# Style timing with macro factors

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- What kind of styles can be timed?

  - low hit rate, low IR styles

- Timing signals

  - nowcasting, slope of yield curve, valuation etc.

- Our models

  - style timing framework

- Results

  - timing can improve performances, but doesn't have perfect consistency, so use it tactically

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Section 1

# What kind of styles can be timed?

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# Pick your battles

Styles which *may* be able to be timed should:

- have a hit rate close to 50% and a low information ratio,
- or have some very extreme returns to the strategy
- & have persistent periods of out or underperformance (aka regimes)

And should not:

- be styles which simply outperform in up markets and underperform in down markets
- or be technical styles

# Avoid high hit rate, high IR styles (1)

- Suppose we have a timing signal which forecasts the sign of the return with accuracy *p*. You buy the asset if your signal forecasts a positive return and sell it if it forecasts a negative return.

- The return to the strategy can be expressed as:

$$strategy\ return_t = abs(r) \cdot x_t, \qquad where\ x_t = \begin{cases} 1, with\ probability\ p \\ -1, otherwise \end{cases}$$

- So the expected return to our strategy is:

$$E(strategy) = (2p-1) \cdot E\big(abs(r)\big)$$

- This is better than the buy and hold if and only if:

$$(2p-1) \cdot E\big(abs(r)\big) > \mu$$

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# Avoid high hit rate, high IR styles (2)

- With some re-arranging, we have that our timing strategy is better than buy & hold if and only if:

$$p > \frac{\mu}{2 \cdot E(abs(r))} + \frac{1}{2}$$

- If μ is very large compared to volatility, then RHS is roughly 1, so you need near perfect accuracy for style timing to work.
- If μ is close to zero, then the RHS is roughly ½ so a less accurate model will beat the buy & hold strategy.

For timing to be effective, you need either an extremely accurate signal or a style with a low IR and hit rate close to 50%.

# Avoid price momentum and volatility

- Price momentum and volatility have time varying style exposures e.g. momentum tilts towards whichever styles have outperformed recently.
- Price momentum / volatility can be almost completely replicated by taking a portfolio of style portfolios with weights assigned by the cross-sectional exposure of price momentum / volatility to the styles.

  $\Rightarrow$ They are style timing strategies!

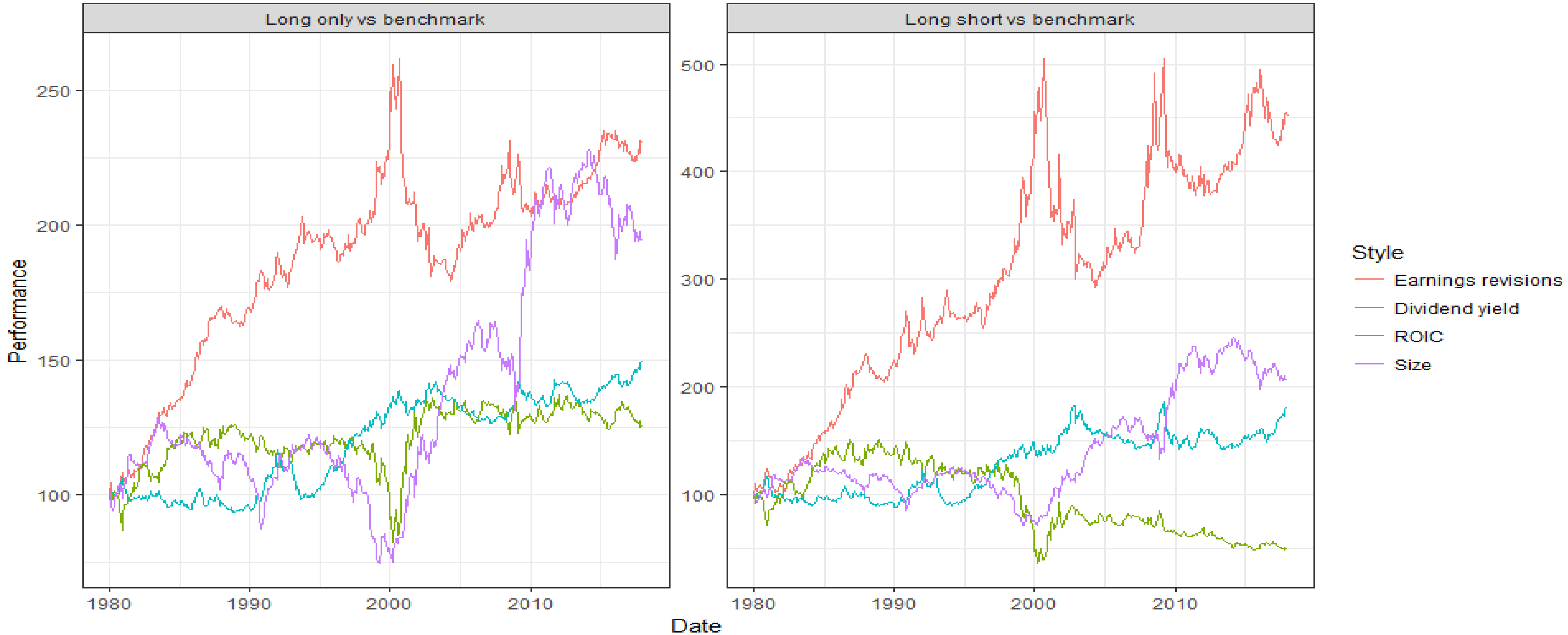
- Trying to rotate between styles when one of your components is already a timing strategy is unnecessarily difficult.
- You should exclude price momentum and volatility from a style rotation strategy.

Please see UBS Research publication "Are you already timing styles successfully? *The implicit style rotation in technical styles",* September 2016 for further details.

# Data (1)

- We attempt to rotate between four different style portfolios:
    i. Trailing dividend yield
    ii. ROIC
    iii. Earnings revisions
    iv. Size, market-cap (small-cap minus large-cap)
- The style portfolios are either long-short or long only.
- The long only portfolio is a cap weighted portfolio of the top third of stocks in the universe. In most of this analysis we look at the long only portfolio vs the benchmark.
- The long short portfolio takes a positive weight in the cap weighted portfolio of the top third of stocks in the universe and a negative weight in the cap weighted portfolio of the bottom third of the universe.
- The US universe is the Russell 1000, the data starts in January 1979 and all returns are in USD.

# Data (2)




| | Active return | Tracking Error | Information Ratio |
|---|---|---|---|
| Earnings revisions | 2.2% | 6% | 0.40 |
| Dividend yield | 0.6% | 7% | 0.09 |
| ROIC | 1.1% | 4% | 0.28 |
| Small-cap | 1.8% | 9% | 0.21 |

| | Return | Risk | Information Ratio |
|---|---|---|---|
| Earnings revisions | 4.1% | 11% | 0.37 |
| Dividend yield | -1.8% | 17% | -0.11 |
| ROIC | 1.6% | 8% | 0.19 |
| Small minus big | 1.9% | 10% | 0.20 |

Source: UBS quantitative research

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Section 2

# Timing signals

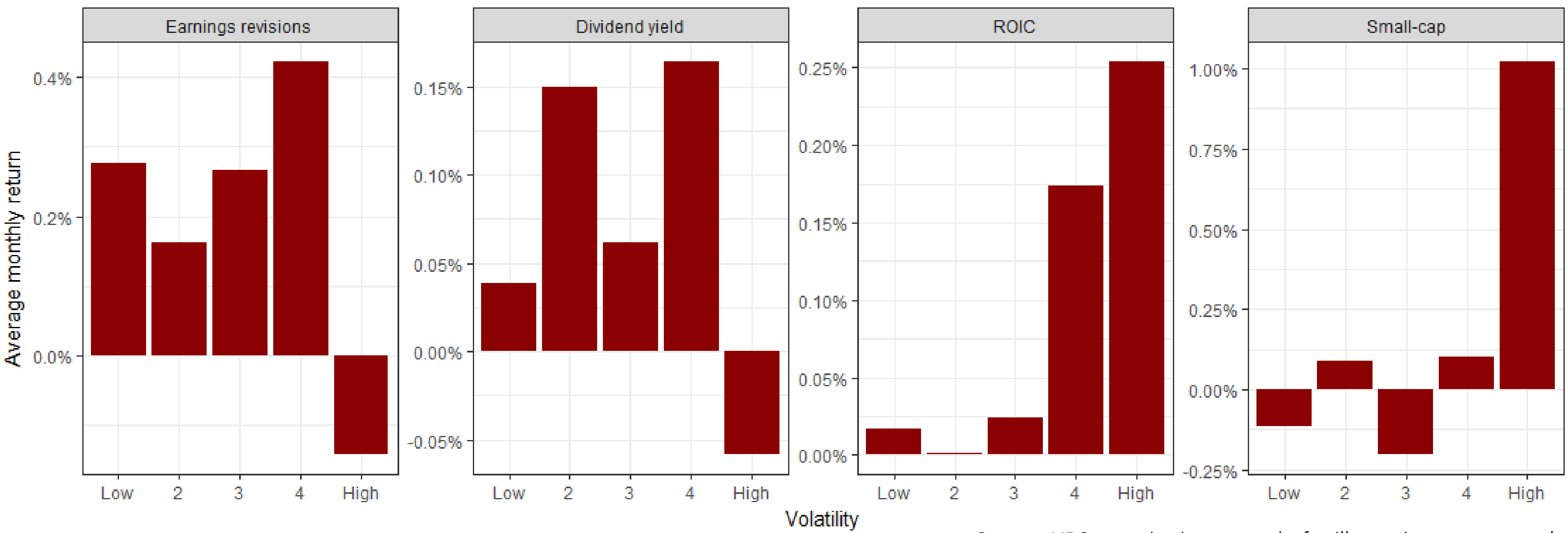
# Timing signals

Some commonly suggested signals for style rotation /style timing include:

- Market volatility
  – This is measured using either the volatility forecast from a GARCH model of daily returns to the R1000
- State of the economy aka nowcasting variable
  – This is taken from UBS economist Pierre Lafourcade's work. It combines a variety of macro economic indicators to create a nowcast for the current state of the economy.
  – A high value indicates strong economy, a low value indicates a weak economy. Crossing from positive to negative is indicative of a recession.
- Market valuation
  – This is the defined as the median earnings yield in the R1000
- Value spread
  – The difference between the median earnings yield in the top third of the R1000 and the bottom third, divided by the median overall
- Slope of the yield curve
  – This is the 10 year minus the 2 year US interest rates

# Why should the signal work? Volatility

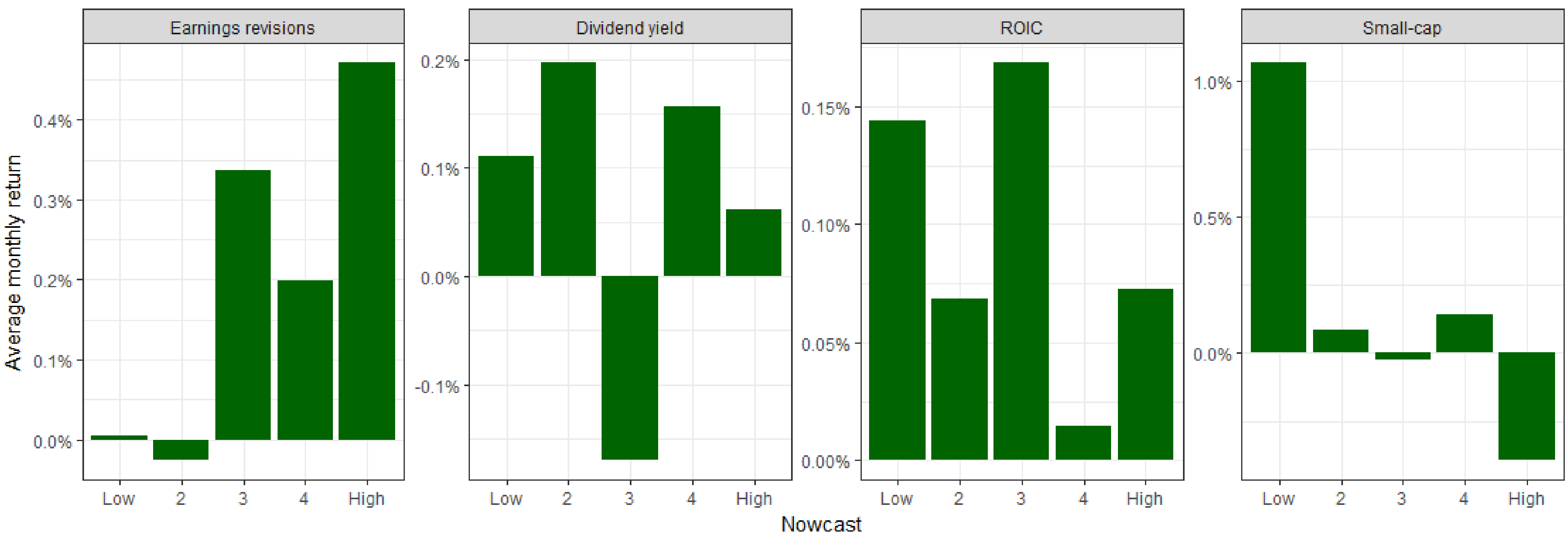
- In times of high market volatility, investors seek "safe" high quality names, so higher volatility is associated with higher returns to the quality style.
- Higher volatility is associated with dividend cuts and so should be negative for the dividend yield style.
- Earnings revisions is similar to price momentum, in that it is trend following, so tends to underperform when the trend breaks down. Trends breaking down are typically accompanied by high volatility.




Source: UBS quantitative research, for illustrative purposes only

# Why should the signal work? Nowcast

- The nowcast is a timely macro economic indicator which shows the state of the economy. Higher values mean stronger macro-economic conditions.
- During periods of recession, we expect high quality stocks to outperform as investors flee to safety and most other styles to underperform.
- During extremely bad macro economic conditions, the market sometimes ignores analysts and blindly sells off. This will cause underperformance in the earnings revisions style.

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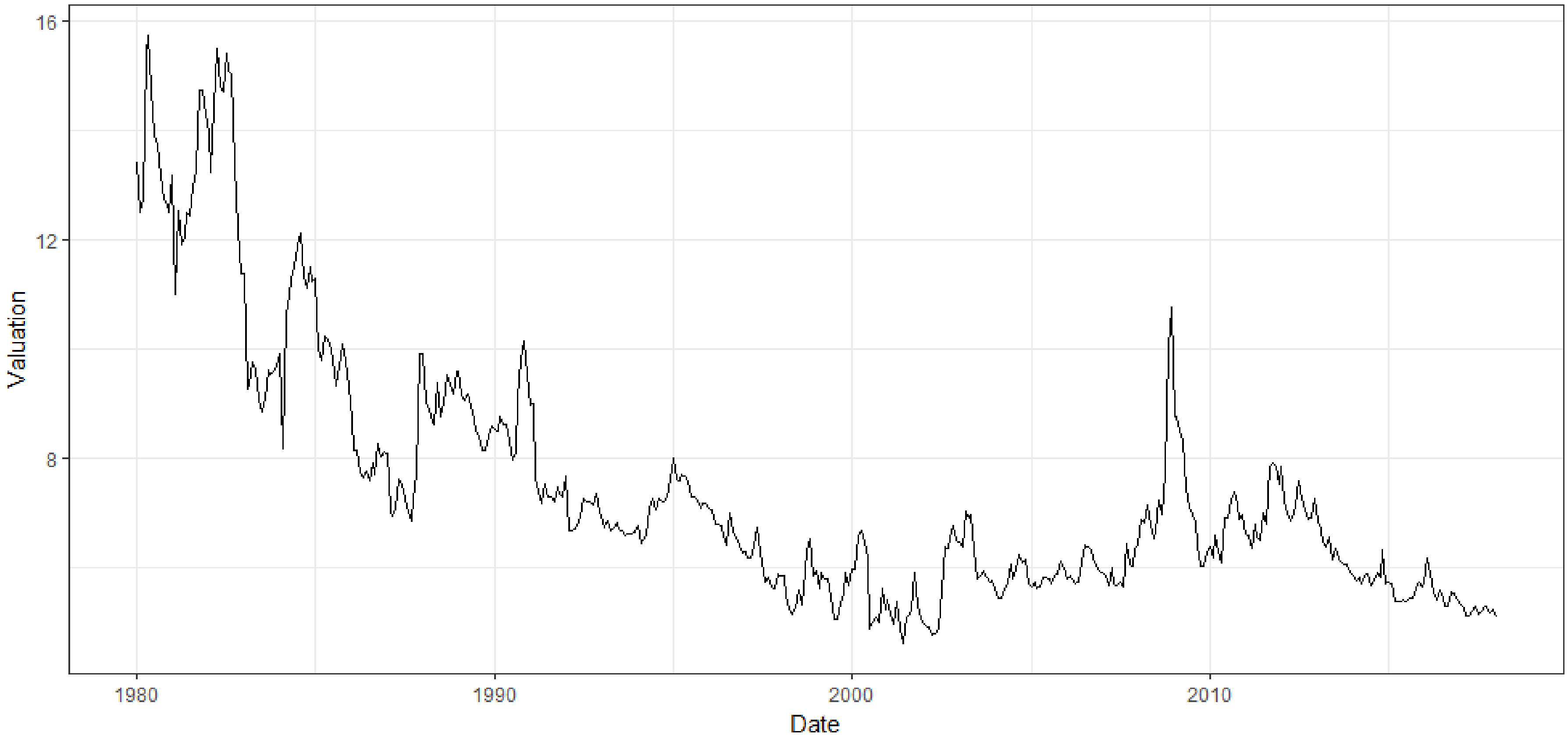
# Why should(n't) the signal work? Market valuation

- Market valuation has a strong secular trend as index level earnings yield has steadily declined through the first twenty years of our data.
- This makes is ill-suited as a timing signal for our period. The model implicitly relies on the past being representative of our future and for most of this sample period, it wasn't.

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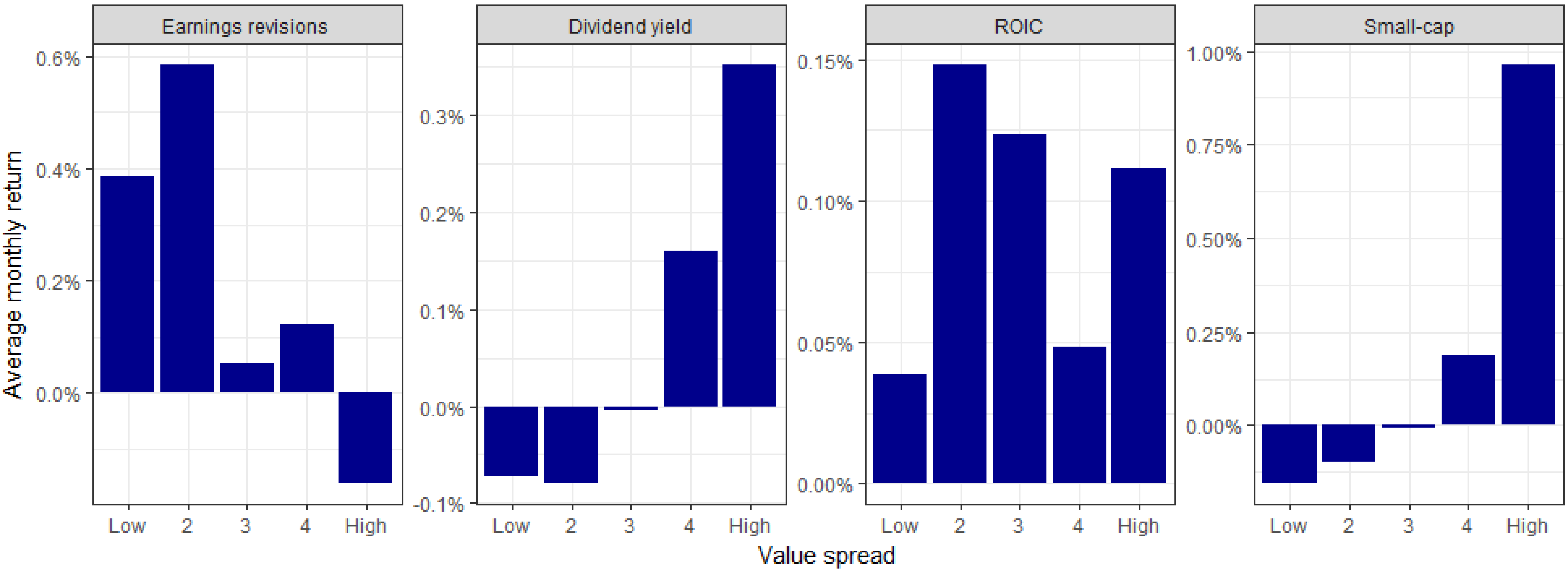
# Why should the signal work? Value spread

- The difference between the median earnings yield in the top third of the R1000 and the bottom third, divided by the median overall
- The value spread is widely assumed to be mean reverting, so that a wider spread is associated with higher future returns to value.

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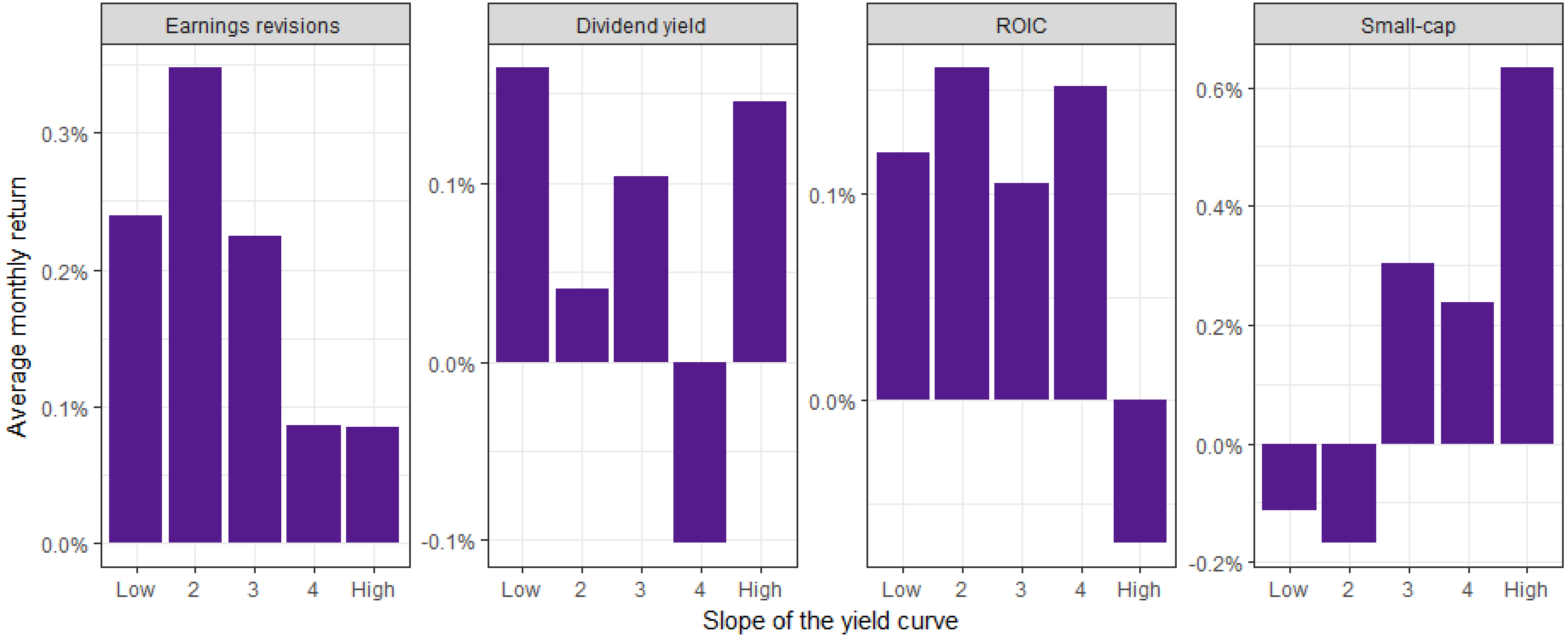
# Why should the signal work? Slope of the yield curve

- Slope of the yield curve (10yr minus 2 yr) has historically been a proxy for the business cycle.
- Historically, slope of the yield curve was a measure of the economy.

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- We are concerned that, given the political manipulation of the yield curve in many countries (via QE) this signal may no longer have the same meaning that it had historically, so is now less useful as a timing signal.

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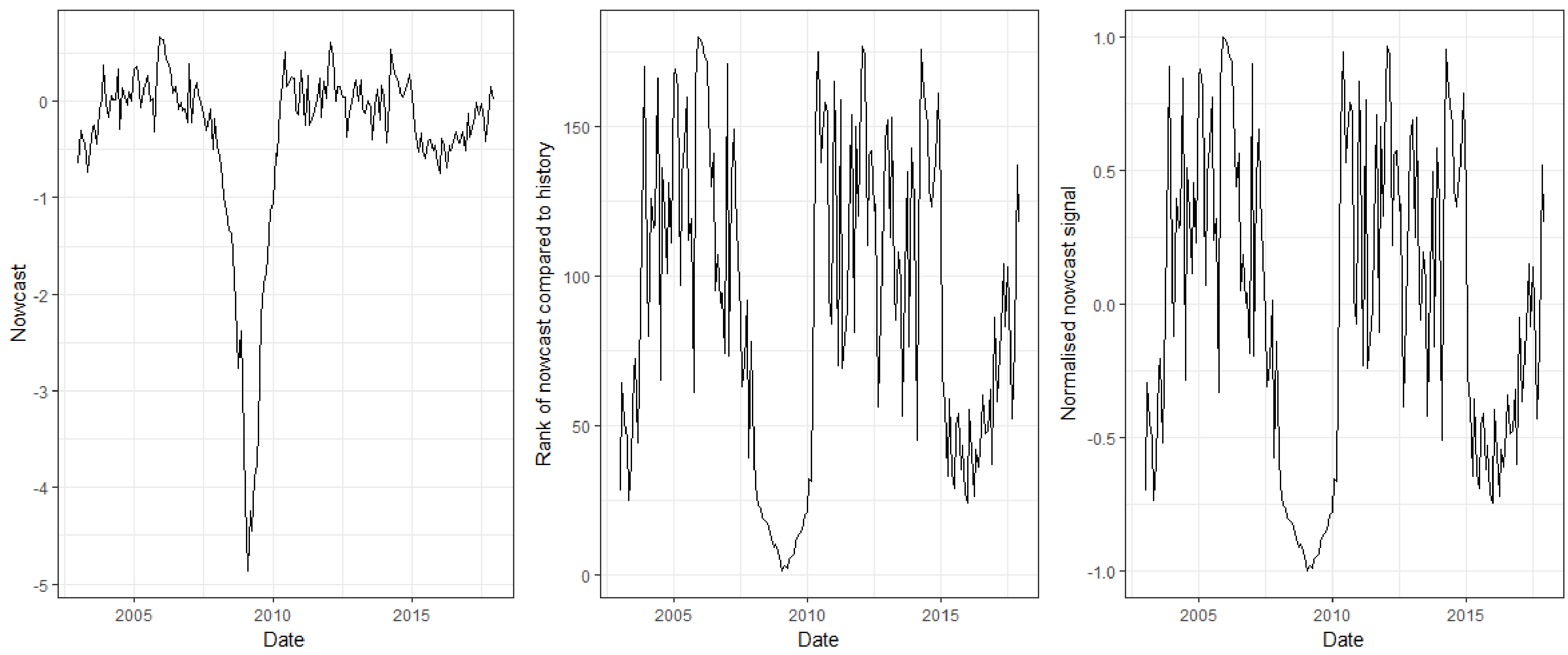
# Normalising these signals

We normalise our signals by:

1. Ranking our timing signal compared to its value over the in-sample period
2. Taking a linear transformation of that to get a score between -1 (minimum) and +1 (maximum).




Source: UBS economists & quantitative research

Section 3

# Our model for style rotation

# Errors Compound

**Traditional Approach**

**Data**

Style time series

Conditioning factors

↓

**Structural Model**

Expected returns conditional on timing factors

Covariance matrix conditional on timing factors

↓

**Portfolio construction**

Optimisation (commonly constrained mean-variance)

↓

**Weights**

**Our Approach**

**Data**

Style time series

Conditioning factors

↓

**Weights**

# The model

- We use historical data to construct a simple dynamic model of this form:

$$\mathit{Weight\ in\ style\ i\ at\ time\ t\ is\ proportional\ to}:\ w_i = \sum_{j=1}^{J} \lambda_{i,j} \cdot \mathit{normalised\ timing\ signal\ j\ at\ time\ t}$$

- We need to find 4 + 4J parameters: a base weight (w) and J exposures (λ) for each of the four styles.
- We run a single optimisation to find the parameters which give the best in-sample information ratio.
- Subject to the constraints that:
  - the base weights $w_i$ must be between 0% and +50%, except for the size base weight which we allow to vary between -50% and +50%.
  - the $\lambda_{ij}$ must be between -25% and +25%
  - the sum of the base weights must be 100%
  - the sum of the $\lambda_{ij}$ must be 0 for all the macro factors j.

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# Example of the model

- Suppose that we optimise and find these parameters:

| | Earnings revisions | Dividend yield | ROIC | Size |
|---|---|---|---|---|
| Base weight | 27% | 5% | 33% | 35% |
| Exposure to slope of yield curve | -0.18 | -0.03 | 0.01 | 0.19 |
| Exposure to nowcast | 0.25 | 0.00 | -0.21 | -0.04 |

- And these normalised conditioning factor scores:

| | |
|---|---|
| Slope of yield curve | -0.63 |
| Nowcast | 0.31 |

- Inputting these into the model we find the weights are proportional to:

| Earnings revisions | Dividend yield | ROIC | Size |
|---|---|---|---|
| 46% | 7% | 26% | 22% |

- If necessary, we scale these down so that the sum of the absolute weights is 100% to find our final weights.

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Source: UBS quantitative research, all data as of 28th February 2018, for illustrative purposes only

# Implementation

Initial window of 7 years, expanding to a rolling window of 15 years

t - 15 years

t

t + 1 month

## In-sample period

We use the time series of the conditioning factors and the style returns to find the base weights and exposures that maximise the information ratio in-sample.

## Out-of-sample period

We input the base weights, the exposures and the out-of-sample values of the conditioning time series into the model to find the weights suggested by the model.

Section 4

# Results

# Benchmarks

To judge whether our dynamic style allocation approach works we need some alternative approaches to compare to. We consider two benchmark approaches:

- Classic, 1/n approach

  This model takes a 25% weight in value, momentum, quality and size.

- Backwards looking style allocation approach

  This model looks back over the in-sample period and chooses the weights that would have gained the best, in-sample information ratio.

# Long only results (1)

- Diversification is very powerful. Best IR for an individual style was 0.4, but 1/N gets an IR of 0.65.

| | | Active return | Tracking Error | Information Ratio |
|---|---|---|---|---|
| Benchmarks | 25% in each style | 1.3% | 2.0% | 0.65 |
| | Optimise weights, but no timing | 1.1% | 1.6% | 0.68 |

Source: UBS quantitative research

# Long only results (2)

- Market valuation is, as expected, unhelpful as a timing signal out of sample.
- Slope of the yield curve and nowcast appear to be the most successful – both measures of the macro economic environment.

| | | Active return | Tracking Error | Information Ratio |
|---|---|---|---|---|
| Benchmarks | 25% in each style | 1.3% | 2.0% | 0.65 |
| | Optimise weights, but no timing | 1.1% | 1.6% | 0.68 |
| Timing with one signal | Timing with market valuation | 1.1% | 1.8% | 0.59 |
| | Timing with valuation spread | 1.3% | 1.7% | 0.75 |
| | Timing with volatility | 1.3% | 1.6% | 0.77 |
| | Timing with nowcast | 1.4% | 1.7% | **0.80** |
| | Timing with slope | 1.4% | 1.7% | **0.86** |

Source: UBS quantitative research

# Long only results (3)

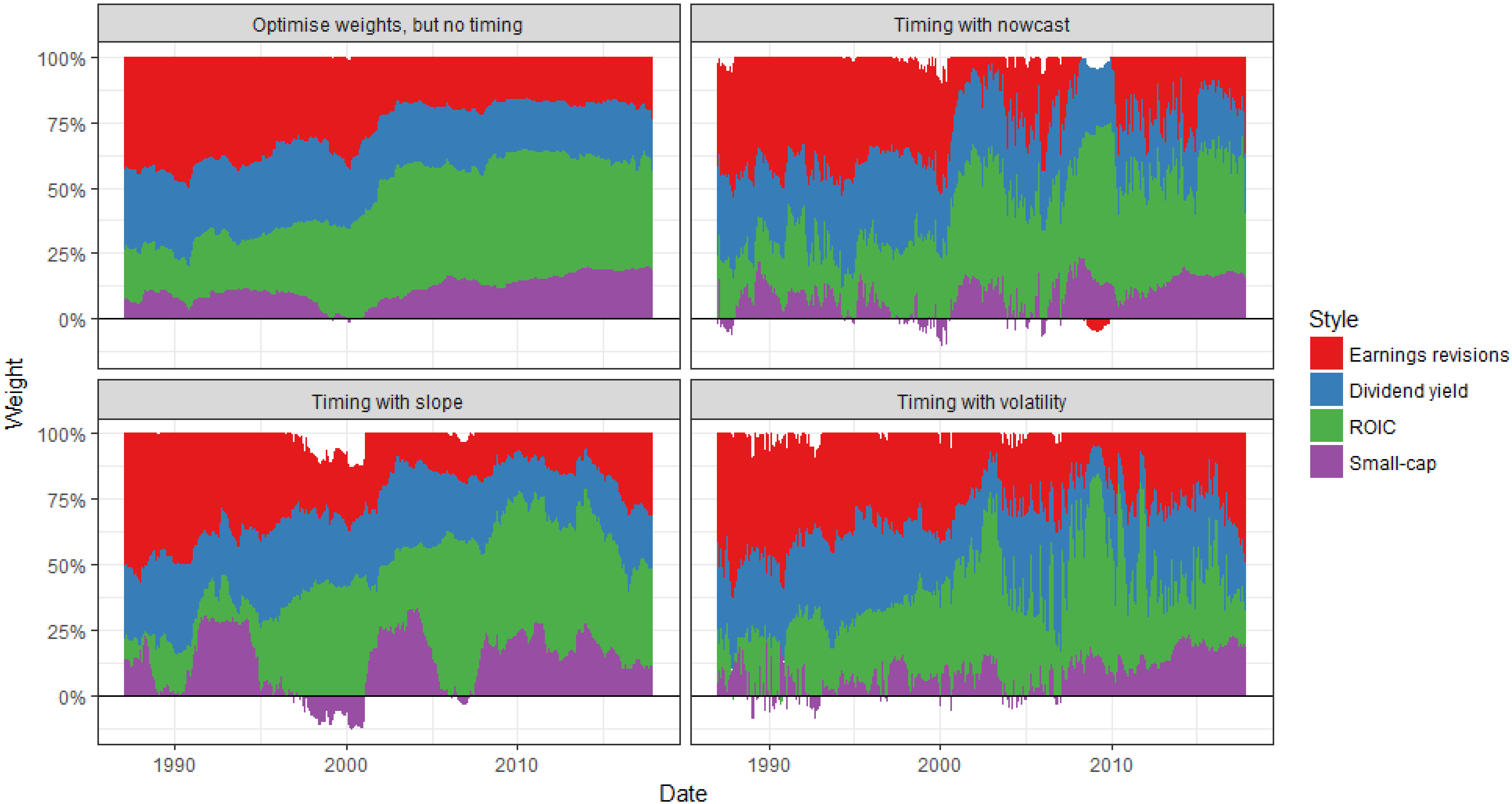
- Timing with multiple factors gives a modest improvement to timing with a single signal.

| | | Active return | Tracking Error | Information Ratio |
|---|---|---|---|---|
| Benchmarks | 25% in each style | 1.3% | 2.0% | 0.65 |
| | Optimise weights, but no timing | 1.1% | 1.6% | 0.68 |
| Timing with one signal | Timing with market valuation | 1.1% | 1.8% | 0.59 |
| | Timing with valuation spread | 1.3% | 1.7% | 0.75 |
| | Timing with volatility | 1.3% | 1.6% | 0.77 |
| | Timing with nowcast | 1.4% | 1.7% | 0.80 |
| | Timing with slope | 1.4% | 1.7% | 0.86 |
| Timing with two signals | Timing with volatility and nowcast | 1.4% | 1.8% | 0.78 |
| | Timing with slope and nowcast | 1.6% | 1.8% | **0.88** |
| | Timing with volatility and slope | 1.5% | 1.7% | **0.92** |
| Timing with three signals | Timing with nowcast, volatility and slope | 1.6% | 1.8% | **0.88** |

Source: UBS quantitative research

# Long only results (4)

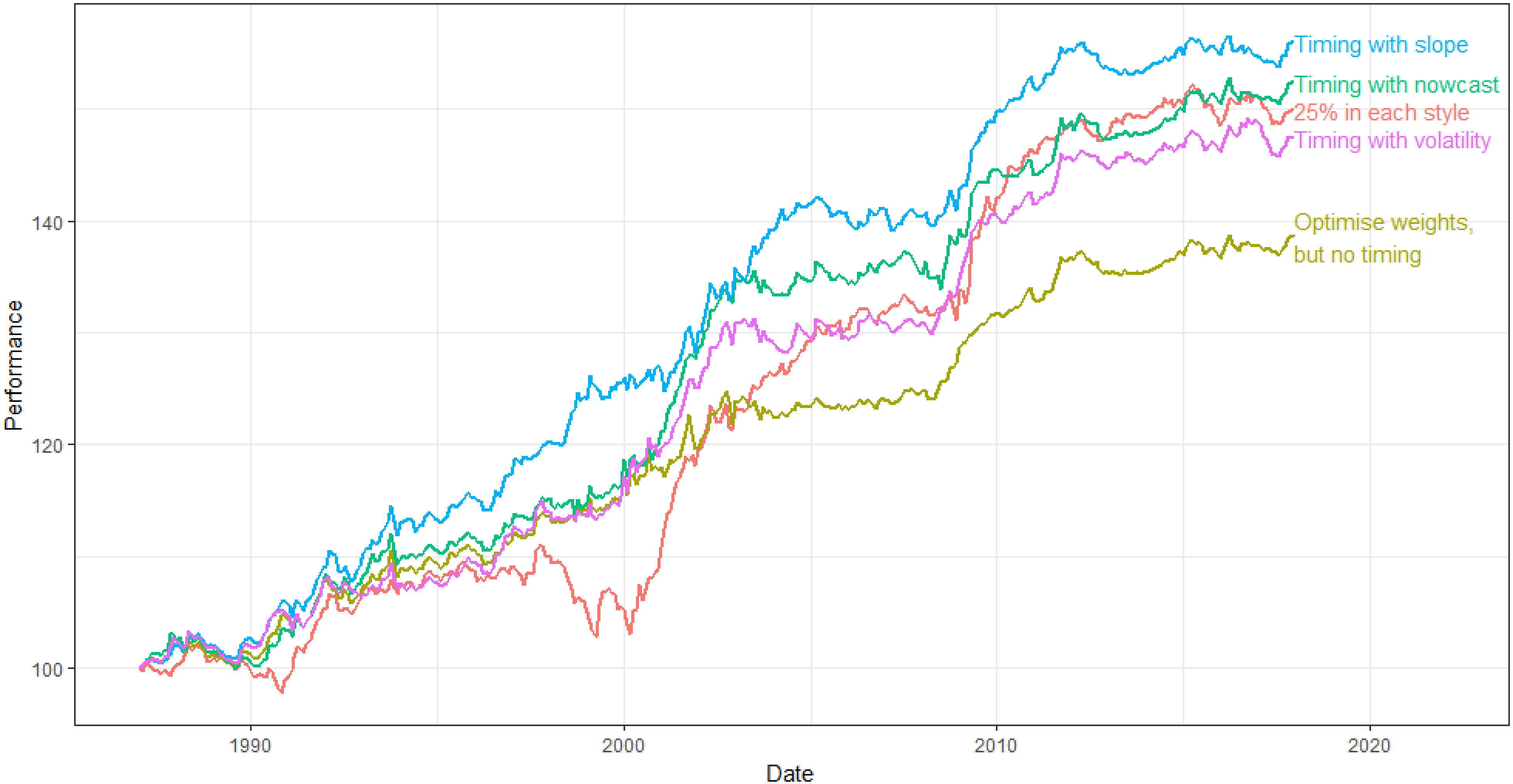
- Turnover for the fast moving signals is very high.




Source: UBS quantitative research

# Long only results (5)

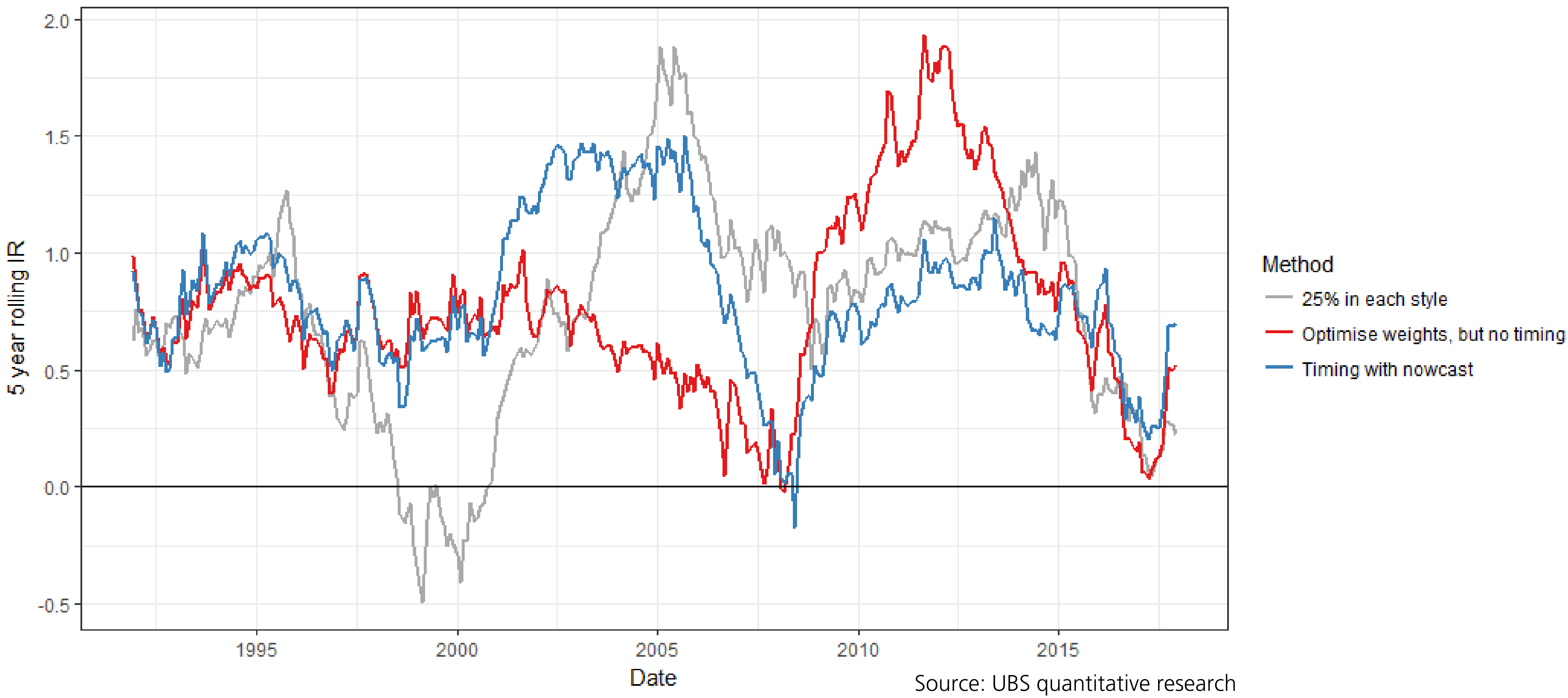
- The timing strategies strongly outperformed over the full period, but it appears that, for much of the time, their performances would have been in-line with simple optimisation or even 1/n.




Source: UBS quantitative research

# Long only results (6)

- Timing outperformed early in the sample period, strongly outperformed in 2002-2005 and has done very well over the last five years, but we do not see perfect consistency.




Source: UBS quantitative research

# Long short results (1)

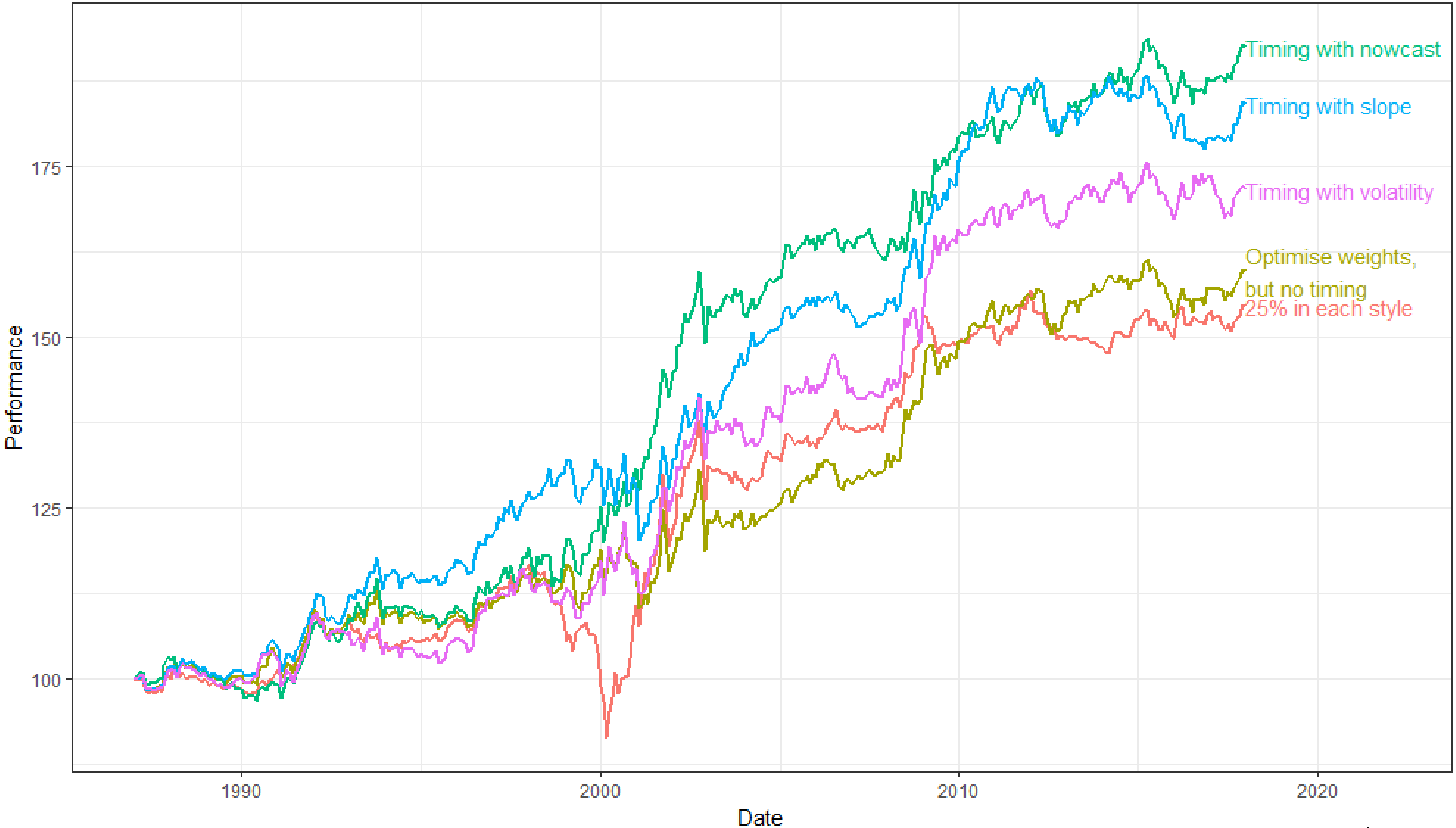
- Long short results show a similar story but with better results:
  - all our timing signals except market valuation are effective to some extent
  - timing with a combination of volatility, nowcast and slope roughly double the IR.

| | | Return | Risk | Information Ratio |
|---|---|---|---|---|
| Benchmarks | 25% in each style | 1.4% | 4.3% | 0.33 |
| | Optimise weights, but no timing | 1.5% | 4.2% | 0.36 |
| Timing with one signal | Timing with market valuation | 1.4% | 5.0% | 0.29 |
| | Timing with valuation spread | 2.1% | 4.3% | 0.50 |
| | Timing with volatility | 1.8% | 4.1% | 0.43 |
| | Timing with nowcast | 2.1% | 3.9% | 0.54 |
| | Timing with slope | 2.0% | 3.9% | 0.51 |
| Timing with two signals | Timing with volatility and nowcast | 2.0% | 4.0% | 0.51 |
| | Timing with slope and nowcast | 2.5% | 4.0% | **0.62** |
| | Timing with volatility and slope | 2.1% | 4.0% | 0.54 |
| Timing with three signals | Timing with nowcast, volatility and slope | 2.4% | 4.0% | **0.60** |

Source: UBS quantitative research

# Long short results (2)

- Again, we see that strategies which time using macro economic variables successfully outperform simpler style portfolios during some periods (2000-2005 and again in 2012-2015) and otherwise perform in-line.




Source: UBS quantitative research

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Section 6

# Conclusions

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# Conclusions

- Style timing is hard. Make things as easy as possible by choosing your styles sensibly.
- Many style timing methods separate out forecasting style alphas and portfolio construction. This can allow errors to compound. Our approach reduces this problem and is completely transparent.
- Timing with signals designed to identify macro-economic conditions improves performance of both long only and long short style portfolios, although the difference is bigger for long-short portfolios.
- However, timed portfolios typically perform in-line with simpler strategies for much of our sample period. This suggests that while timing improves performance it should be used tactically rather than on a month by month basis.

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|---|---|---|---|
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| **Neutral** | FSR is between -6% and 6% of the MRA. | 39% | 24% |
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| **Buy** | Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event. | <1% | <1% |
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