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Factor Benchmarks

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Barclays Capital Quantitative Portfolio Management Conference

Summary

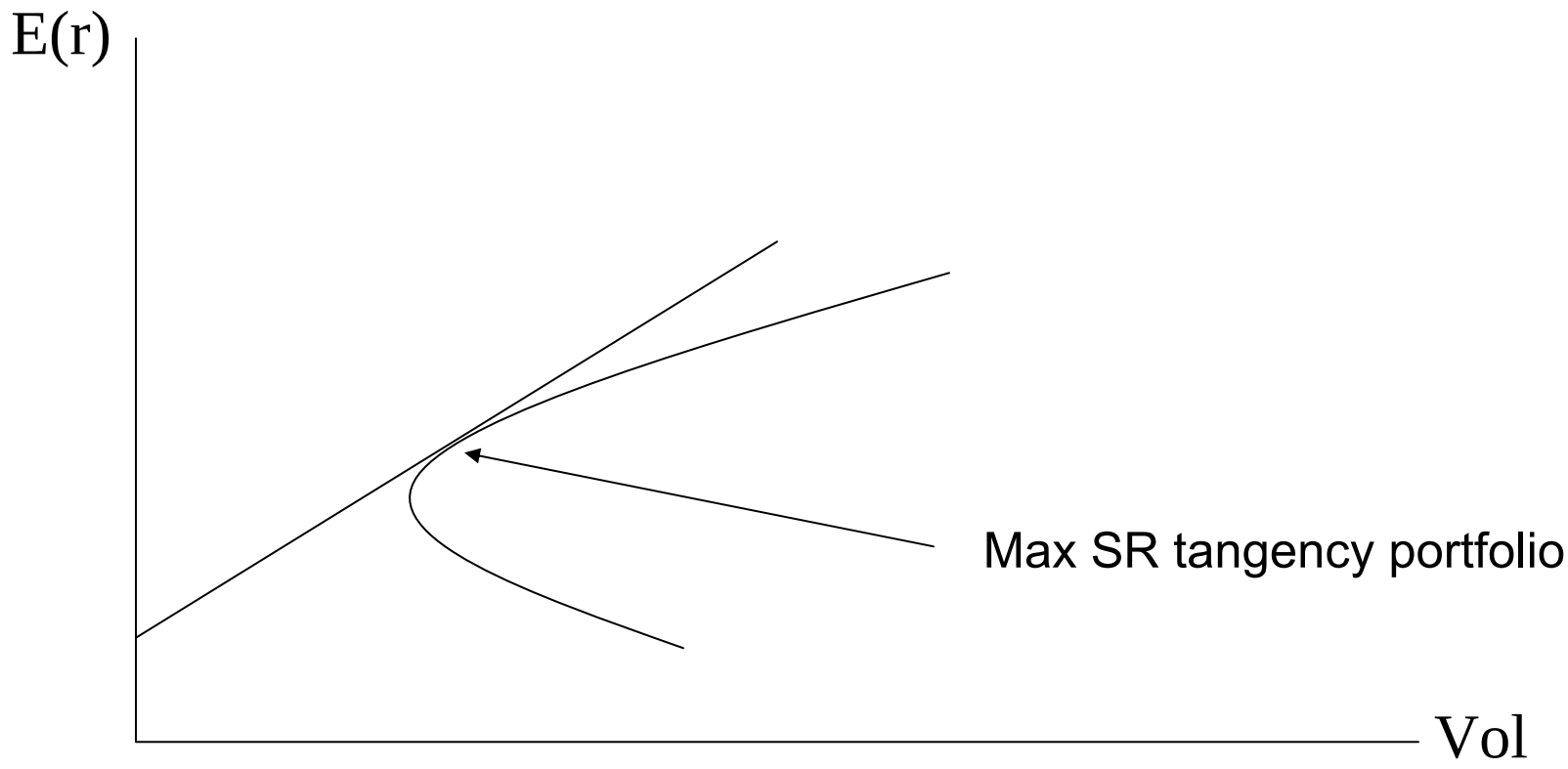
- Existing benchmarks are overwhelmingly passive, based on market weights, and do not reflect dynamic factor risk premiums
- Incorporating factors into benchmarks leads to
  - Non-market capitalization weights
  - Dynamic weights
  - Customizable for an individual investor's risk appetite
- More appropriate basis to evaluate active strategies
  - Removes systematic risk that should be obtainable more cheaply than true active strategies
  - Does not penalize a manager for poor performance of factors

Outline

- Why Factor Benchmarks?
- Norwegian SWF and Factors
- Dynamic Factor Benchmarks

Why Factor Benchmarks?

Portfolio Allocation in the CAPM World



Why Factor Benchmarks?

Moving to a Multifactor World

- Suppose investors care about bad times defined by more than just low market returns, e.g. times of low liquidity (the risk that when you want to sell, nobody wants to buy at a “decent” price)
- The extra liquidity risk must affect the average investor (remember the average investor holds the market)
- Assets with high exposure (high betas) to liquidity risk earn high returns. These assets have low payoffs during illiquid times and require high returns to compensate the average investor for holding them.

Why Factor Benchmarks?

Portfolio Allocation in the Multifactor World

- A risk-tolerant investor prepared to bear greater losses during illiquid times supplies “insurance” to risk-averse investors by holding stocks with high liquidity risk. Such an investor earns higher returns, on average, for providing liquidity insurance.
- The illiquidity-averse investor tilts his portfolio to stocks that tend to pay off during times of illiquidity. Conversely, an investor providing liquidity insurance holds stocks which do worse during illiquid periods.
- There is an optimal illiquidity hedging portfolio: the liquidity factor portfolio. The composition of this portfolio changes over time.
- Agents hold the market and the liquidity factor portfolio, combined with the risk-free asset. The overall portfolio (individual asset holdings) is a non-market weighted portfolio that is dynamically changing.

Why Factor Benchmarks?

	CAPM World	Multifactor World
Factor	Market	Multiple factors, e.g. liquidity. Note factors can be correlated.
Factor Risk	Poor market return	Poor returns during times of illiquidity
Asset Allocation (determined by risk aversion)	Hold more/less market risk Investors more tolerant of market risk reap higher returns	Hold more/less illiquidity risk Investors more tolerant of illiquidity risk reap higher returns
Equilibrium Pricing	Market risk cannot be diversified away	Illiquidity risk cannot be diversified away
Asset Returns	Assets provide market risk (which provides a return) and idiosyncratic risk (which does not)	Assets provide liquidity risk (which provides a return) and idiosyncratic risk (which does not)

Why Factor Benchmarks?

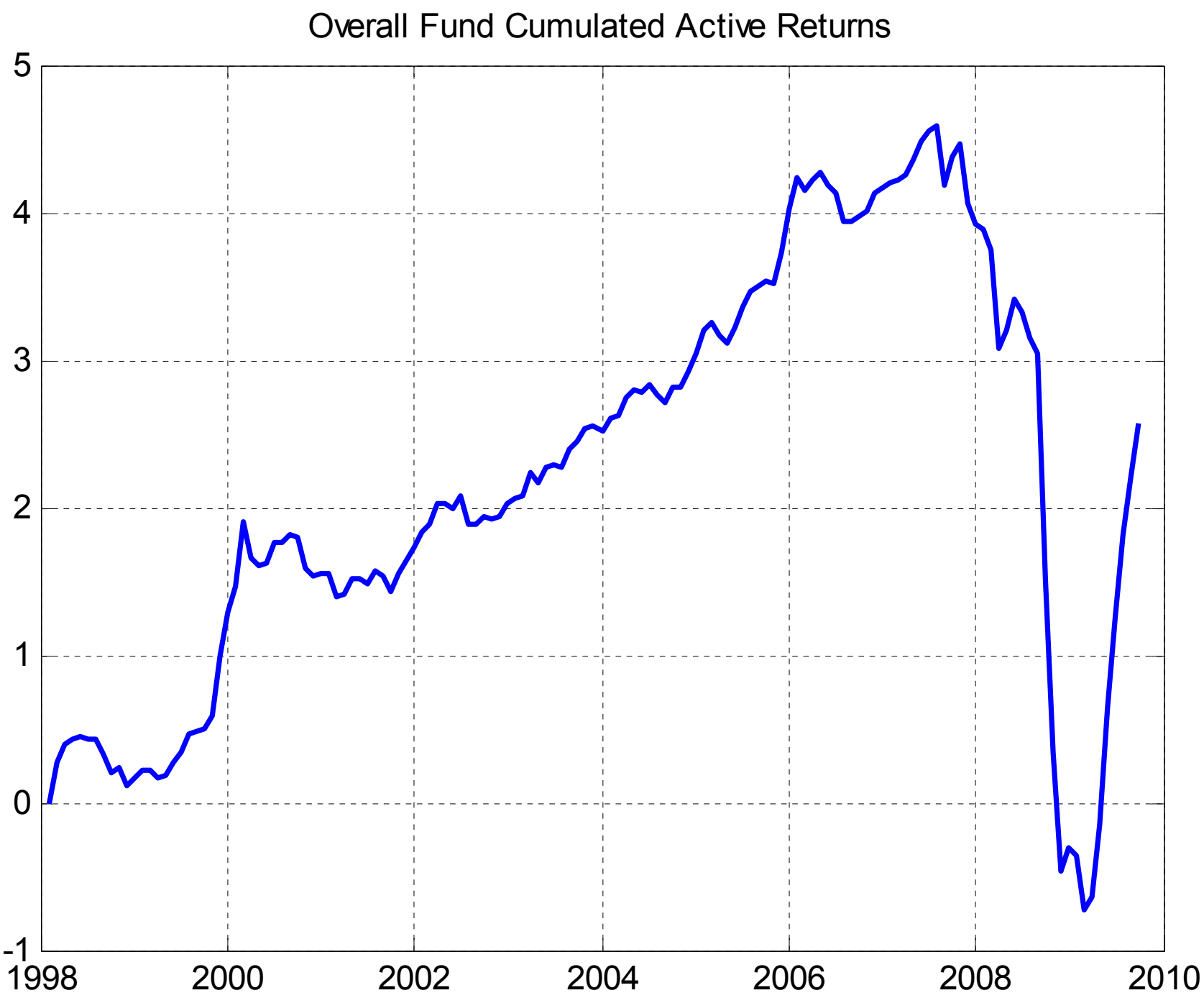
- Being exposed to each factor is reward for bearing a different set of "bad times" than just negative market returns, e.g. periods of illiquidity, high volatility, high credit spreads, poor performance of value stocks, etc.
- Why isn't this already priced by the market?
  - Market prices the average effect
  - If you have risk capacity that is different from the average investor, e.g. you can more easily bear losses during illiquid times, then you should have larger weights in stocks with high illiquidity risk than the average investor. This means you hold optimal non-market capitalization weights.
  - Hold different combinations of factor portfolios (benchmarks)

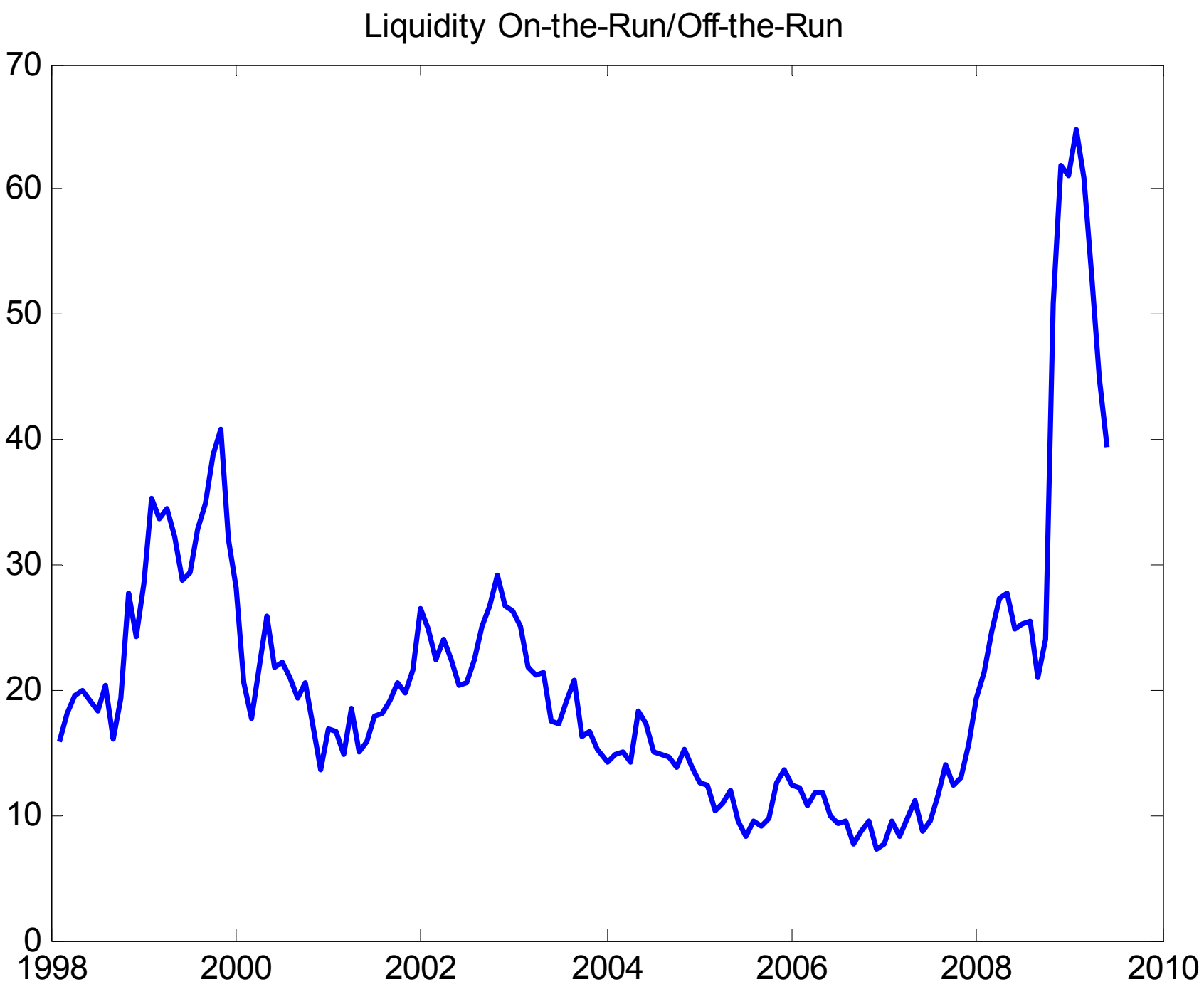
Why Factor Benchmarks?

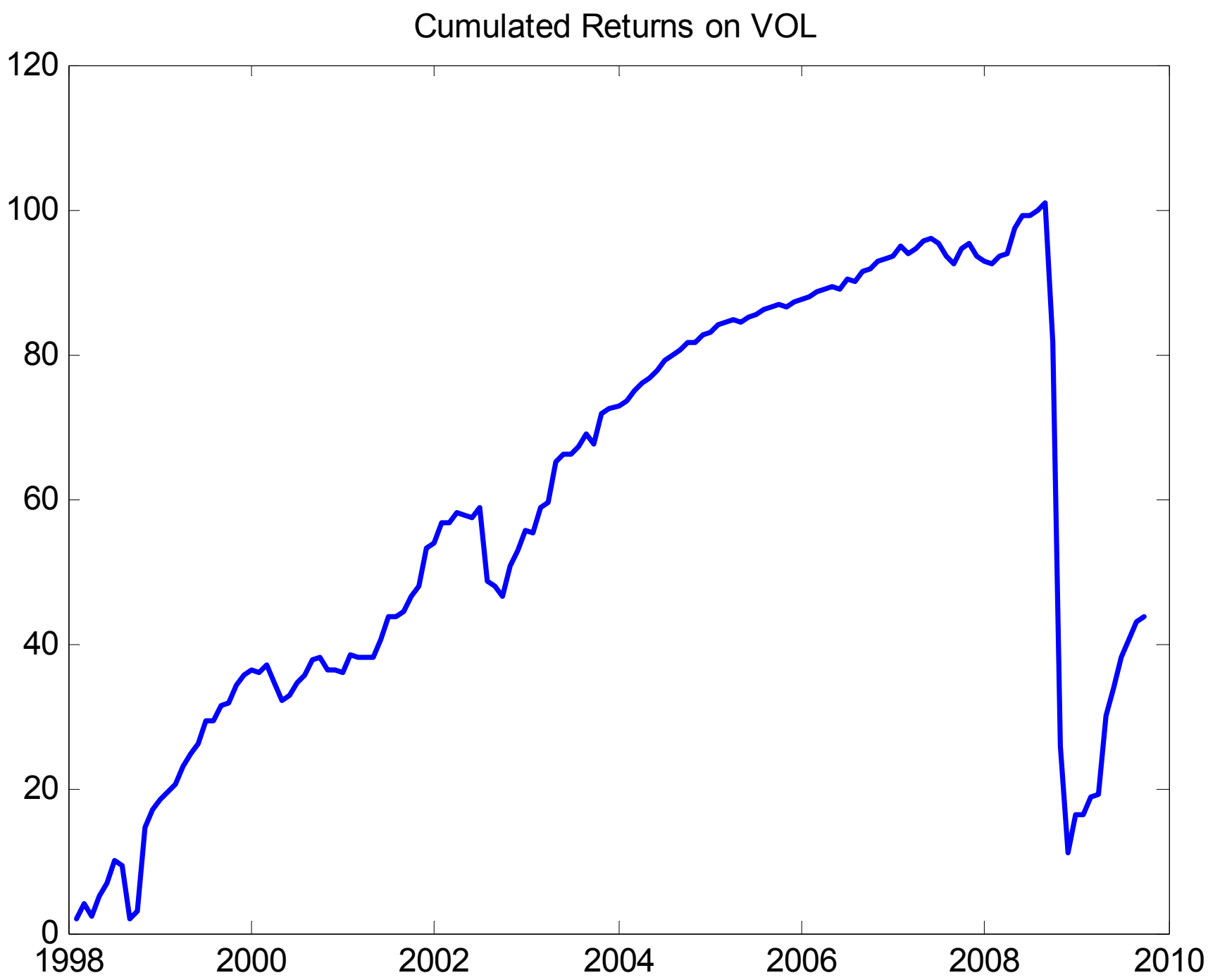
- "Factor-mimicking portfolios" with long-short positions
  - These portfolios are by construction dynamic and leveraged
  - Most famous examples are SMB and HML of Fama and French for size and value/growth, but versions exist for momentum, liquidity, volatility, carry, credit, and other factor risk
  - Academic factor portfolios are poorly constructed for real trading purposes
- Factor mimicking portfolios are "dynamic" asset classes
- But, currently no industry-wide standards for factor benchmarks exist and the existing academic versions are not "tradable" or scalable for large investors

Norwegian SWF and Factors

- Report commissioned by the Norwegian Ministry of Finance in 2009 on active management of the Norwegian SWF ("Norwegian Government Pension Fund – Global")
- Should the Fund be active? YES!
- Close to 70% 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


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

Norwegian SWF and Factors

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

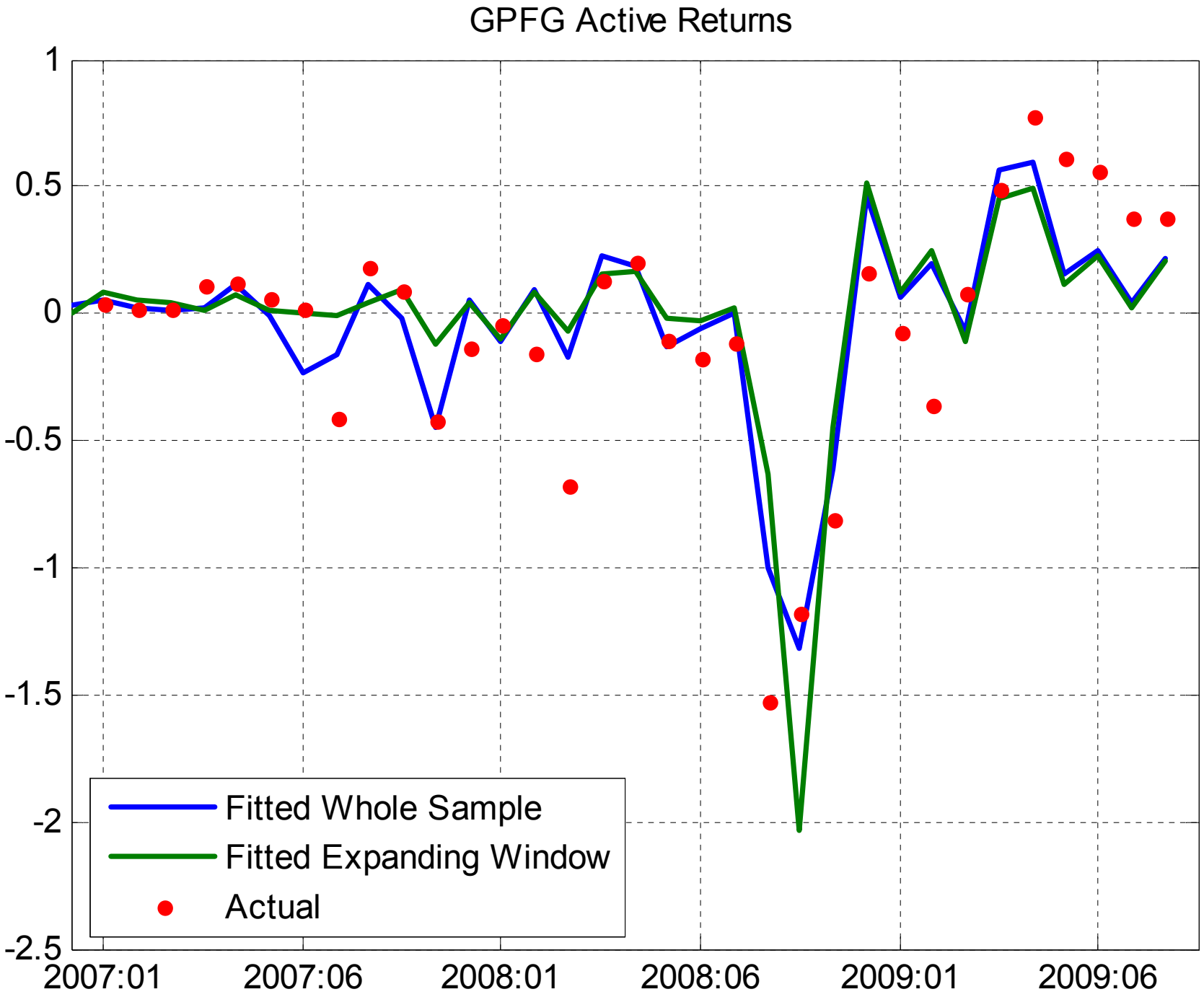
Partial Correlations of Active Returns with Systematic Factors

	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

Norwegian SWF and Factors

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

Norwegian SWF and Factors

- Large exposure to systematic factors is entirely appropriate
- Top-down, intentional approach to choosing factor exposure

  => Factor benchmarks
- A new framework for taking and measuring systematic risk
  - "Passive but dynamic"; "index but active"
  - Set desired amount of factor exposure at the level of the asset owner, not fund manager
  - Better framework to evaluate active strategies

Dynamic Factor Benchmarks

- Start with the market portfolio, with separate [global] bond and stock proportions specified
- Specify long-short “hedge” portfolios, for example:
  - Value/Carry
  - Volatility
  - Small/Large
  - Credit
  - Momentum
  - By no means a complete list

Dynamic Factor Benchmarks

Simple Example

- Three stocks: Value 20%, Neutral 50%, and Growth 30% (mkt weights).
- Value/Growth factor is long value, short growth.
- Suppose the desired portfolio is 100% equities with a loading of 5% on the value/growth hedge portfolio:

	Market Portfolio	+ Dynamic Portfolio	= Desired Portfolio
Value	0.20	0.05	0.25
Neutral	0.50		0.50
Growth	0.30	-0.05	0.25
	1.00	0.00	1.00

Dynamic Factor Benchmarks

- Now suppose the Value stock does well and is now "Neutral" with a new mkt cap weight of 0.40 (from 0.20). The old "Neutral" stock declines in price from 0.50 to 0.30 and now becomes "New Value". The Growth stock remains unchanged.

	Market Portfolio	+ Dynamic Portfolio	= Desired Portfolio
New Neutral	0.40		0.40
(old Value)	[old 0.20]		
New Value	0.30	0.05	0.35
(old Neutral)	[old 0.50]		
Growth	0.30	-0.05	0.25
	1.00	0.00	1.00

Dynamic Factor Benchmarks

Features

- Weights are non-market capitalization weights and theoretically could be negative
- Optimal desire of exposure to the dynamic factor is set by the investor (here 5%) and is reflected in the benchmark
- Benchmark is “passive” in the sense that it is based on a set of systematic rules, but is “dynamic” in that its composition changes over time
- Specifying the asset weights directly has no “error” compared to running ex-post factor regressions

Dynamic Factor Benchmarks

Factor Exposure is the Investor's Decision

- Perhaps there are some factors an investor should have low, or even negative exposure, e.g. due to liability or endowment profile
- A long horizon makes an investor potentially able to bear some factor risk better than other players, especially liquidity and volatility risk, where consistent profitability is revealed only over long periods.
- The risk appetite could be, and probably is, different across different factors.
- Collecting a risk premium is selling insurance. The questions should be which insurance premiums should NOT be collected and what losses can be tolerated when bad times arise?
- Want to separately identify each factor and impose factor risk limits.

Dynamic Factor Benchmarks

Factor Benchmarks and Active Management

- Raises the bar for active management
  - Alpha risk is often factor risk in disguise. Factor benchmarks remove dynamic factors from “alpha”
  - Separates systematic risk vs true active returns in paying for active management
  - Hedge funds often provide an expensive way to access dynamic factors
- Conversely, should not penalize a manager for poor factor performance, e.g. Norwegian SWF over 2008-9, if that factor exposure is desired and chosen a priori

Conclusion

- Why Factor Benchmarks?
  - Individuals have different risk tolerances to multiple factors.
- Norwegian SWF and Factors
  - Large systematic exposures led to large active losses over 2008-9
- Dynamic Factor Benchmarks
  - Non-market weighted
  - “Passive” but “dynamic”
  - Customizable for an individual investor’s risk appetite

Conclusion

If I had more time…

- Which Factors?
- Optimal Factor Construction
- Factor (not Asset) Allocation
- Factor (not Asset) Rebalancing
- Factor (not Asset) Timing and Selection

References

- Ang, A., W. N. Goetzmann, and S. M. Schaefer, 2009, "Evaluation of Active Management of the Norwegian Government Pension Fund – Global," http://www.regjeringen.no/upload/FIN/Statens%20pensjonsfond/rapporter/AGS%20Report.pdf

  Other materials: http://www.regjeringen.no/en/dep/fin/News/news/2010/Seminar-on-acive-management-of-the-Government-Pension-Fund-Global.html?id=591422

- Andrew Ang's research: http://www.columbia.edu/~aa610