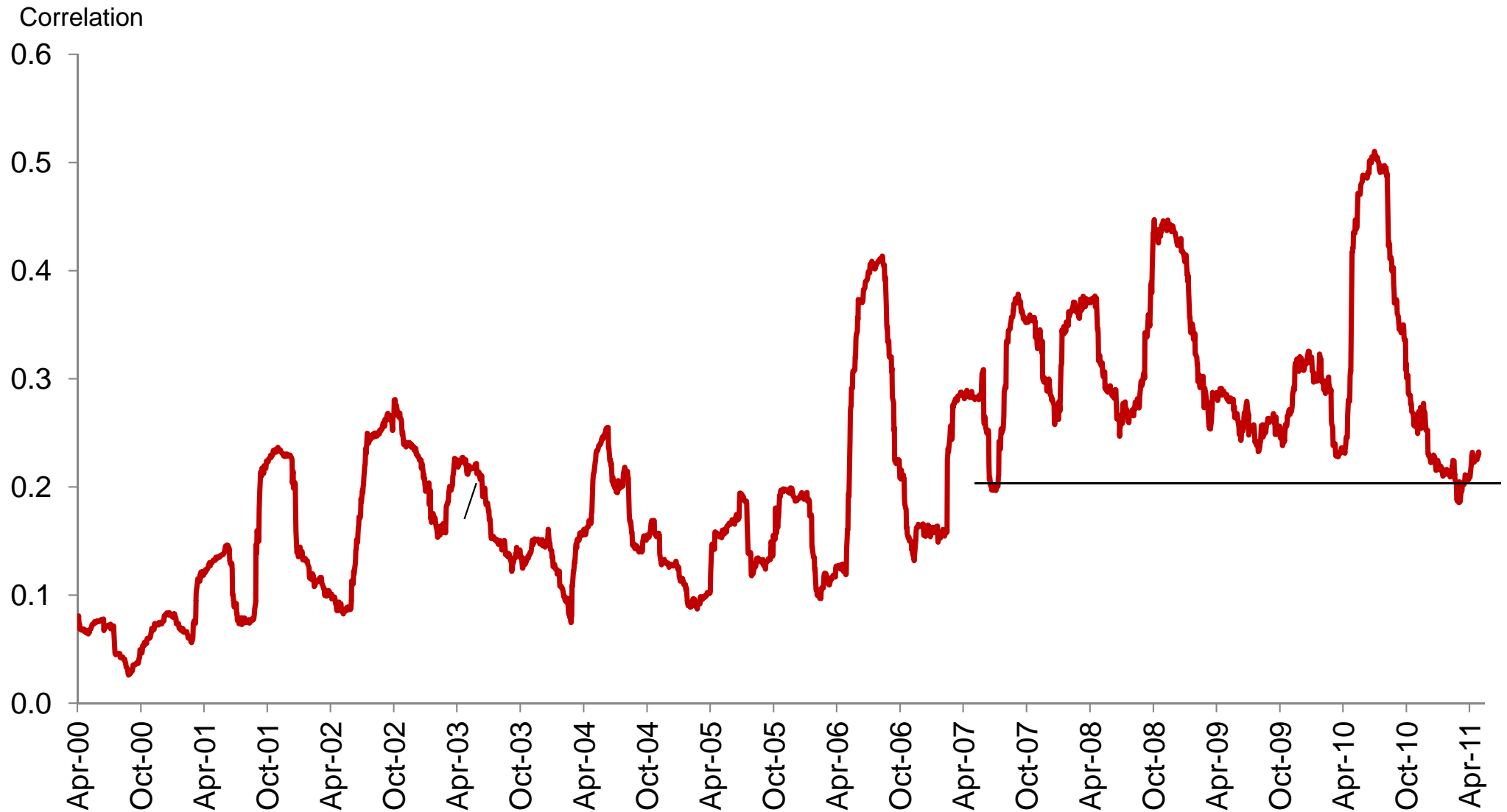
Average correlation of stocks Global and US



Global correlation is defined as the mean of all the pairwise correlations between stocks over the prior 75 days. Universe is the 500 largest stocks in the FTSE World index. US correlation is the median 63-Day correlation of S&P 500 Stocks to the S&P 500 Index.

Source: Nomura Equity Strategy, Ned Davis

Average correlation of stocks (Europe)



Correlation is defined as the mean of all the pairwise correlations between stocks over the prior 75 days. Universe is the stocks that are in or ever have been in the FTSE World index. Source: Nomura Equity Strategy

Dispersion of expected growth rates

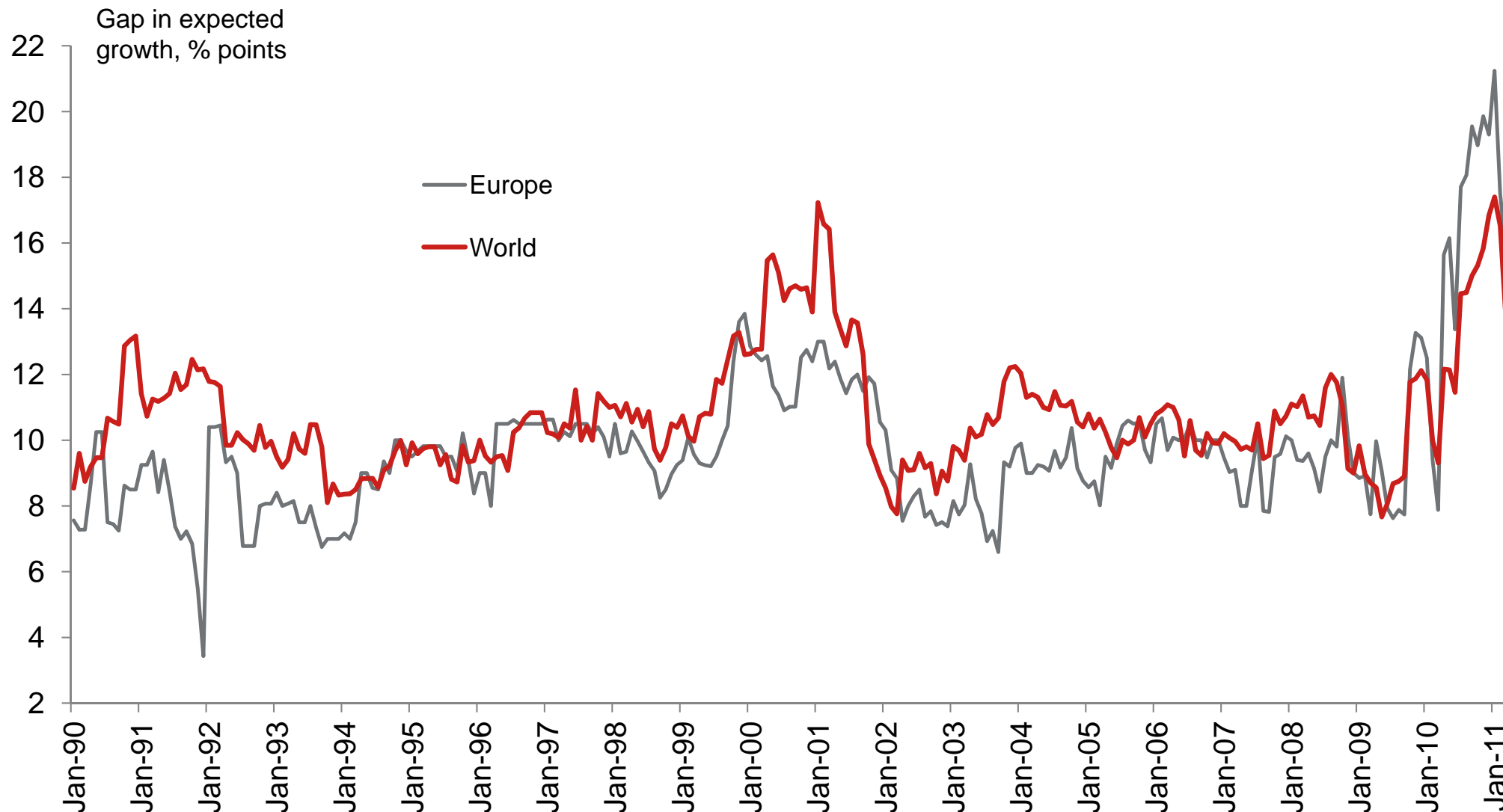


Chart shows the cross-sectional dispersion of expected growth rate for each region. This is defined as the median long-term expected growth of high-expected-growth names less the median for low-expected-growth names. The portfolios are defined as the top/bottom quartiles of stocks screened on long-term expected growth and FY0-FY3 expected growth. The universes used are the 300 largest stocks in the FTSE World Europe and the 500 largest companies from the FTSE World index. Portfolios are rebalanced every quarter.

Source: IBES, WorldScope, FTSE, Exshare, Nomura Equity Strategy research

P/E Valuation of expected growth

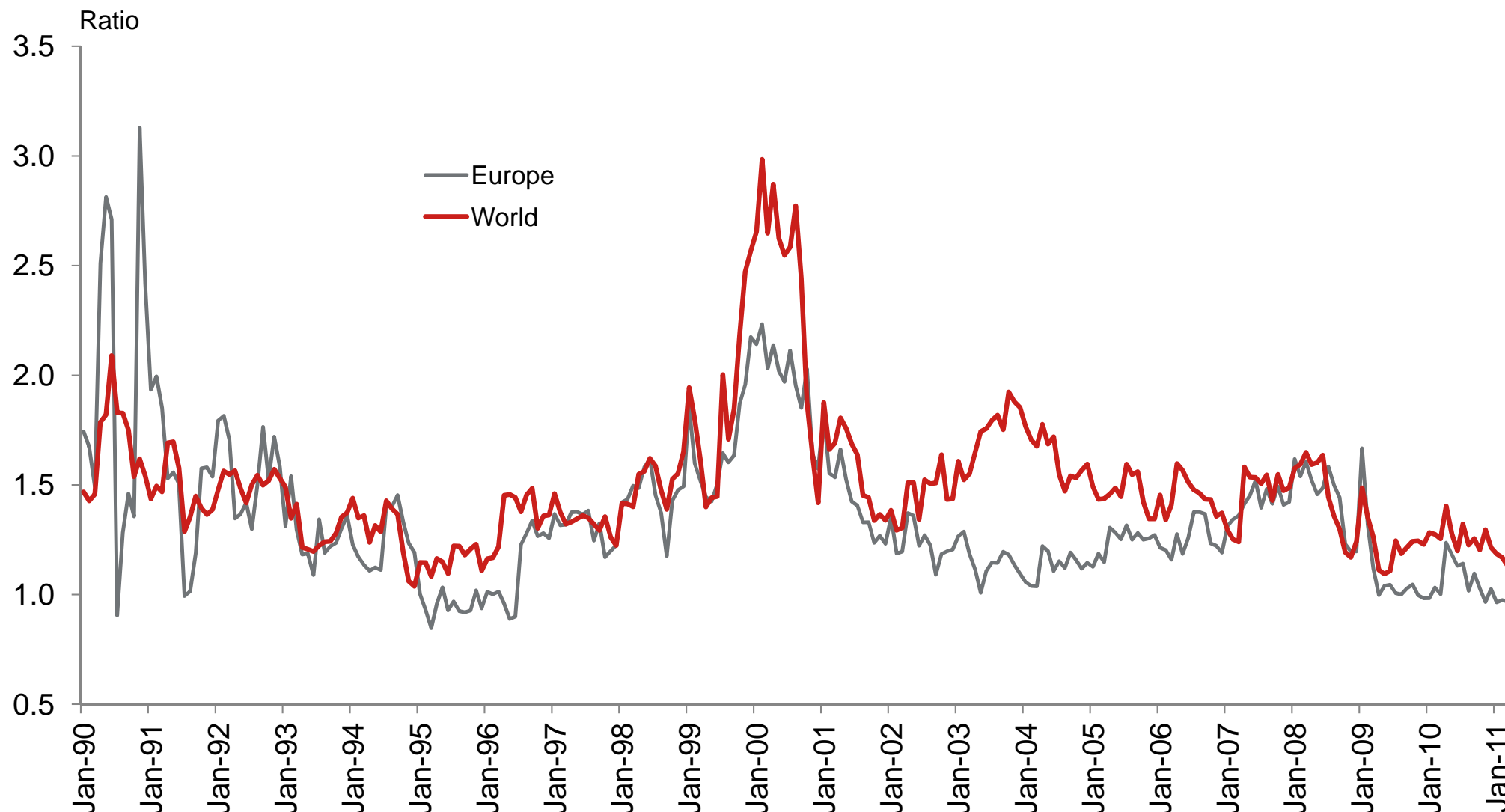


Chart shows the P/E ratio of the top/bottom quartiles of stocks screened on long-term expected growth and FY0-FY3 expected growth with stocks selected from the 300 largest stocks in the FTSE World Europe and the 500 largest companies from the FTSE World index every quarter.

Price/Book valuation of expected growth

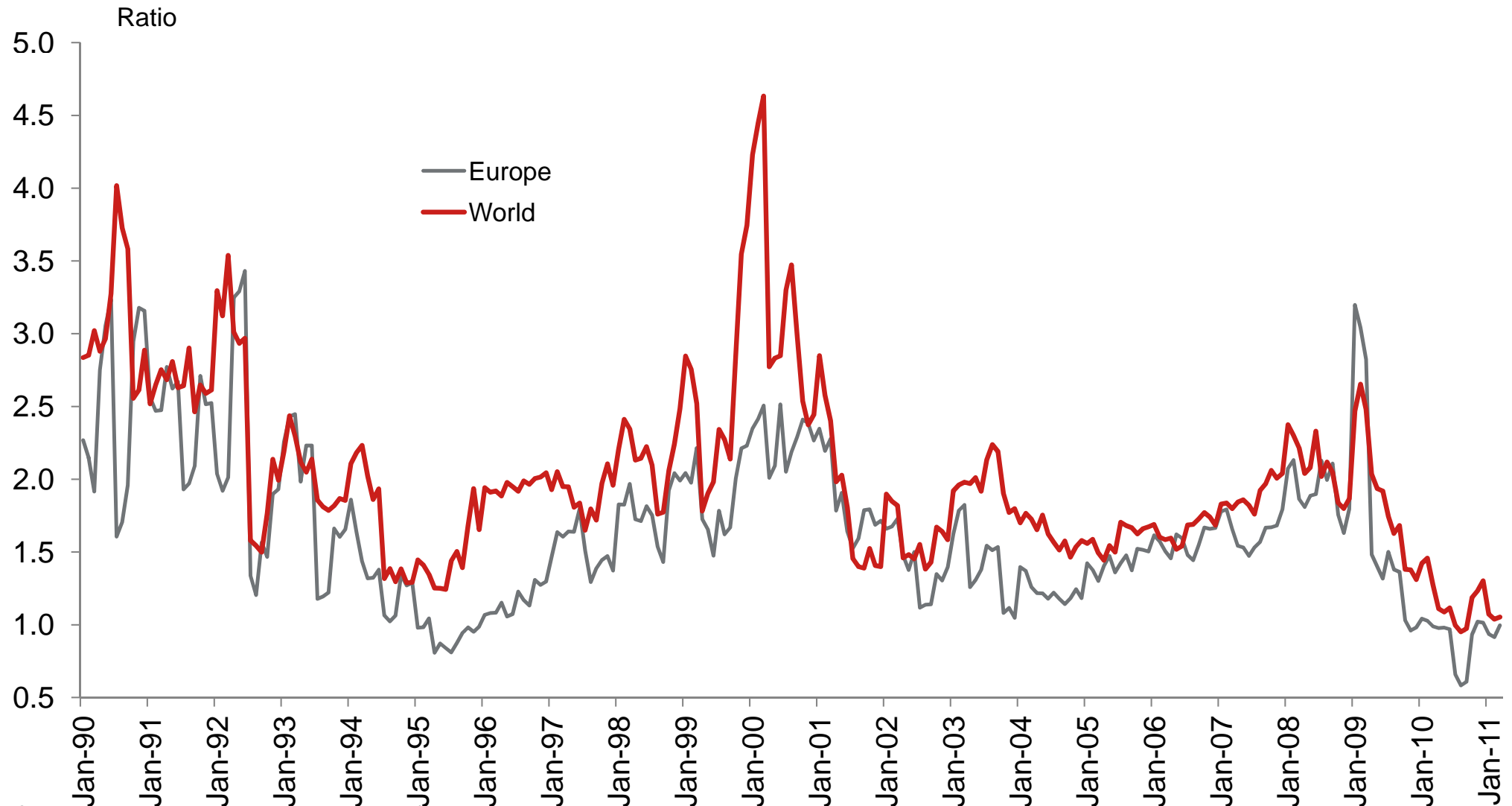


Chart shows the price/book ratio of the top/bottom quartiles of stocks screened on long-term expected growth and FY0-FY3 expected growth with stocks selected from the 300 largest stocks in the FTSE World Europe and the 500 largest companies from the FTSE World index every quarter.

Source: IBES, WorldScope, FTSE, Exshare, Nomura Equity Strategy research

How good are growth measures at actually predicting growth?

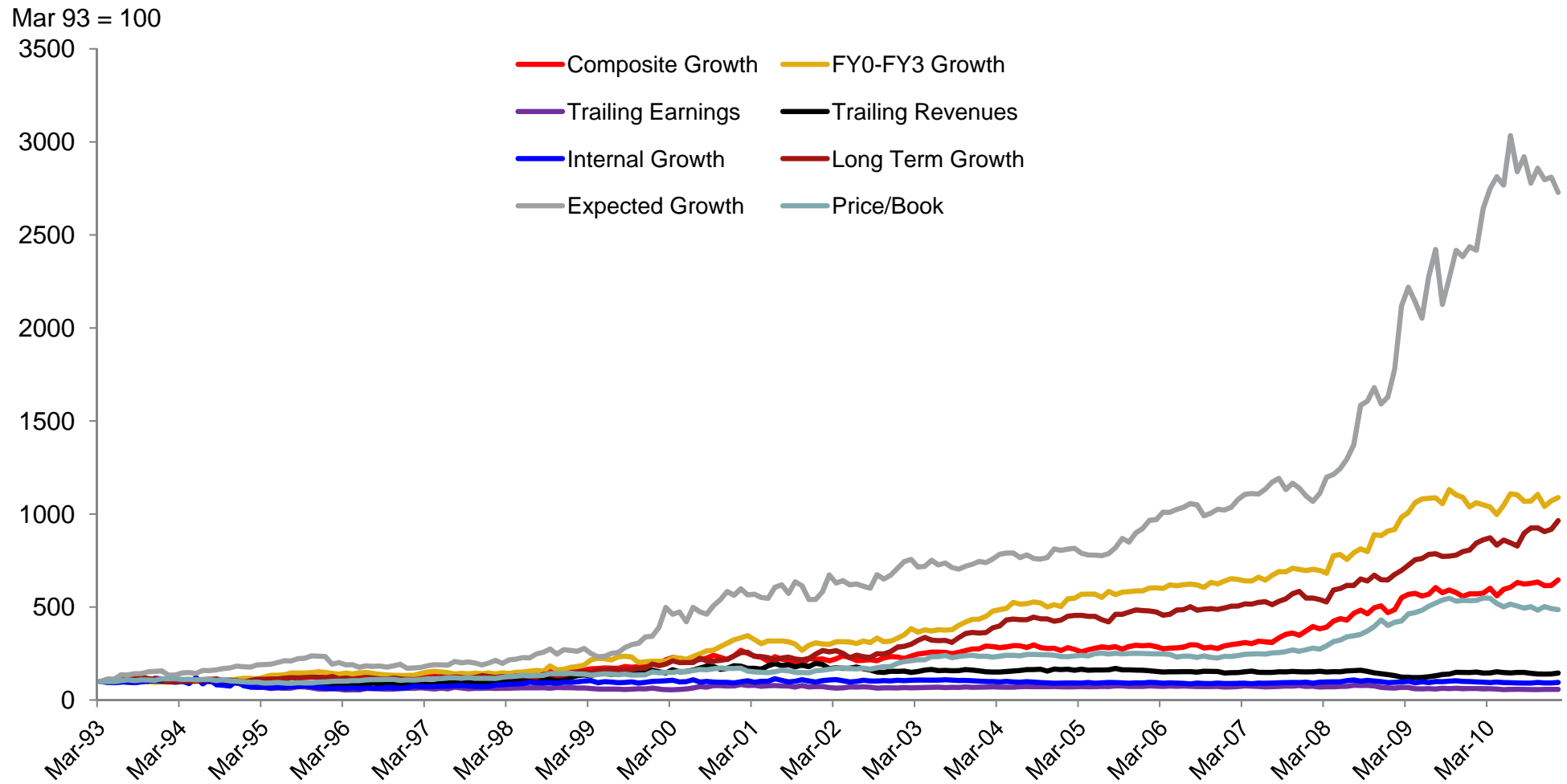


Figure shows the ex post one year forward growth for a wide variety of growth factors. This is done by constructing high/low growth portfolios every December on these factors and track the growth in 12 month forward consensus EPS over the subsequent year. We chart the spread in cumulative earnings growth between the high and low growth portfolio which is also the data highlighted in yellow to the right of each sheet. Portfolios are selected from the 500 largest stocks in the FTSE World.

Source: IBES, FTSE, WorldScope, Exshare, Nomura Equity Strategy research

Valuation of large/small caps

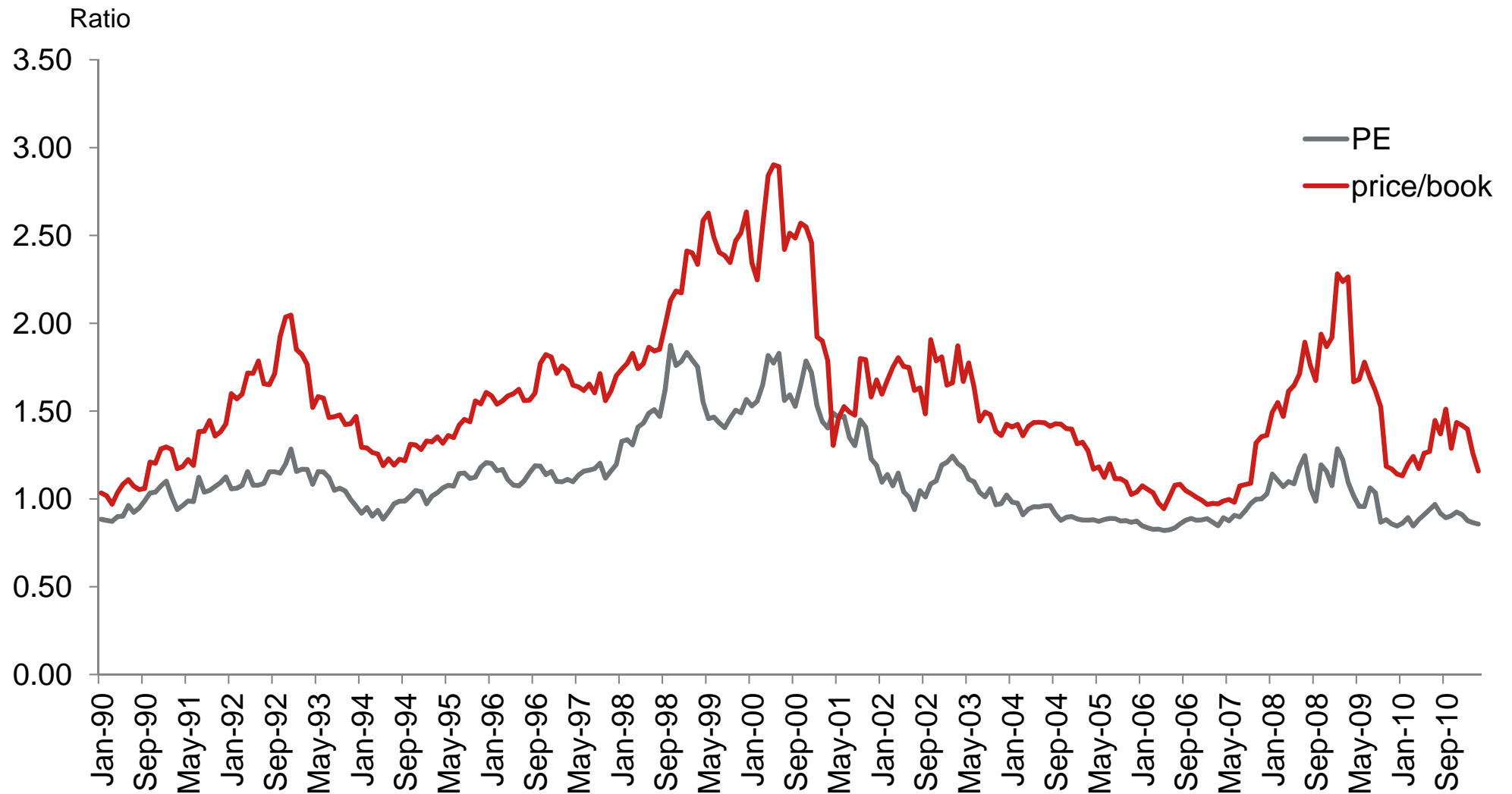


Figure shows the relative P/E and price/book of the largest/smallest quartile of stocks selected from the FTSE World Europe index and rebalanced every quarter. Source: FTSE, WorldScope, Exshare, IBES, Nomura Equity Strategy research

Current Trends in Quant Asset Management

- Quant Managers are offering wider range of models:
- This includes many non-benchmark strategies eg minimum variance
- Strategies applied to broader universe: Emerging markets, small caps
- Discretion in quant models
- Looking at alternative ways of using the data that we have already: timing and interaction of factors
- Factor rotation approaches

Has Minimum Variance been re-priced?

Cross-sectional distribution of P/E by volatility decile

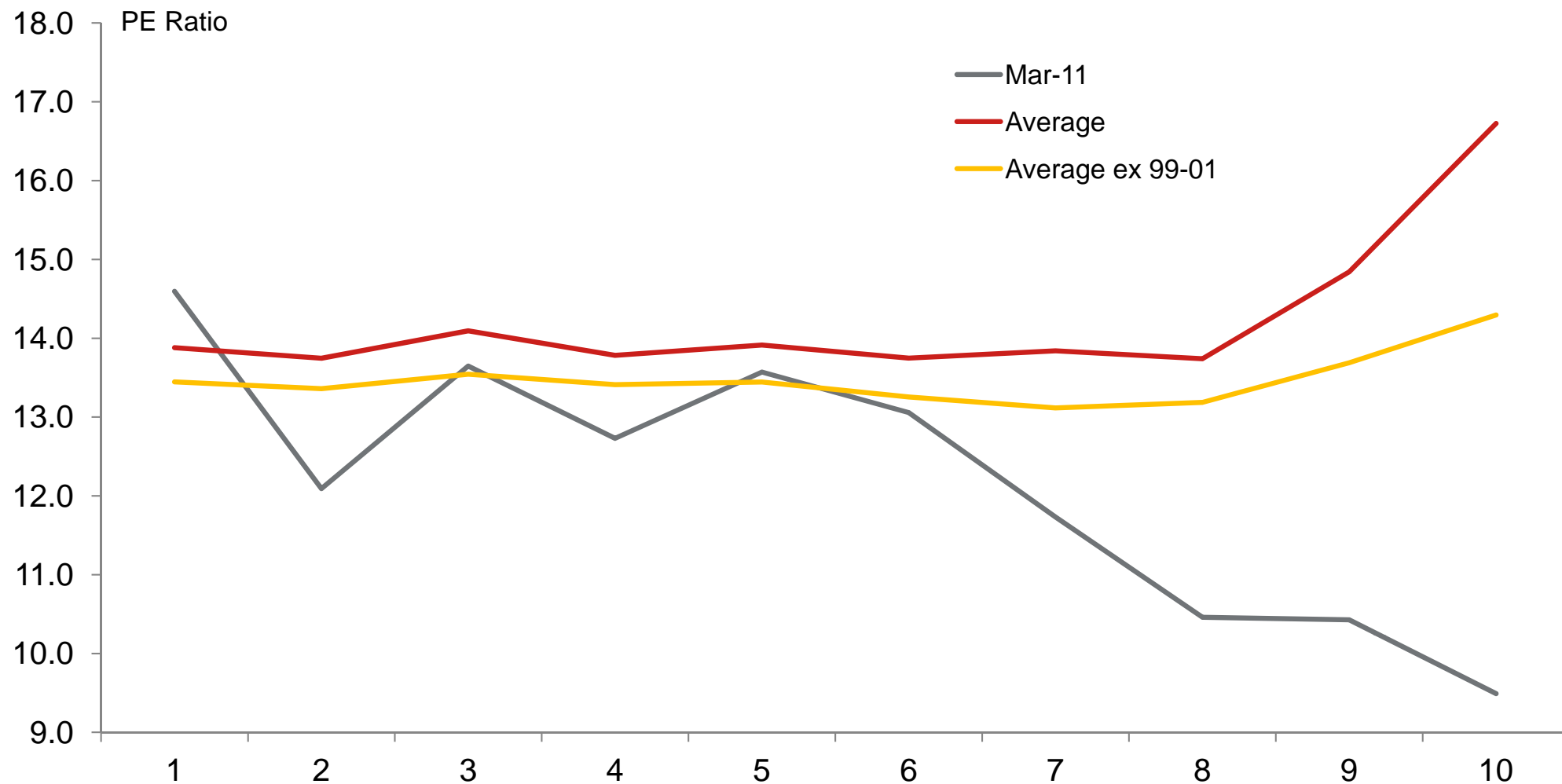


Figure shows the valuation of volatility deciles defined as the median 12 month forward PE of stocks in each decile screened on trailing 12 months volatility of returns. The universe is the 300 largest stocks in the FTSE World Europe index. The portfolios have been rebalanced every quarter. The average valuation is calculated over the period January 1990 – March 2011.
 Source: Nomura Equity Strategy research

Has Minimum Variance been re-priced?

Slope of cross-sectional regression of P/E for volatility deciles

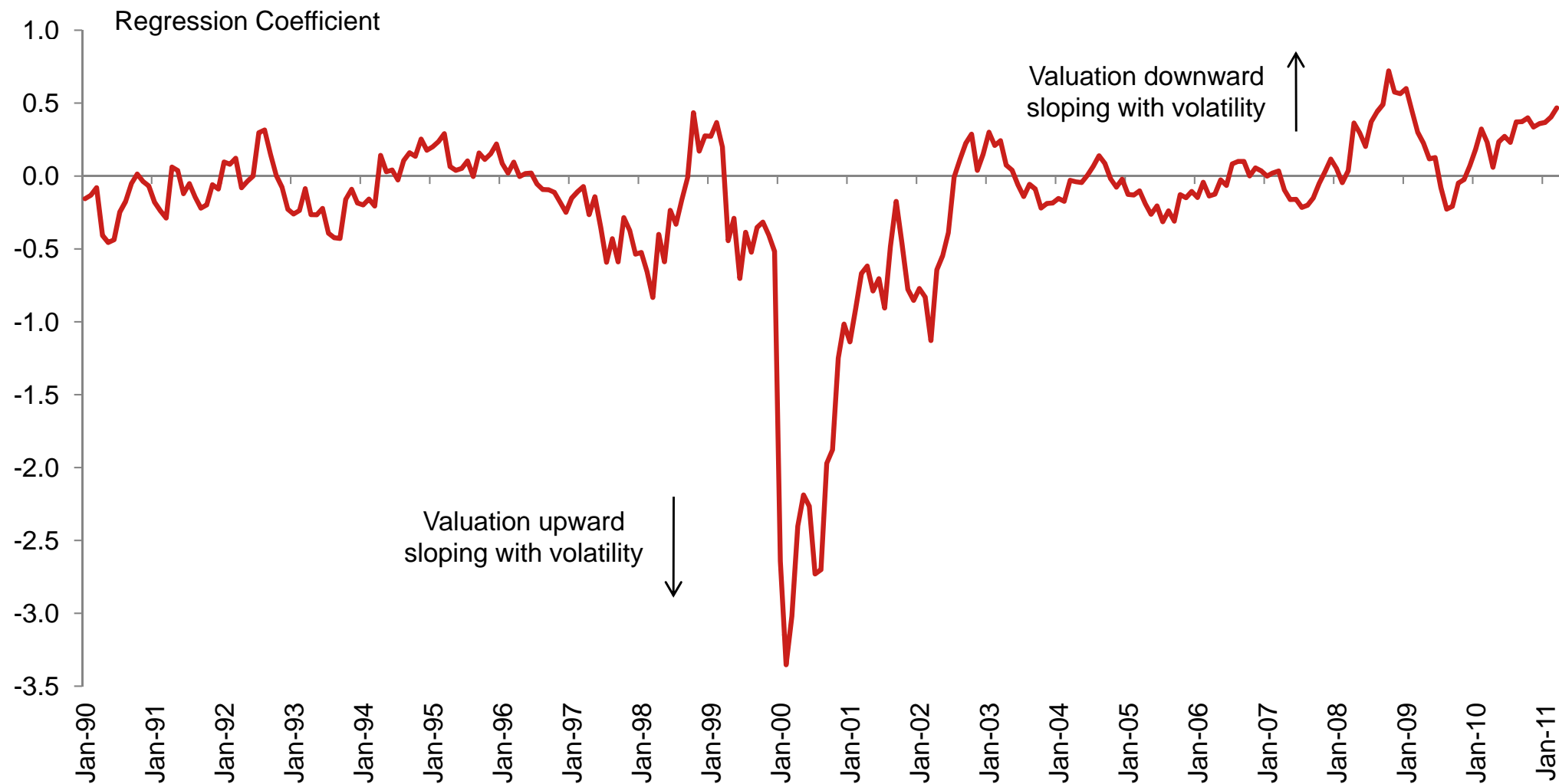


Figure shows the slope coefficient from a regression of the valuation of volatility deciles on a cross-sectional dummy variable. Valuation is measured as the median observation within the portfolio of consensus 12 month forward PE. Portfolios have been created by sorting on trailing 12 month realised volatility. A negative coefficient implies that valuation is upward sloping with volatility and vice versa. The universe is the 300 largest stocks in the FTSE World Europe index. The portfolios have been rebalanced every quarter.
 Source: Nomura Equity Strategy research

Factor efficacy over the month

- There are many managers who use month-end prices for screening and then implement factor portfolios early in the month
- There is evidence that this makes end-month factor construction and portfolio implementation less effective
- In some cases implementing just before the end of the month can lift performance

PE and PBK become less effective at month end

Efficacy of factors for 3 month forward stock selection when implemented on day:

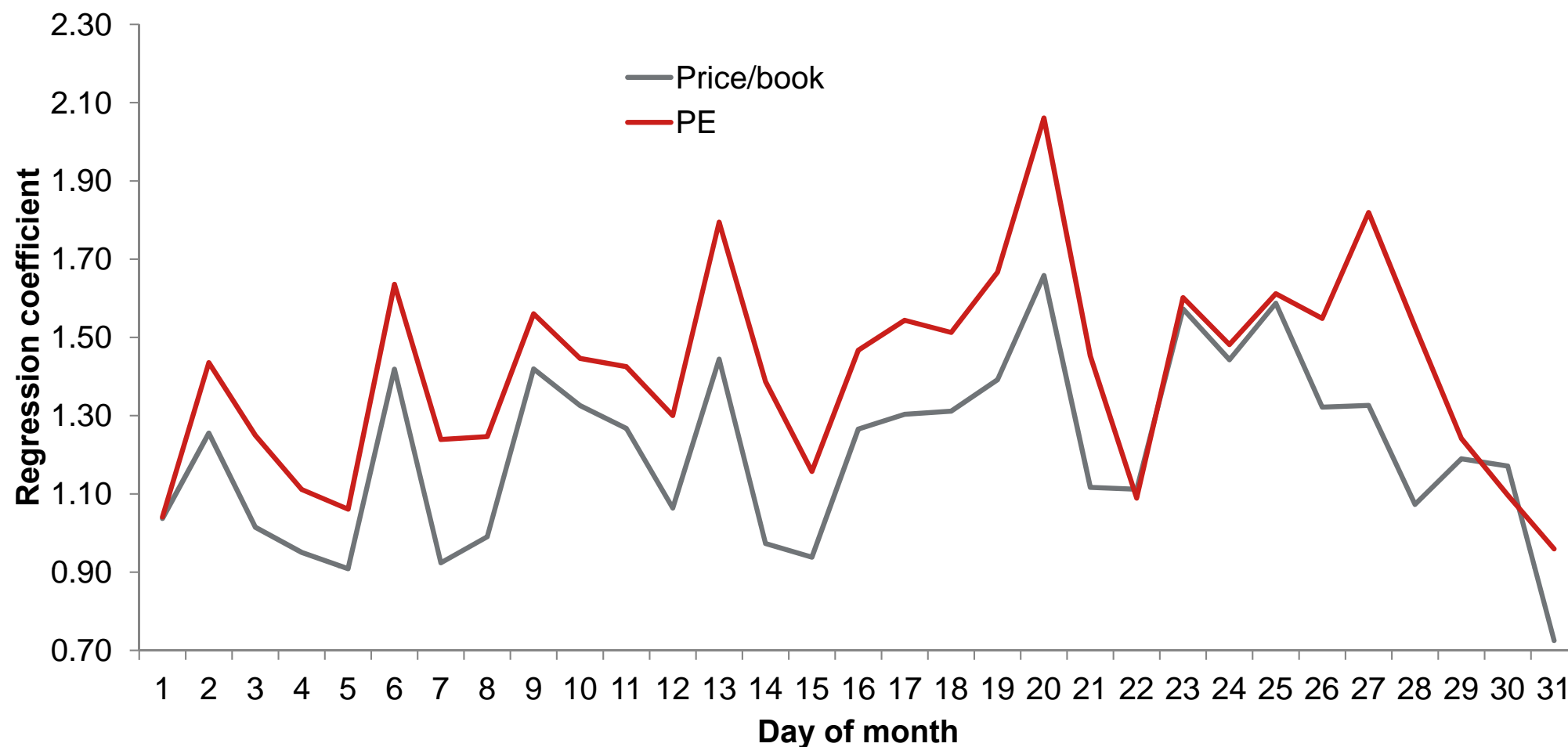


Chart shows the regression coefficients of a regression run of 3 month forward returns on factor values screened on a given day of the month. Regressions run 2000-2011 for the 300 largest stocks in the FTSE World Europe index. Source: Nomura Equity Strategy

Short term reversal also less effective at month end

Efficacy of 1 month reversal factor for 1 month forward stock selection when implemented on day:

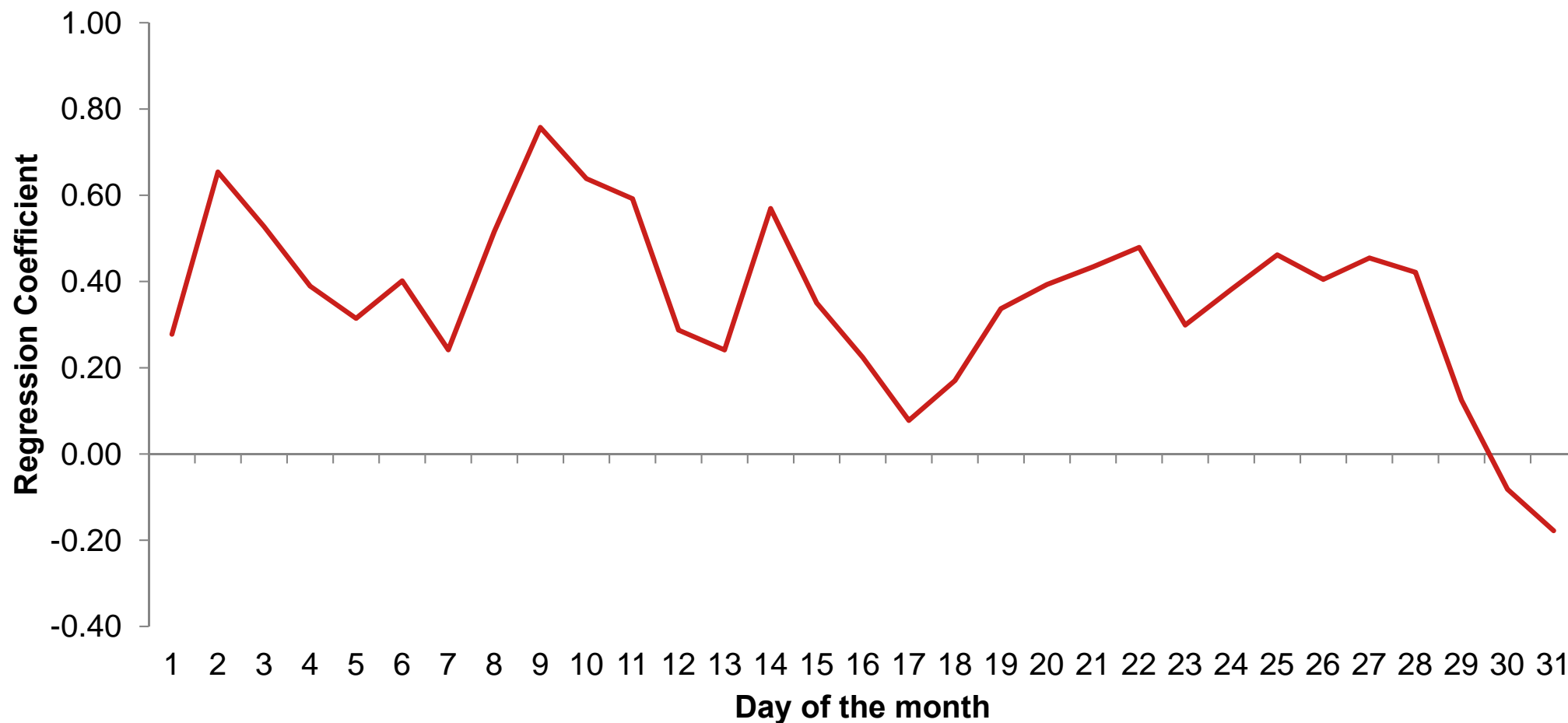


Chart shows the regression coefficients of a regression run of 1 month forward returns on factor values screened on a given day of the month. Regressions run 2000-2011 for the 300 largest stocks in the FTSE World Europe index. Source: Nomura Equity Strategy

V + M interaction also becomes less effective at month end

Efficacy of factors for 3 month forward stock selection when implemented on day:

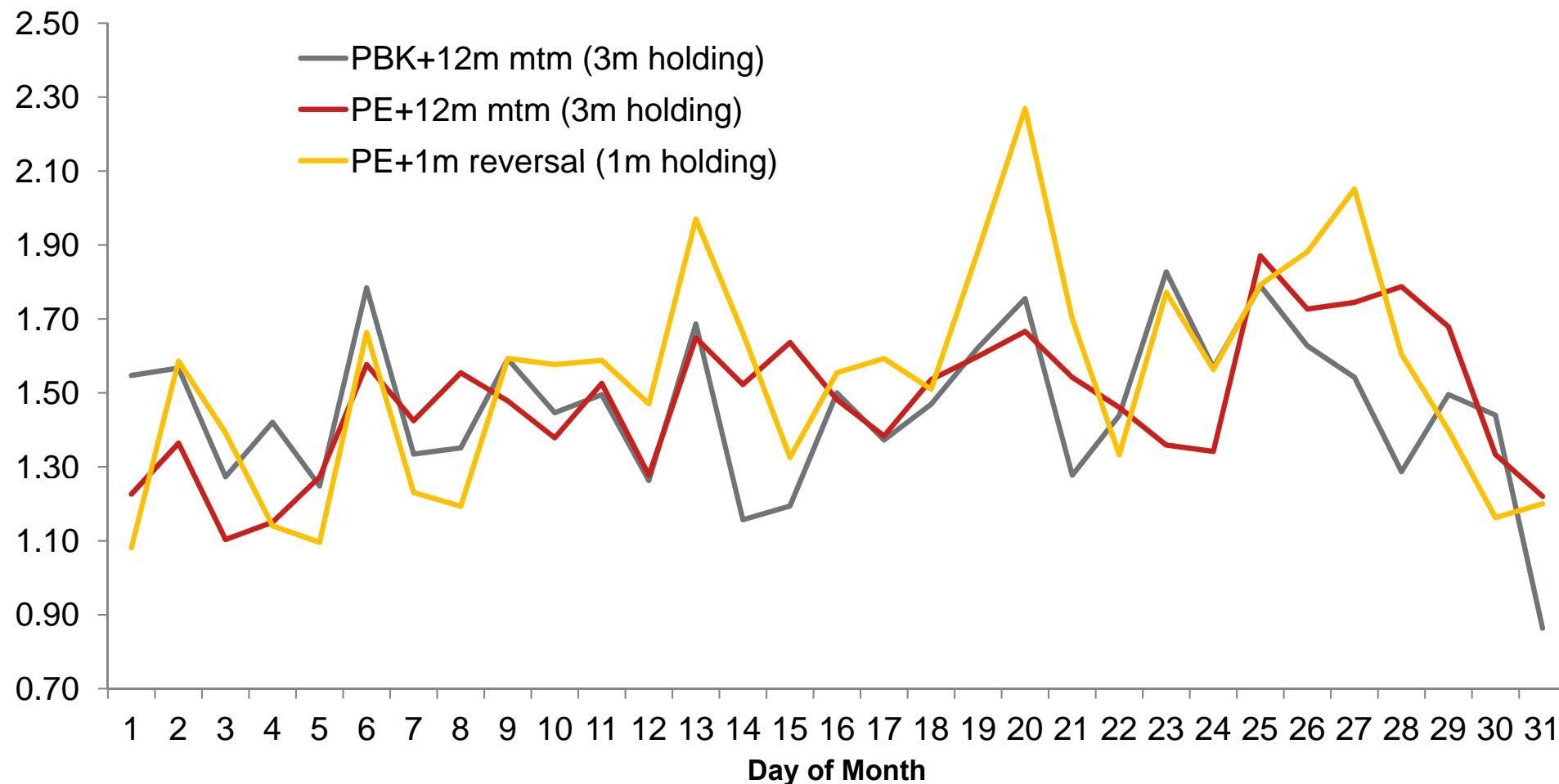
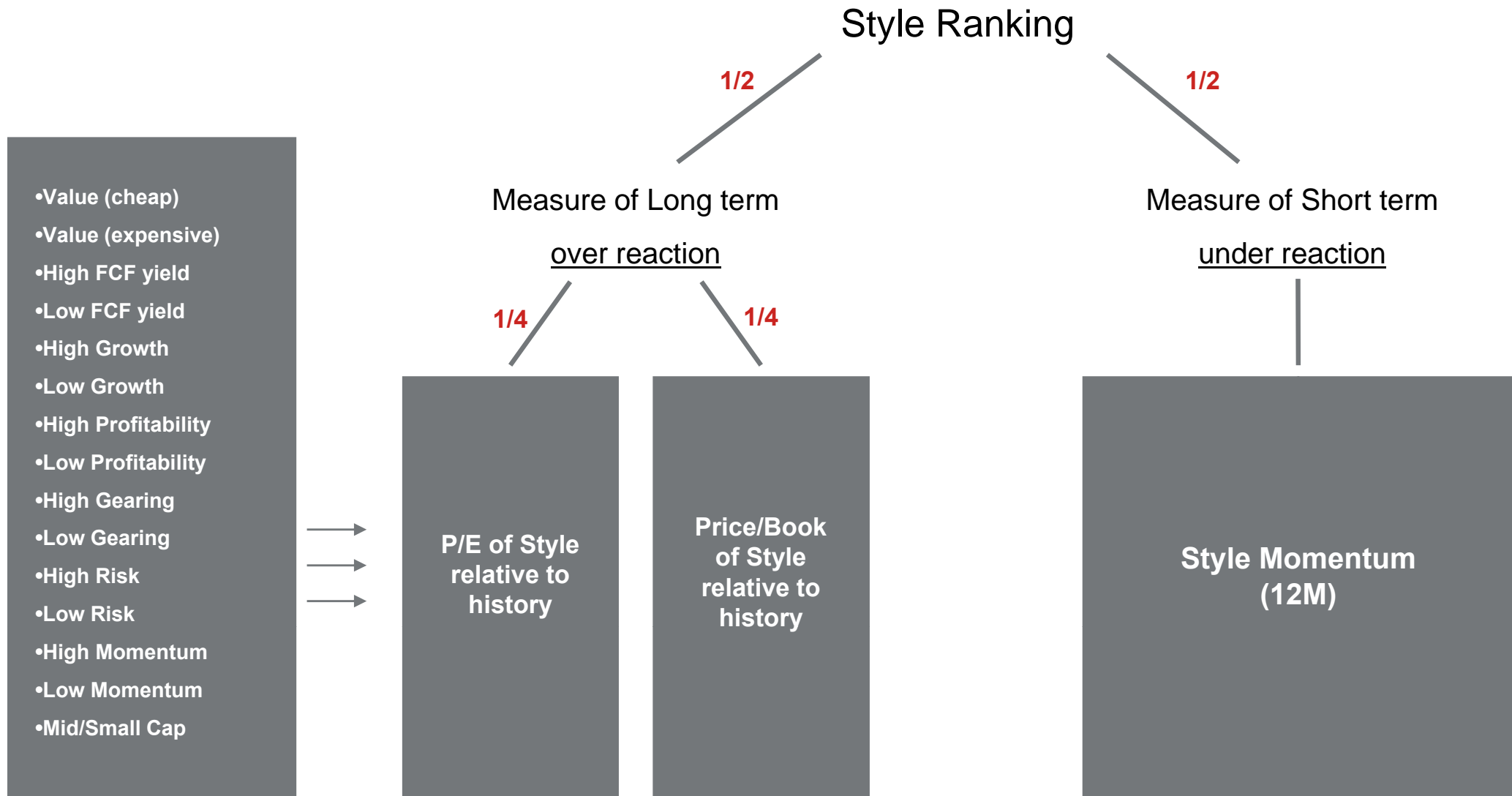


Chart shows the regression coefficients of a regression run of 3 month forward returns on factor values screened on a given day of the month. Regressions run 2000-2011 for the 300 largest stocks in the FTSE World Europe index. Source: Nomura Equity Strategy

Style selector



- Value (cheap)
- Value (expensive)
- High FCF yield
- Low FCF yield
- High Growth
- Low Growth
- High Profitability
- Low Profitability
- High Gearing
- Low Gearing
- High Risk
- Low Risk
- High Momentum
- Low Momentum
- Mid/Small Cap

Performance of alternative style selector model (Europe)

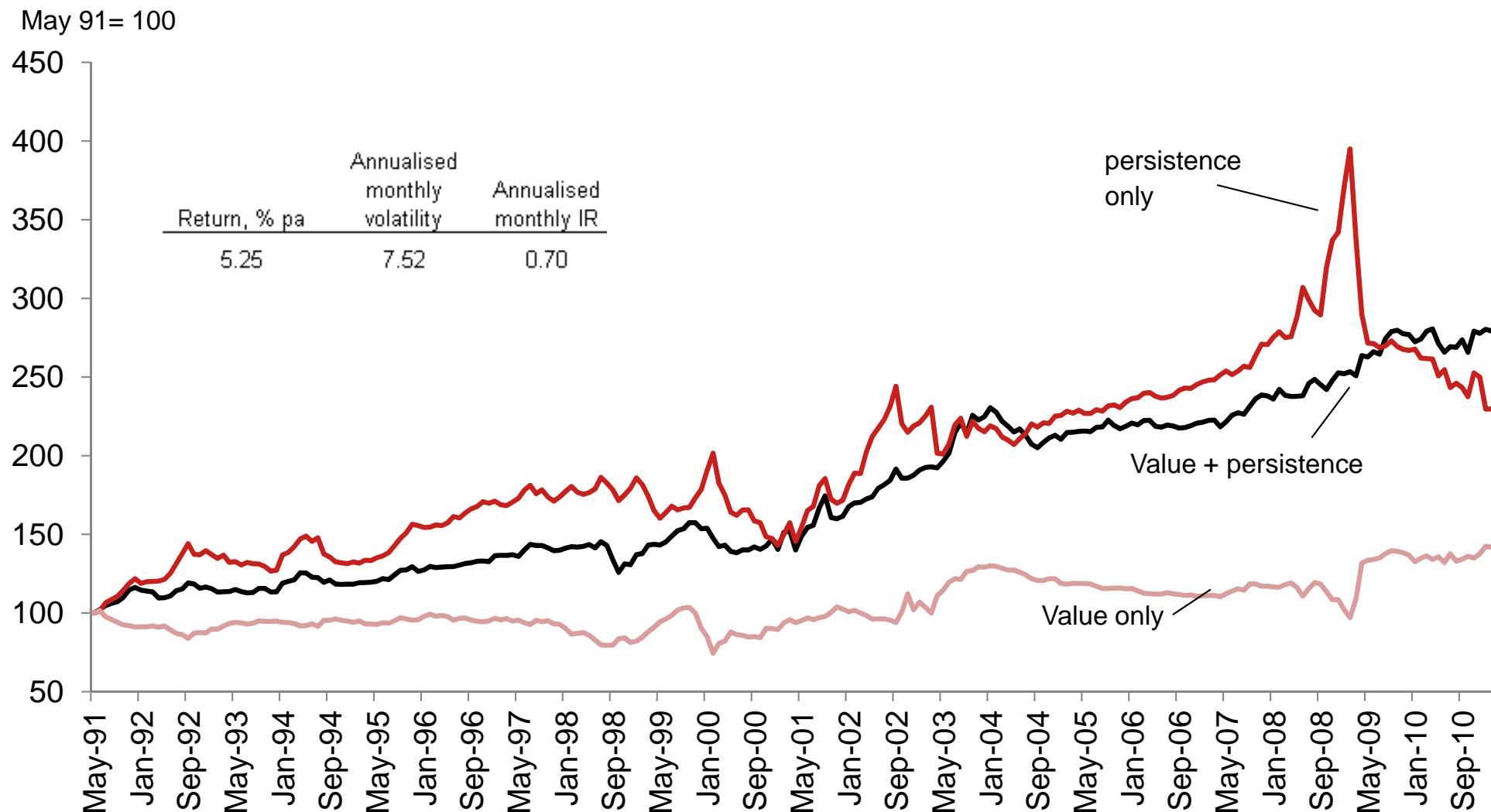


Figure shows the relative performance of attractive and unattractive styles according to a range of switching models on a long-short basis. Portfolio holdings have been rebalanced each month. Stocks have been equally weighted within the style portfolio at the beginning of each holding period and styles are equally weighted. Style performance is on a total return, common currency basis. From 2000 a three-day implementation lag is introduced as each rebalancing point to allow for a conservative trading horizon. The investable universe is the 300 largest companies in the FTSE World Europe index Source: Nomura, WorldScope, FTSE, Exshare

Model recommendations for May

This updates our ranking of European styles. We use a value and momentum approach as detailed in *European Style Selector*, 5 June 2009. The model recommends going long styles highlighted at the top of the table and short the styles highlighted at the bottom.

	Current PE	Average PE	PE (z score)	Current PBK	Average PBK	Price/Book (z score)	Momentum (12m)	Rank on PE (A)	Rank on Price/Book (B)	Rank on Momentum (C)	Overall Rank : 1/4 A + 1/4 B + 1/2 C	Final Rank
Low Profitability	12.46	14.63	-0.87	1.42	1.65	-0.53	34.93	4	7	1	3.25	1
High FCF Yield	10.67	12.64	-0.84	1.75	2.09	-0.66	33.70	5	5	3	4.00	2
High Gearing	12.46	14.11	-0.56	2.18	2.15	0.05	33.84	8	14	2	6.50	3
Value (Expensive)	17.22	20.62	-0.53	3.95	4.59	-0.36	31.82	9	10	5	7.25	4
High Growth	13.40	16.50	-0.65	2.42	3.82	-1.06	28.42	7	1	11	7.50	5
Low Growth	11.21	12.89	-0.75	1.41	1.62	-0.56	28.63	6	6	9	7.50	5
Low Gearing	15.57	16.83	-0.31	3.39	3.75	-0.28	32.46	13	11	4	8.00	7
Large Cap	11.16	14.08	-0.90	1.80	2.38	-0.83	26.79	3	3	13	8.00	7
High Risk	9.34	15.14	-1.18	1.25	2.10	-0.83	26.47	1	2	15	8.25	9
Low Momentum	10.53	13.15	-0.92	1.36	1.85	-0.82	26.70	2	4	14	8.50	10
Low FCF Yield	13.30	14.69	-0.52	2.45	2.12	0.53	30.74	10	16	6	9.50	11
High Profitability	13.90	15.14	-0.36	4.39	4.72	-0.21	29.94	11	13	7	9.50	11
High Momentum	14.51	15.54	-0.27	2.33	2.71	-0.41	28.82	14	9	8	9.75	13
Value (Cheap)	9.26	9.95	-0.35	1.17	1.35	-0.52	28.40	12	8	12	11.00	14
Low Risk	13.55	14.06	-0.23	2.84	2.67	0.32	28.44	15	15	10	12.50	15
Mid/Small Cap	12.48	12.73	-0.13	1.47	1.57	-0.22	25.07	16	12	16	15.00	16

Source: Nomura Strategy Research

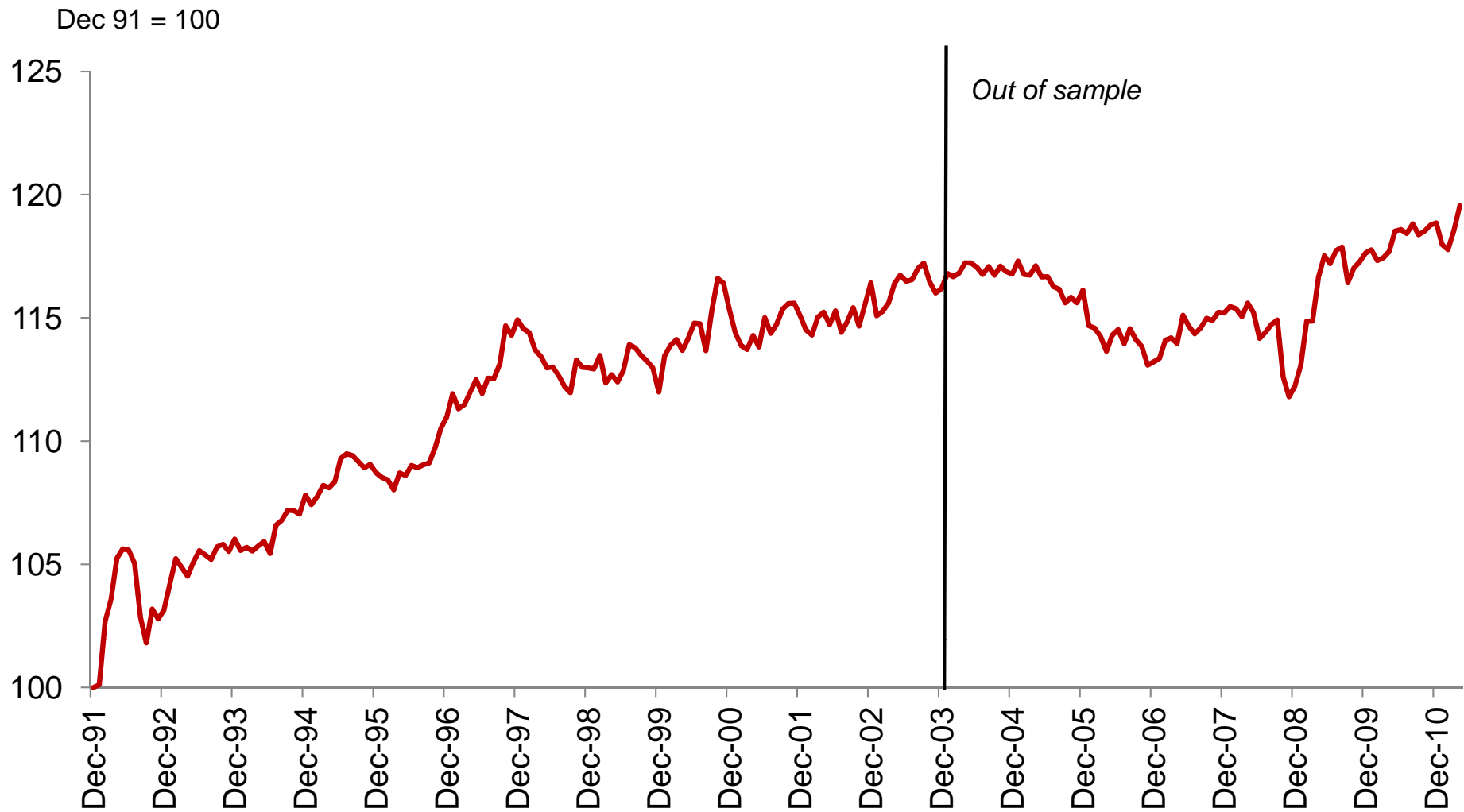
Interaction factor

- A normal multifactor model may select a stock as attractive if it is the cheapest in the universe but only attains a mediocre score on other factors.
- This could be erroneous if what really matters is the joint score on value and momentum. An example of this would be:

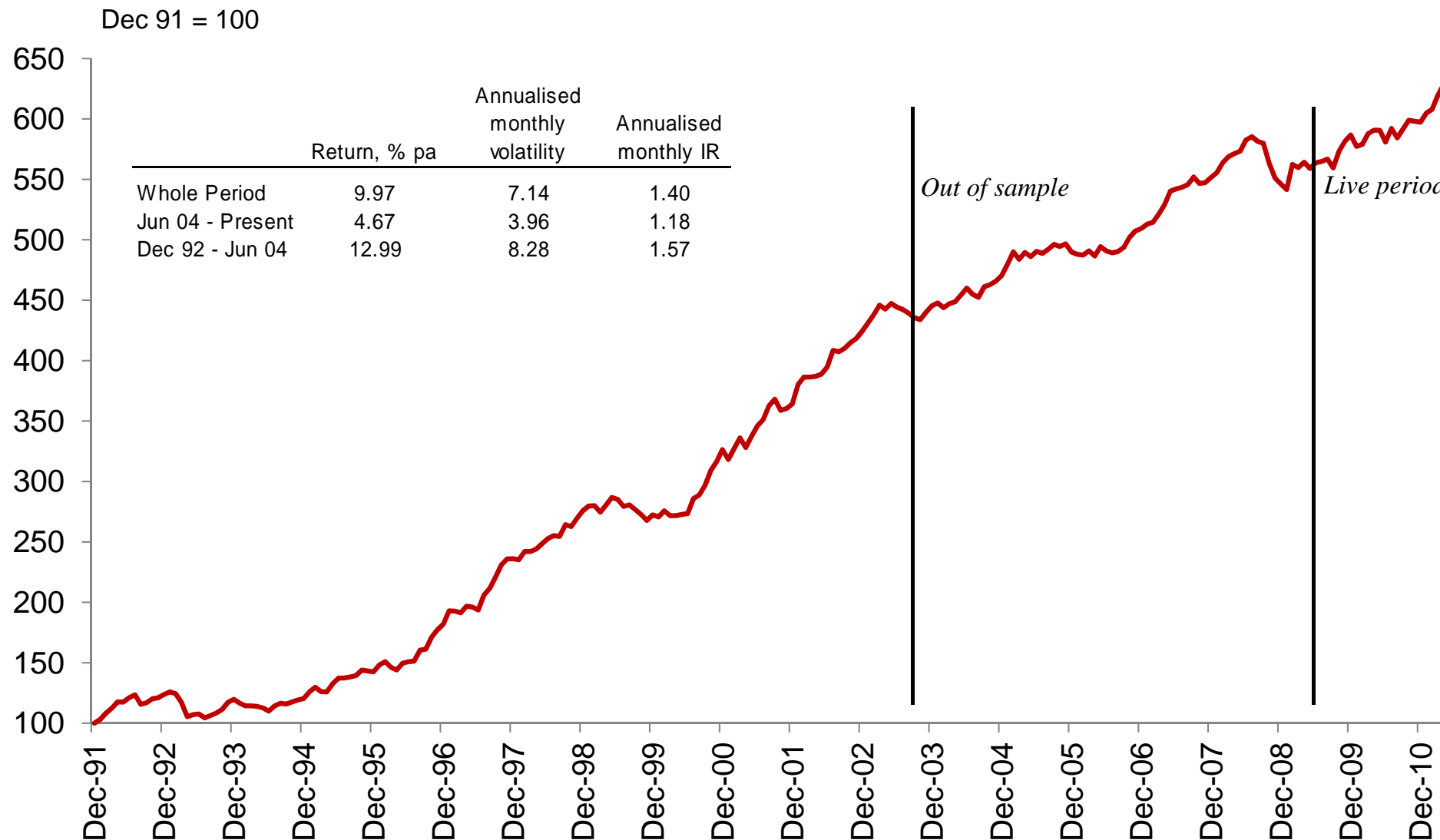
$$r_{i,t:t+\delta} = \alpha + \beta_1 \cdot V_{i,t} + \beta_2 \cdot M_{i,t} + \gamma \cdot \mathfrak{J}(V_{i,t} \cdot M_{i,t})$$

- If we make the interaction function non-linear, this will give a disproportionate weight to stocks where the value and momentum signal are aligned.
- May help in situations of overcrowding
- We use a cubic interaction function to combine factor scores

Value added from non-linear interaction factor



Performance of Nomura Global Multifactor Model



Out of sample is the period over which the factor coefficients have been constant. Live period is the period over which the stocks selected by the model have been published every month. Source: Nomura Equity Strategy research