Evaluation of Active Management of the Norwegian Government Pension Fund – Global

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Outline

- Summary of empirical studies of active management and the Efficient Market Hypothesis [EMH]
- Evaluation of NBIM's historical track record
- Recommendations on how the Fund's advantages can be exploited

Section I:
Academic Evidence on Active Management

Active Management vs. Indexing

- Modern versions of the Efficient Markets Hypothesis [EMH] recognize real-world frictions, e.g. information, transactions costs, financing costs, etc
- Tests of the EMH recognize that there are multiple factors driving returns and the market portfolio is inefficient
- Tests on prices have produced violations of the EMH suggestive of the potential for active management
- Finding active managers who consistently deliver excess risk-adjusted returns is difficult

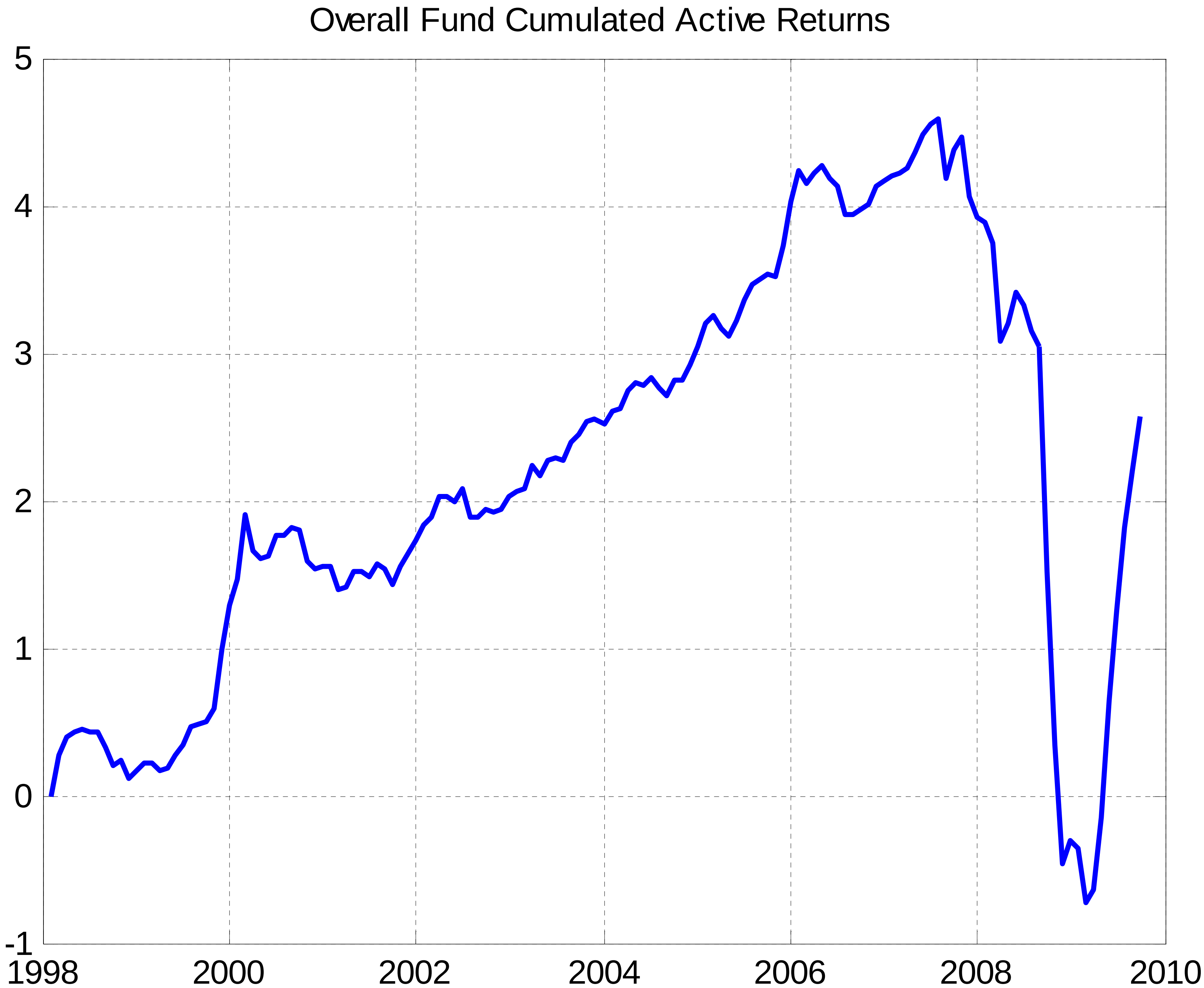
Section II:
Active Management of the Fund

Analysis

- Overall fund, asset class level (fixed income and equities), internal and external levels
- Variance decompositions: benchmark vs active
- Active returns: averages [alpha] and risk (tracking error), autocorrelations, reward-to-risk ratios, higher moments (skewness)
- Factor exposure: (rolling) partial correlations, fitted factor exposures
  - Robustness to other “academic” factors
- Regime (break-date) analysis and rolling factor regressions
- Correlations to hedge fund strategies

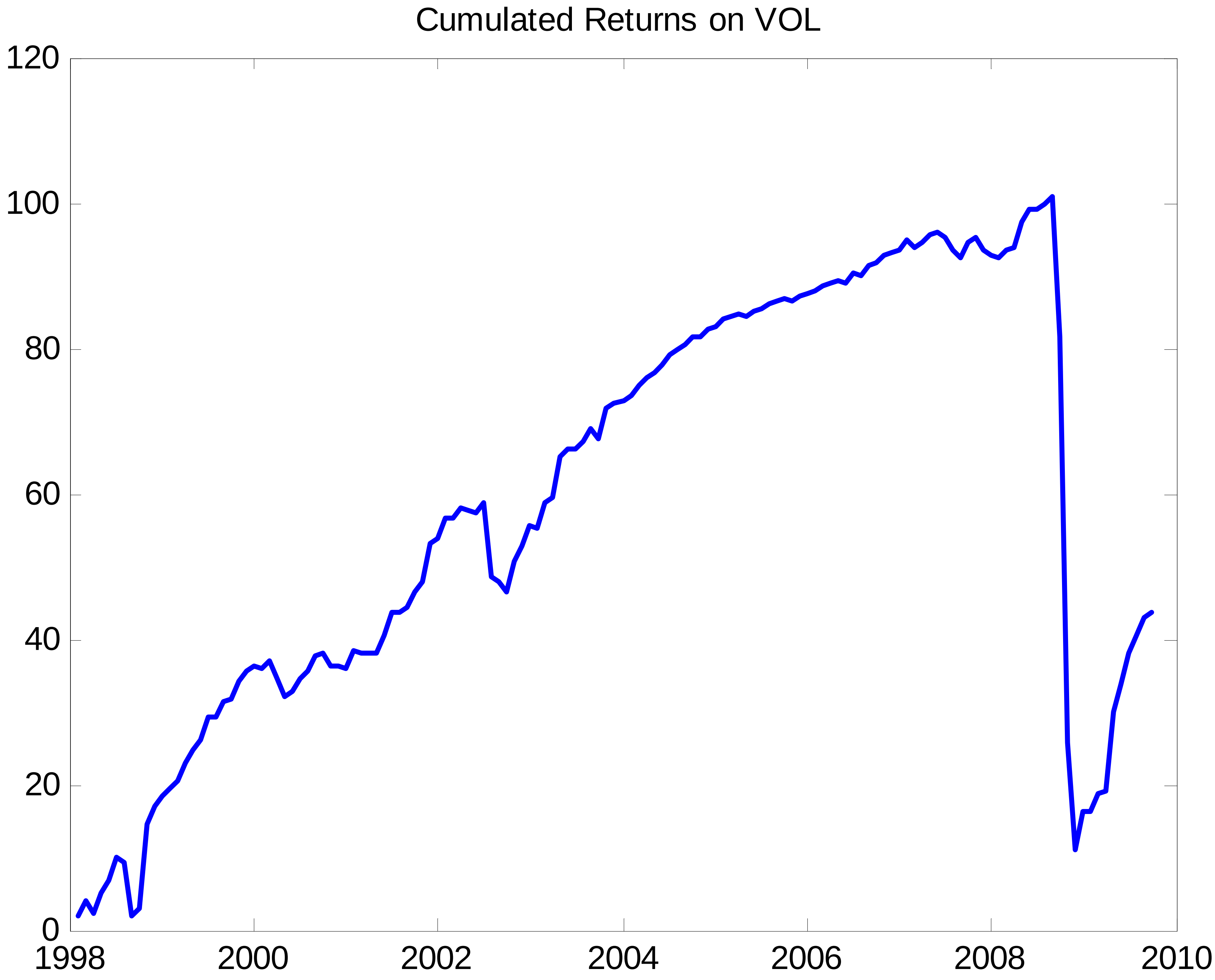
Main Points

- The amount of active risk taken by the Fund is very small but in general, has added value
- The small amount of active management has very large exposure to systematic factors: over 2/3rds of the active returns are attributable to systematic factors
- Many of these systematic factors, especially liquidity, volatility, and credit, fared very poorly during 2008 and early 2009 and are responsible for most of the active losses
- External active management also has large exposure to systematic factors
- The active losses are concentrated in fixed income, in both internal and external management



Overall Fund Cumulated Active Returns
5
4
3
2
1
0
-1
1998
2000
2002
2004
2006
2008
2010


Liquidity On-the-Run/Off-the-Run
70
60
50
40
30
20
10
0
1998
2000
2002
2004
2006
2008
2010



Cumulated Returns on VOL
120
100
80
60
40
20
0
1998
2000
2002
2004
2006
2008
2010

Overall Fund: Active Risk

- The amount of active risk in the Fund is 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%

Overall Fund: Average Active Returns

- Active management has, in general, added value

Active Returns

		Active Returns			
		Mean	Autocorr	Skew	Reward-to-Risk Ratio
Full Sample	Coeff	0.02	0.55	-2.41	0.07
	P-value	0.56			
Pre-2008	Coeff	0.03	0.16	-0.30	0.15
	P-value	0.01			

Overall Fund: Systematic Factor Exposure

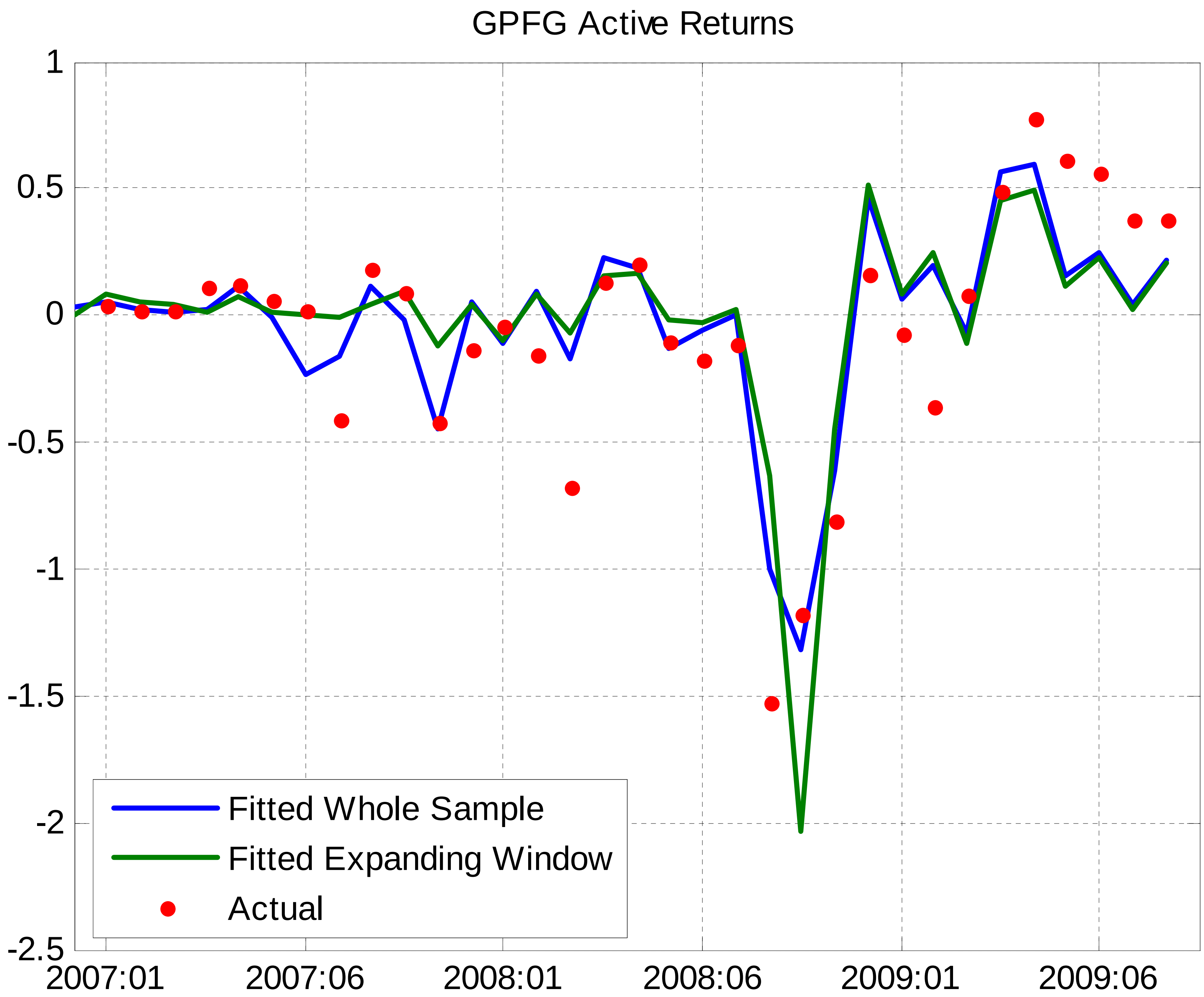
- A large fraction of active returns is related to systematic factors

Partial Correlations of Active Returns with Systematic Factors

	Full Sample		Pre-2008	
	Partial Corr	P-value	Partial Corr	P-value
TERM	-0.17	0.05	-0.25	0.01
CREDITAa	0.40	0.00	0.02	0.81
CREDITBaa	-0.40	0.00	-0.16	0.09
CREDITHY	0.02	0.83	-0.01	0.90
FXCARRY	0.07	0.44	0.13	0.16
LIQUIDITY	0.31	0.00	0.25	0.01
VALGRTH	-0.35	0.00	-0.45	0.00
SMLG	0.21	0.01	0.44	0.00
MOM	-0.03	0.76	0.07	0.48
VOL	0.39	0.00	0.24	0.01

Overall Fund: Active Losses 2008-9

- Could the negative active returns over 2008-9 been anticipated?
- If the factor exposures had been estimated pre-2008 and the asset owner had some knowledge of the potential drawdowns of these factors, the Fund’s losses over 2008-9 may have been within expected loss limits

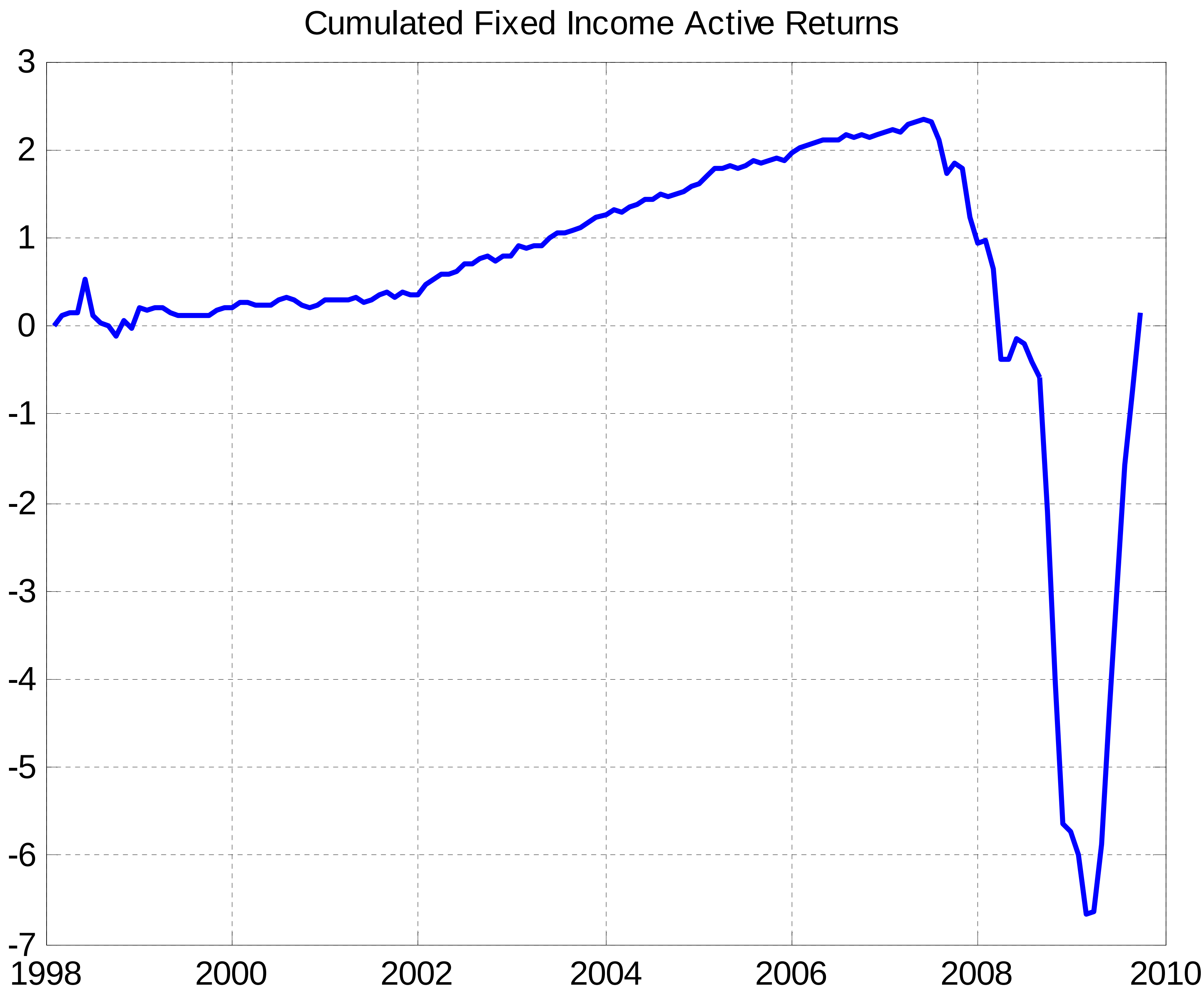

GPFG Active Returns
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
2007:01
2007:06
2008:01
2008:06
2009:01
2009:06
Fitted Whole Sample
Fitted Expanding Window
Actual

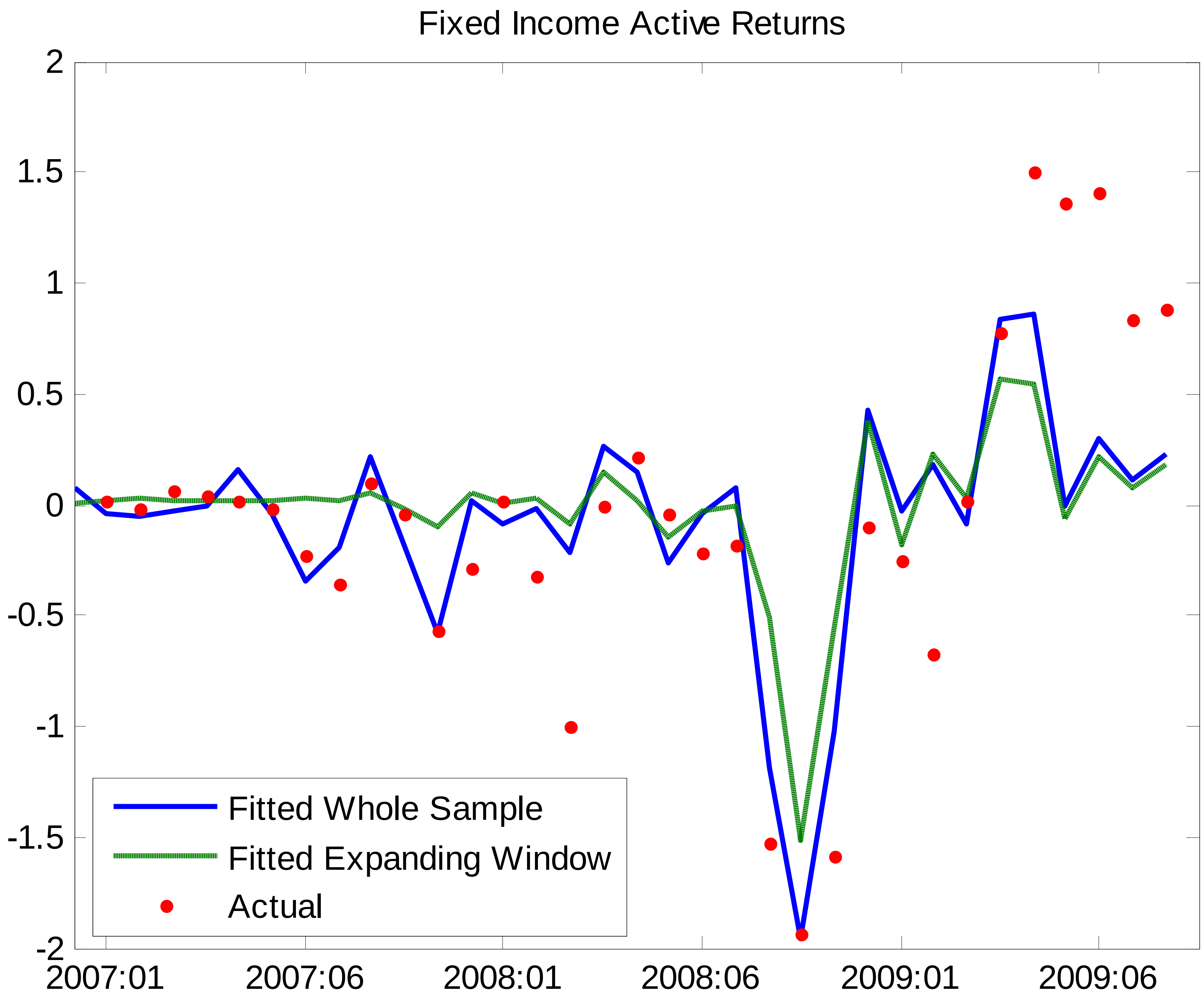
Overall Fund: Active Risk

Tracking error limit of the Fund was exceeded post-2007

- Tracking error limit = 1.5% per annum

  = 0.43% per month
- Amount of active risk since 1998 = 0.25% per month
- Amount of active risk post-2007 = 0.59% per month
- However, most of this increase in tracking error is due to high factor volatility
- We do not recommend a tracking error limit; tracking error targets or bands are more appropriate, combined with new factor benchmarks consisting of liquid securities


Cumulated Fixed Income Active Returns
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
1998
2000
2002
2004
2006
2008
2010



Fixed Income Active Returns
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
2007:01
2007:06
2008:01
2008:06
2009:01
2009:06
Fitted Whole Sample
Fitted Expanding Window
Actual

External Funds

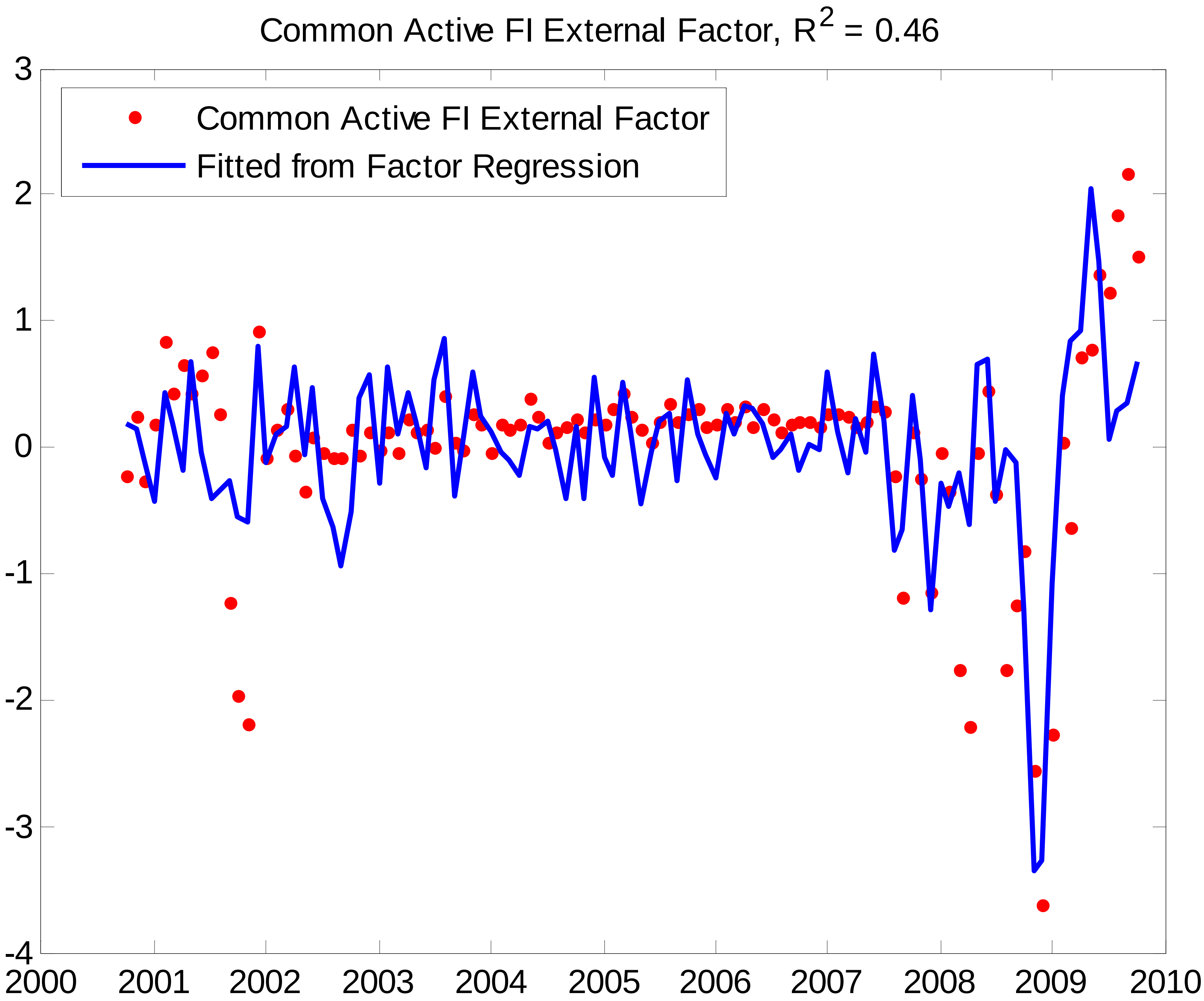
- Ret = FundBmk + $\boxed{\text{(Bmk – FundBmk)}}$ + $\boxed{\text{(Ret – Bmk)}}$

Mandate decision is taken by NBIM

Active Return

- Characterize only the active return of the external mandate


Fixed Income External Active Mean Returns and SEs
4
2
0
-2
-4
-6
-8
0
5
10
15
20
25
30
35
40
45
50



Common Active FI External Factor, R^2 = 0.46
Common Active FI External Factor
Fitted from Factor Regression
3
2
1
0
-1
-2
-3
-4
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010

Section III:
Comparative Advantages and Capabilities

Factor-Based Investing

- Active management has played a small role in the overall performance of the fund
  - Contributed positively and may be beneficial for other aims
- Active returns have had large exposure to systematic risks
  - Mainly a result of bottom-up decisions
  - Large systematic exposure is first order
  - We believe this exposure is entirely appropriate
  - These factors earn risk premiums over the long run
- We recommend the Fund move to a more top-down, intentional approach to choosing factor exposure
  - Factor exposure should be an extension of current asset allocation policy

Factor-Based Investing

- Base investment philosophy on compensation for taking systematic risk
  - Alpha is difficult to capture in large scale
  - Alpha risk is often factor risk in disguise
  - Factor risk premiums are long-horizon investments
  - Should separate systematic risk vs true active returns in paying for active management
- Relative to standard market-weighted benchmarks (eg FTSE and Barcap), active management is one way to access factor risk premiums: the Fund should remain active in this context

Recommendation: Custom Benchmarks

- In-house, customized benchmarks on liquid securities
  - Recommend the Fund not be a passive follower of widely used indexes
  - Costs and distortions of following common passive indexes as many institutions track these indexes at the same time
  - The Fund is a natural provider of liquidity to investors forced to rebalanced to index weights and can reap liquidity premiums
  - Many widely used indexes, especially fixed income indexes, contain illiquid securities which are better held in other structures
    - Enhances the effectiveness of tracking error as a risk budgeting and risk management tool

Recommendation: Factor Benchmarks

- Express through exposure to factor risk
  - Fund already capturing premiums to multiple factor exposures, but this factor exposure should be made explicit
- Factor exposures should be in the Fund’s benchmark
  - “Passive but dynamic”; “index but active”
  - Set desired amount of factor exposure at the level of the asset owner, not fund manager
  - Measure and build your own factors: ensure lowest possible cost, better risk management, etc
  - Use the factors to evaluate internal and external active management and alternative asset classes

Factor-Based Investing: Fund's Advantages

Factors fit into the Fund's comparative advantages

- Governance structure, especially transparency
  - Better communication of the risks of the Fund's strategies
  - Asset owner decides on which factors and the amount of factor risk
- Scale
  - Systematic factors can be implemented in large scale
- Long-term investment horizon
  - Allows the Fund to ride out periods of short-term losses from some factors which are negatively skewed
- Relationship to its management company, NBIM
  - NBIM has the expertise to implement factor benchmarks

Factor-Based Investing: Benefits

- Better understanding of risk-return trade-offs
- Method to gauge the benefit of adding new factors or asset classes to the portfolio
- Allows the asset owner to determine which factors should have large or small exposure
  - Amount of active risk independent of factors could be lower than today since factor risk is brought into the benchmark
- Raises the bar for active management
- More robust portfolios

Factor-Based Investing: Challenges

- Lack of widely recognized factor benchmarks
  - NBIM has expertise in maintaining and tracking indexes
- No long time series
  - Many factors have 20-30 years (some 100+ years) of history. Factors without long time series would not be in the benchmark
- Complete set of factors is unknown
  - Removes systematic factor risk from active returns that should be obtainable more cheaply than true active strategies
- Extend asset to factor allocation
  - Need for more public education on factor risk-return trade-offs
- New governance structure
  - Recommend a creating a new “Factor Benchmark” Division

Factor-Based Investing: Candidate Factors

- Term risk
- Credit risk
- Value-growth risk
- Small-large risk
- Momentum risk
- Volatility risk

All these factor portfolios could be created at low cost by NBIM

Factor-Based Investing: Factor Allocation

- After creating factor portfolios, do risk-return analysis on each factor
- Determine how much factor exposure is desired, similar to the decision on the optimal equity-bond mix
  - Extension of asset allocation.
- Set long-run targets, like the 60%-40% equity-bond target
  - Important to rebalance factor exposures just as currently done for asset exposures
  - Automatic rebalancing essential to avoid arbitrary and time-inconsistent actions

Recommendation: Horizon Buckets

- Categorize assets by horizon
  - Cash
  - Short-term (e.g. listed equities, liquid fixed income)
  - Long-term (e.g. illiquid fixed income, real estate, strategies with long verification horizons)
- Horizon buckets set appropriate expectations
  - Appropriate performance review
  - Appropriate future liquidity planning

Overall Summary

- Summary of empirical studies of active management and the Efficient Market Hypothesis [EMH]
  - There is no compelling evidence to recommend indexing but finding managers with excess risk-adjusted returns is difficult
- Evaluation of NBIM's historical track record
  - The active risk of the Fund is overall small, has a positive mean, and has large exposure to systematic factors
- Recommendation of how the Fund's advantages can be exploited
  - Allow the asset owner to decide how much factor risk is appropriate by bringing factors into the Fund's benchmark and creating horizon categories for assets