

Factor Investing and the Management of the Norwegian Sovereign Wealth Fund

Stephen M Schaefer

London Business School

investmentforum

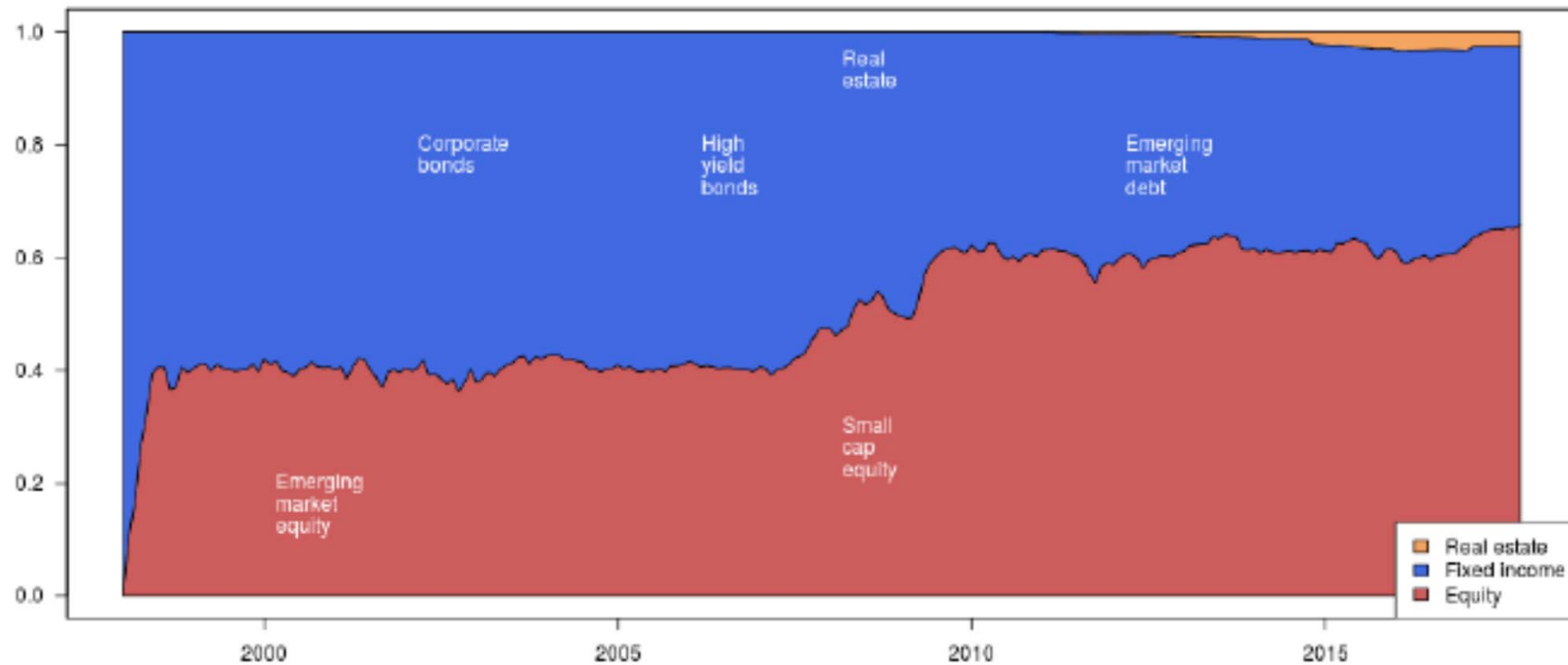
Salzburg

19 April 2018

Performance Measurement in Norway's Government Pension Fund Global

- **GPFG:**
 - one of the two largest SWFs in the world (current MV assets ~ \$950 Bn)
 - Actively managed by Norges Bank IM (NBIM) under mandate set by the Norwegian Ministry of Finance (MoF)
 - 60:40 equity/bond split (at the time) with essentially standard benchmarks (“slightly bespoke”).
- **Fund returns for 1998-2006:** 46 bps outperformance against benchmark with SD of tracking error of 38 bps: IR of 1.2
- **2009-10:** Study into management of fund (for MoF) with Andrew Ang and Will Goetzmann
- **Follow-up studies:** Ang, Brandt and Denison (2014), Dahlquist & Ødegaard (2018)

Weights on Equity, Fixed Income and Real Estate



Source: Review of Norges Bank's Active Management of the Government Pension Fund Global Dahlquist, M & Ødegaard, B.A., 2018.

We studied *active returns*

$$\text{Active Return} = \text{Actual Return} - \text{Benchmark Return}$$

- Active returns are the result of active management

How active is the GPF?G?

- Our 2009 study found that the amount of active risk in the Fund was very small

Variance Attribution		
	Full Sample	Pre-2008
Benchmark Return	99.1%	99.7%
Active Return	0.9%	0.3%
Total Return	100.0%	100.0%

Question 1: what was the contribution of active management to returns?

- About two-thirds of the (small) variance of the active returns could be explained by a small number of systematic factors and, in particular, by Value, Liquidity and Volatility
- These exposures were not deliberate choices by fund sponsor but induced through active management styles of:
 - internal managers; and
 - about 150 external equity about 50 external FI mandates

Question 2: What happened to the fund in the crisis?

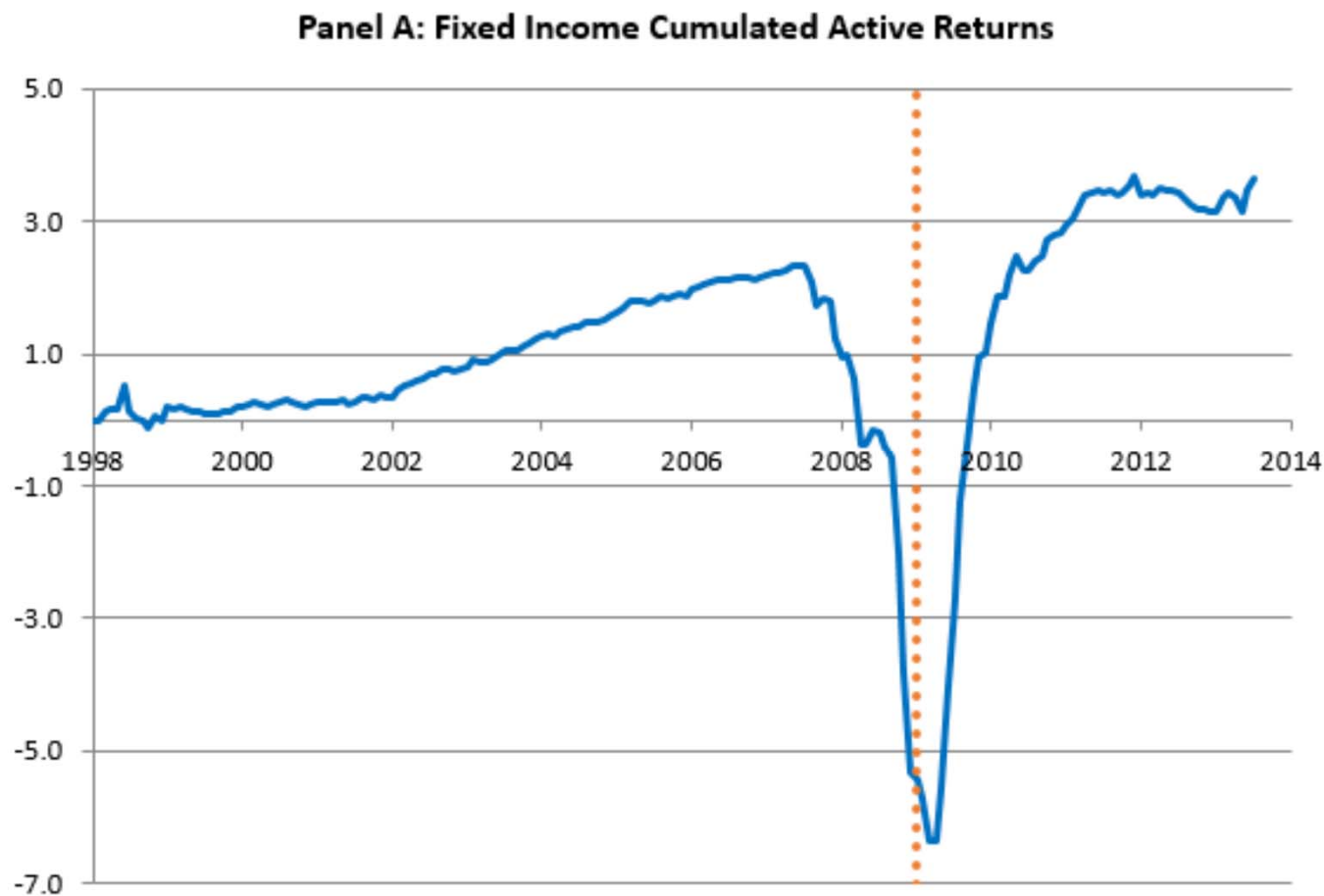
Overall Fund Cumulated Active Returns



Overall Fund Cumulated Active Returns

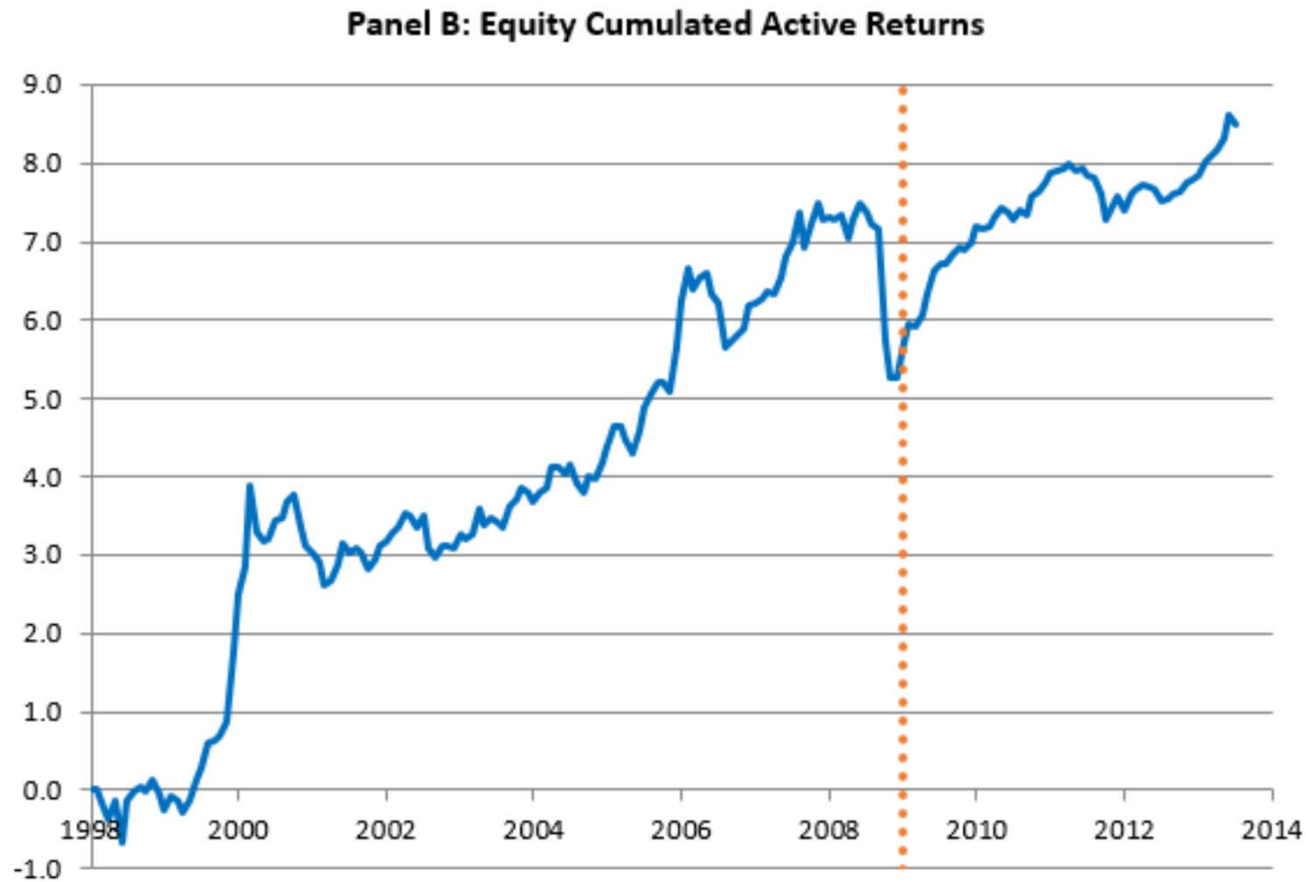


Most of the underperformance was in fixed income



Source: Review of the Active Management of the Norwegian Government Pension Fund Global, Ang, Brandt & Denison, 2014.

... and smaller but still significant in equities

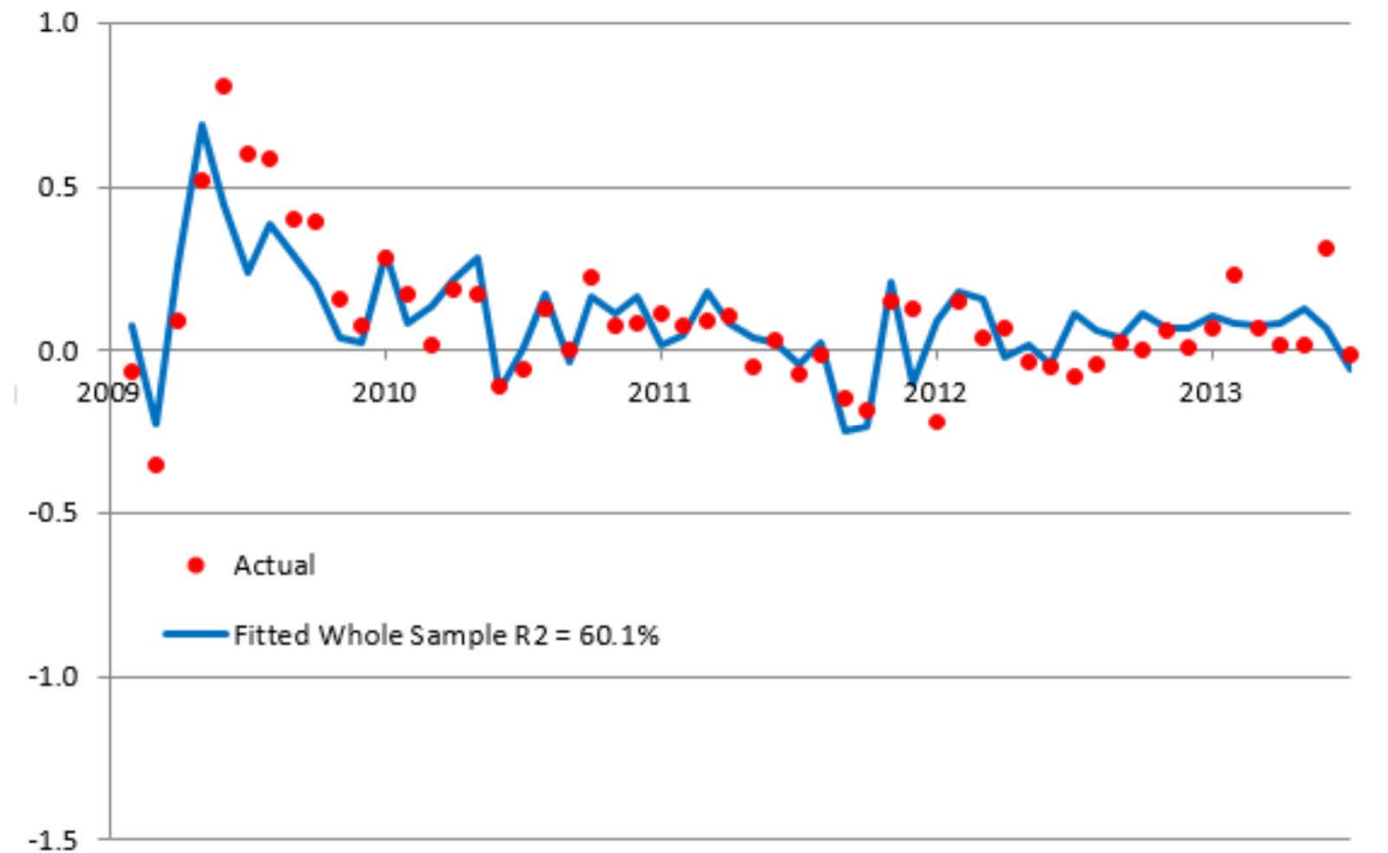


Source: Review of the Active Management of the Norwegian Government Pension Fund Global, Ang, Brandt & Denison, 2014.

Question 3: Do factors explain actual tracking error?

- The fund had a very large negative tracking error of around 500 bps in 2008-09 (~ \$16 billion)
 - the historical tracking error prior to the crisis had been around 40 bps (12 SD's)
- Does the fund's factor exposure combined with actual factor innovations help to explain the outcome?
 - to some significant extent – yes
 - although some pre-crisis factor exposures difficult to estimate

Overall Fund Active Returns Post Financial Crisis



Source: Review of the Active Management of the Norwegian Government Pension Fund Global, Ang, Brandt & Denison, 2014.

Main Finding of 2009 Report

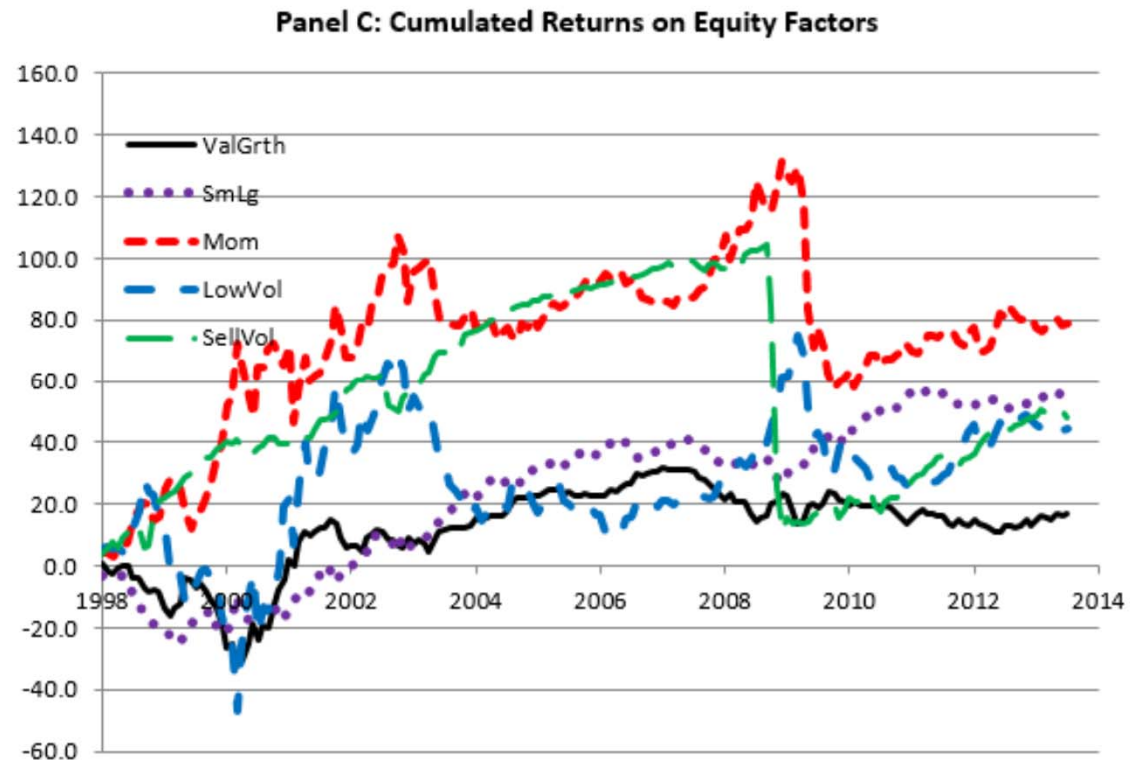
- Active returns on the GPFG were affected by exposures to systematic factors over and above the exposures that were present in the benchmark
- **Recommendation:** that the Ministry of Finance (who set benchmark) should decide the level of factor exposure and that these exposures should be included in the benchmark

Implications of Factor Exposure I: Performance Measurement

- While many factors are 'dynamic' (e.g., value, momentum), factor exposure can be created relatively cheaply
- Active managers should be rewarded only for performance over and above the return on a portfolio with equal factor exposure
 - e.g., active value manager should not be rewarded simply for generating exposure to the value factor

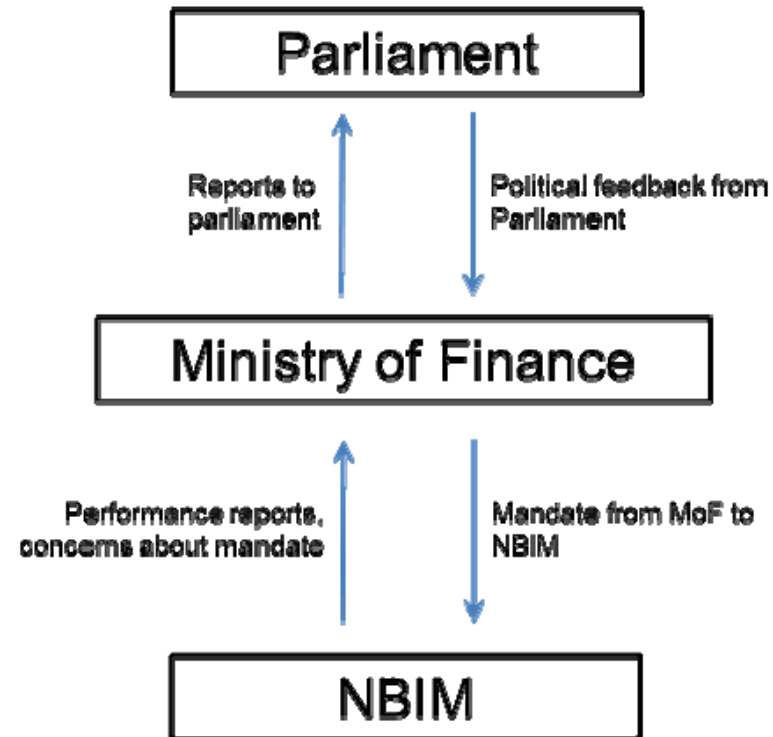
Implications of Factor Exposure II: Fundamental Risk Characteristics

- Different factors have different risk characteristics (e.g., the extent of drawdown in a crisis)
- Choice of factor exposure should reflect fund characteristics
- This aspect of factor investing is important but poorly understood



GPFG's Governance Structure and Benchmarks

GPFG's Governance Structure



Response of the Ministry

- Ministry of finance decided not to include ‘strategic’ factor exposures explicitly in the benchmark
 - MoF continuing with benchmark defined solely in terms of conventionally constructed indices of publicly traded equities and bonds
- But, in revision to mandate given to manager (NBIM), Ministry included references to factor exposure:
 - “the equity and bond portfolios shall be composed in such a way that the expected relative return is exposed to several systematic risk factors”*.
 - “the Bank shall establish principles for the measurement and management of market risk, including relevant sources of systematic risk”* .

**Source: Ministry of Finance, Management Mandate for the GPF, Revised 31-Aug-2017.*

Benchmark Framework

- **Ministry**: Benchmark expressed in terms of standard equity and fixed income benchmarks with adjustments for rebalancing rules that reflect scale



- **NBIM**: “Operational Reference Portfolio” Ministry benchmark adjusted for
 - factor tilts
 - scale and liquidity based opportunities for diversification beyond benchmark
 - now report factor exposure of fund returns

Operational reference Portfolio

- Addresses manager's view on risk-reward of various factors
 - returns and risks aggregated
- Does not attempt to address relative suitability of exposures to different risk factors
 - this issue is not often considered in the discussion of factor investing
 - not well understood

NBIM Now Reports Systematic Risk Exposures

- Example: fund exposure to market and 4 Fama-French Factors
 - SMB: size
 - HML: value/growth
 - RMW: profitability
 - CMA: investment

Note: R-squared is low because F-F (Global) Market portfolio has very different weighting from benchmark portfolio

	Since 1999 (1)	Last 10 years (2)	Last 5 years (3)
Alpha	0.25 (1.34)	0.21 (1.05)	0.20 (0.71)
F-F MKT	0.02 (4.48)	0.02 (4.14)	0.01 (2.08)
F-F SMB	0.05 (6.77)	0.03 (3.36)	0.02 (1.31)
F-F HML	-0.02 (-1.66)	-0.00 (-0.32)	0.01 (1.30)
F-F RMW	0.01 (1.16)	-0.01 (-0.54)	-0.02 (-1.62)
F-F CMA	-0.02 (-1.98)	-0.04 (-2.67)	-0.02 (-1.01)
Observations	216	120	60
Adjusted R ²	0.44	0.43	0.27

Source: NBIM, Risk and Return Report, 2016.

Summary

- Norway's GPFG has taken strategic decision that fund should have exposure to systematic risk factors
- Has delegated choice of factors and degree of exposure to manager (subject to overall risk limits)
 - gives manager freedom to use factor exposure to boost Sharpe ratio
- Difficult question remains regarding economic character of risks and conformity with fund objectives