Passive Investing

September 2007

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A Passion to Perform. Deutsche Bank

Passive Investment Trends

- **Passive investment has seen significant growth over the past 10 years**
- **Let us consider the main factors behind this**
  - Investors have been consistently disappointed by relative active returns
  - This first became a general feature as markets performed poorly in 2002 and 2003
  - The combination of poor performance and high costs was also a negative factor as well as the lack of flexibility in active strategies
  - Investors realised that they could manage pure market exposure efficiently and cheaply via index products

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Passive Investment Trends - Performance
S&P US Indices versus Active Fund Returns

Standard & Poors Index Versus Active Fund Scorecard

% of General Equity Funds Outperformed by Index

Category	Fund	1 yr	3 yr	5 yr
S&P 500	LargeCap	70.75	65.72	72.22
S&P 400	MidCap	61.46	68.63	77.38
S&P 600	SmallCap	56.52	80.20	77.67

based on equal-weighted fund counts

% of Active Funds Outperformed by Asset Weighted Index fund return

Category	Fund	1 yr	3 yr	5 yr
S&P 500	LargeCap	71.79	65.49	70.63
S&P 400	MidCap	45.33	60.78	62.12
S&P 600	SmallCap	59.72	84.27	70.59

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Passive Investment Trends – Costs

- **The competition at a cost level has been one of the most important factors**
  - Although active fund fees have declined over the long term from as high as 200bps to around 120bps, in absolute terms these remain high
  - The competition has mainly come from indexed and passive products where costs are substantially lower
  - Institutional costs for passive assets can be as low as 5-10bps depending on the benchmark being tracked
  - Zero tracking error index swaps – for institutions these can even be zero cost products, again depending on the benchmark

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Passive Investment Trends – Lower Costs

- **The most obvious area where low costs can be found is ETFs**
  - In the large cap arena ETF costs can be a low as 9-10bps for the S&P 500 in the US
  - In Europe there are ETFs with fees as low as 15bps on indices such as the EURO STOXX 50 and DAX
  - ETFs represent one of the fastest growing areas for the introduction of passive investment products
  - ETFs encapsulate the two key factors that investors seek
    - Low tracking error
    - Low costs
    - Benchmark oriented returns

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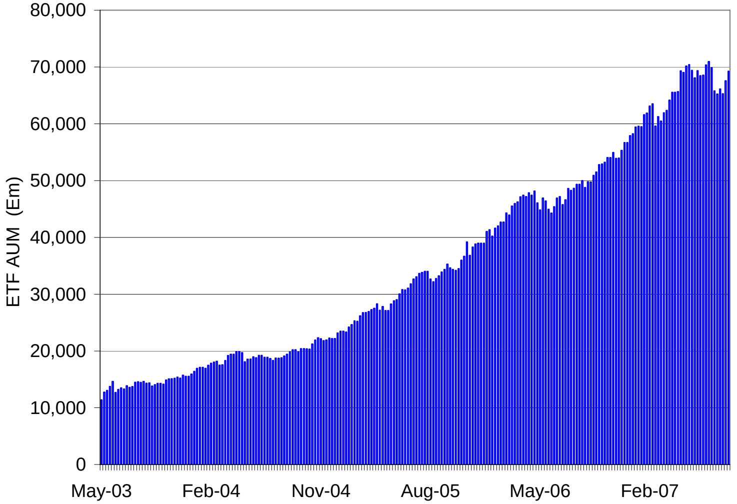
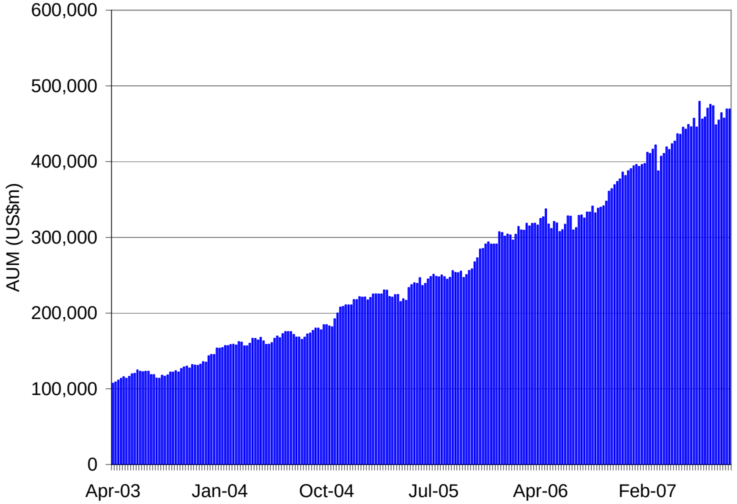
Passive Trends – ETFs Asset Growth

European ETF AUM



US ETF AUM



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Passive Investment Trends – New Indices

- **So active funds and active styles have been hardest hit by the comparison of costs and performance**
- **What happens to active funds once active styles become effectively incorporated into index products**
  - Active investment management styles tends to focus on different factors as sources of alpha
  - These tend to be based on company level data, as opposed to a macro styled theme
  - By being based on generally readily available data active styles lend themselves to replication
  - Replication is then optimally packaged into a low cost index product

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Passive Investment Trends – Fundamental Indices

- **So are we arguing for a shift to "fundamentally weighted indices"?**
- **Not necessarily – there is much to be said about obtaining returns simply due to the nature of index construction**
  - Many fundamentally weighted indices, whilst being factor based, obtain alpha simply through the weighting scheme
  - Fundamentally weighted indices tend to have a small to mid cap bias
  - Also there tends to be an implicit value bias
  - Can often have significantly higher turnover
  - Work at a micro level rather than being applicable at an aggregate market level

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Passive Investment Trends – Fundamental Indices

- **Should we then dismiss fundamentally weight indices?**
- **Again not necessarily – they represent a valid form of index construction**
- **If we consider an index as being a rules-based method of constructing a portfolio**
  - Fundamentally weighted indices offer exposure to an active style
  - Investors can therefore chose between styles and add these as portfolio tilts or active strategies
  - Investors can hedge away exposure to particular factors
  - So fundamental indices have a part to play

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Passive Investment Trends - Risk Factors and Styles

Factor Strategies and Common Sources of Alpha

	Value / Growth Measures	
Dow Jones STOXX	**Projected** Projected price/earnings (P/E) ratio Projected earnings growth	**Historical** Trailing p/e ratio Trailing earnings growth Price/Book (P/B) ratio Dividend yield
FTSE	**Value** Price to Book Sales to Price Dividend Yield Cash Flow to Price	**Growth** 3 Year Historic Sales Growth 3 Year Historic Earnings per Share Growth 2 Year Forward Earnings per Share Growth 2 Year Forward Sales Growth Return on Equity (1-Payout Ratio)
MSCI	**Value** Book value to price ratio (BV/P) 12-month forward earnings to price ratio Dividend Yield	**Growth** Long term forward EPS growth rate Short term forward EPS growth rate Current Internal Growth rate Long term hisotrical EPS growth trend Long term historical sales per share growth trend
S&P	**Value** Book Value to Price Ratio Cash Flow to Price Ratio Sales to Price Ratio Dividend Yield	**Growth** 5-Year Earnings per Share Growth Rate 5-Year Sales per Share Growth Rate 5-Year Internal Growth Rate (IGR) (IGR = ROE x Earnings Retention Rate)

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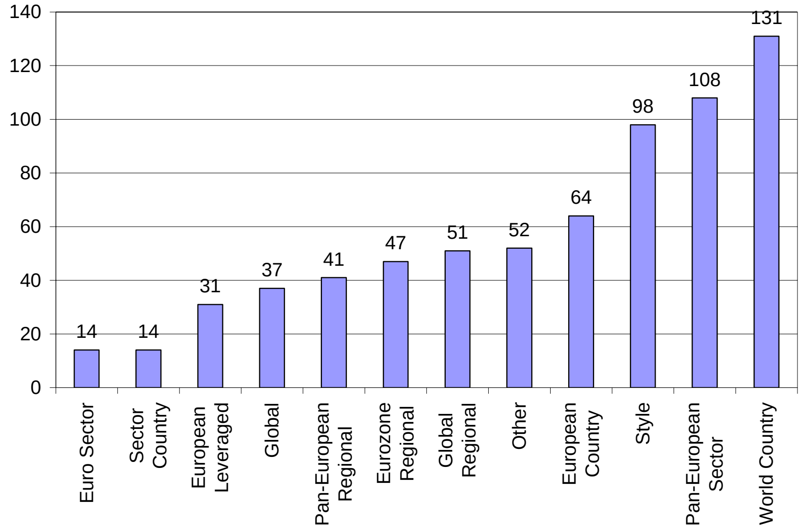
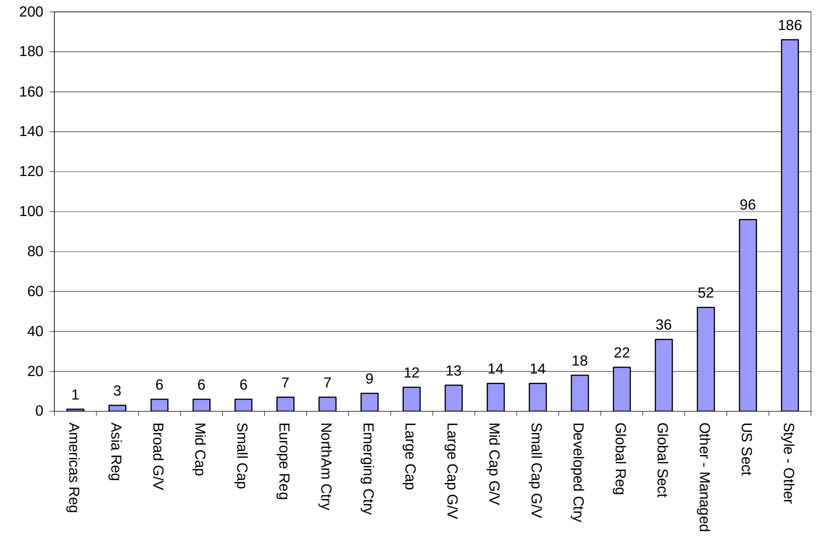
Passive Trends – ETFs Types

Europe - 98 style ETFs



US – 186 style ETFs



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Passive investment and Long only Portfolios

- **Investors seeking to add alpha to portfolio returns have long been constrained by a number of important factors**
- **Stock concentration places a significant limitation on active weights that can be achieved versus the benchmark**
- **Investors need to split alpha and beta strategies**
- **Most major benchmarks have very high levels of concentration**
  - This applies to all the main US indices, European local markets and broad regional benchmarks from MSCI, FTSE and STOXX
  - It is a factor in both developed and emerging markets

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The impact of concentration on active strategies

In order to understand what this means for an active strategy we need to consider that active managers deliver to investors an Information Ratio

Therefore the alpha generation is a function of

- Information Coefficient – this is a measure of how well correlated the actual returns are with the forecast
- The opportunity set of active bets
- The Transfer Coefficient – a measure of the efficiency of portfolio construction

The Information Ratio can also be described as a function of the

- The alpha generated versus the benchmark
- The tracking error versus the benchmark

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The Transfer Coefficient and Portfolio Construction

Transfer Coefficent

$$IR = \frac{\alpha_p}{\delta_A} \quad ; \quad IR = IC \times TC \times \sqrt{N}$$

Transfer Coefficient (if IC = 1)

$$TC = \frac{\alpha_p}{\delta_A} \times \frac{1}{\sqrt{N}}$$

α_p = Portfolio alpha
δ_A = Active risk
N = Opportunity set of active bets
IR = Information Ratio
IC = Information Coefficient
TC = Transfer Coefficient

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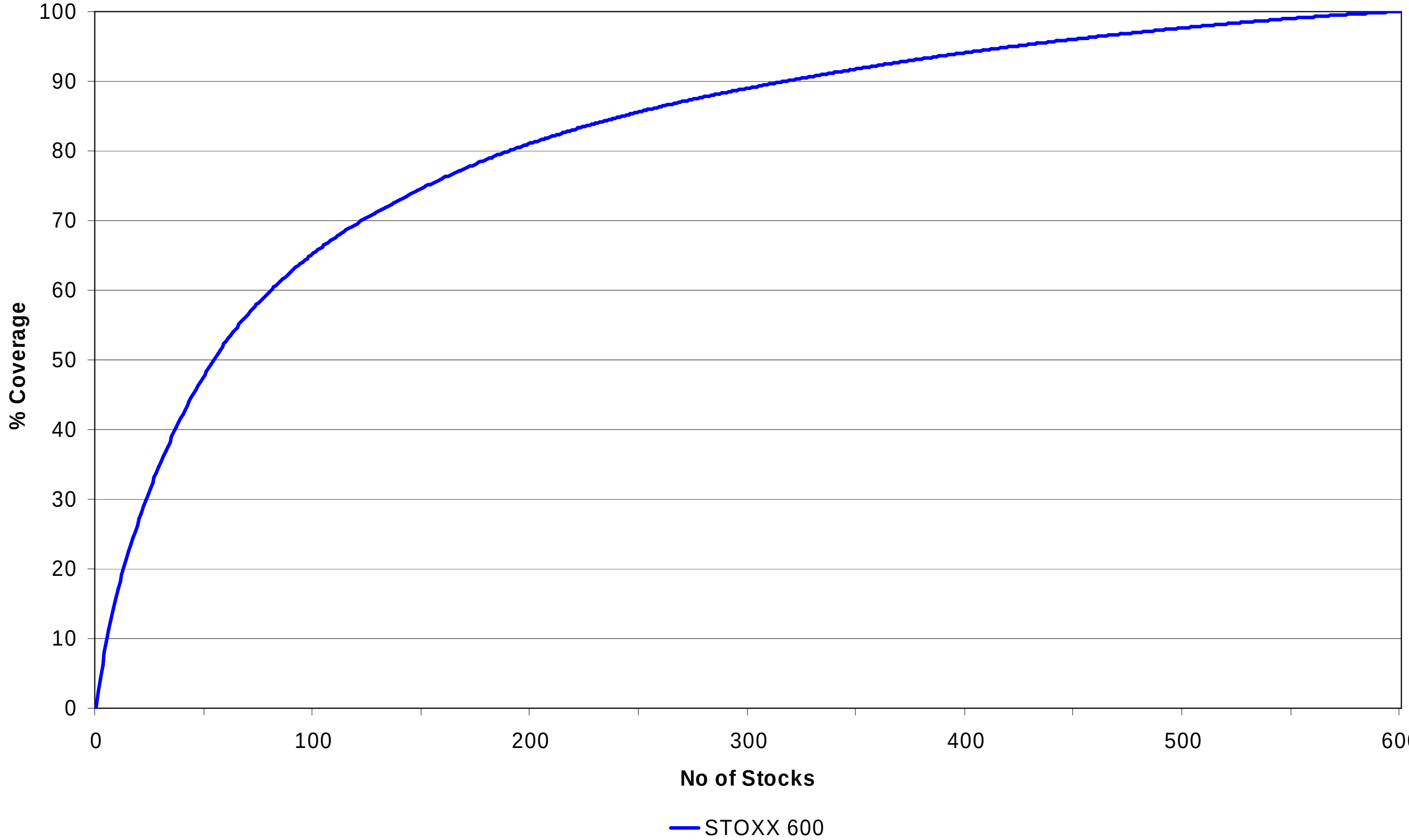
Stock Concentration – a Constraint on Long only Strategies

Stock Concentration in the STOXX 600



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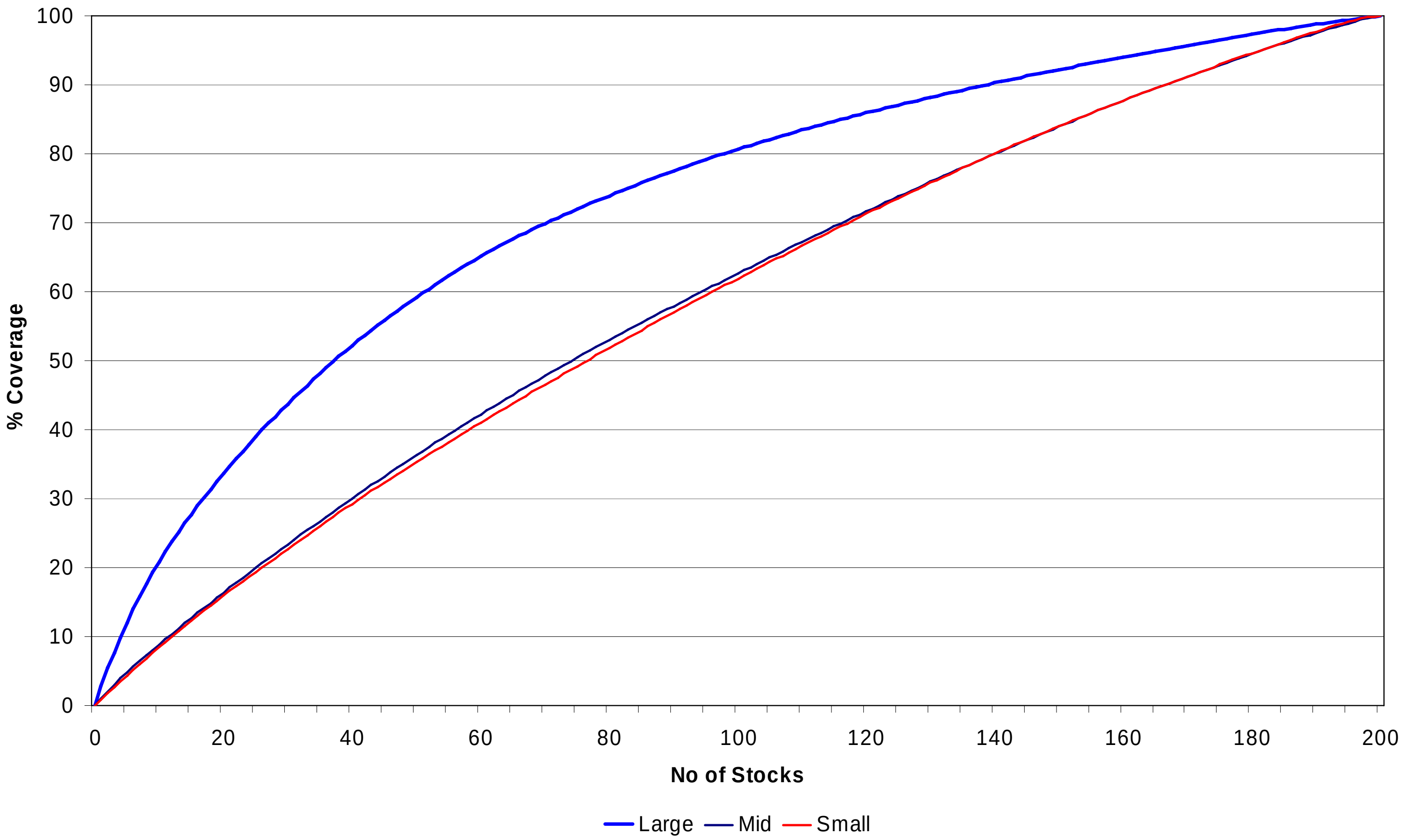
Stock Concentration – a Constraint on Long only Strategies

Stock Concentration in the STOXX Large, Mid & Small



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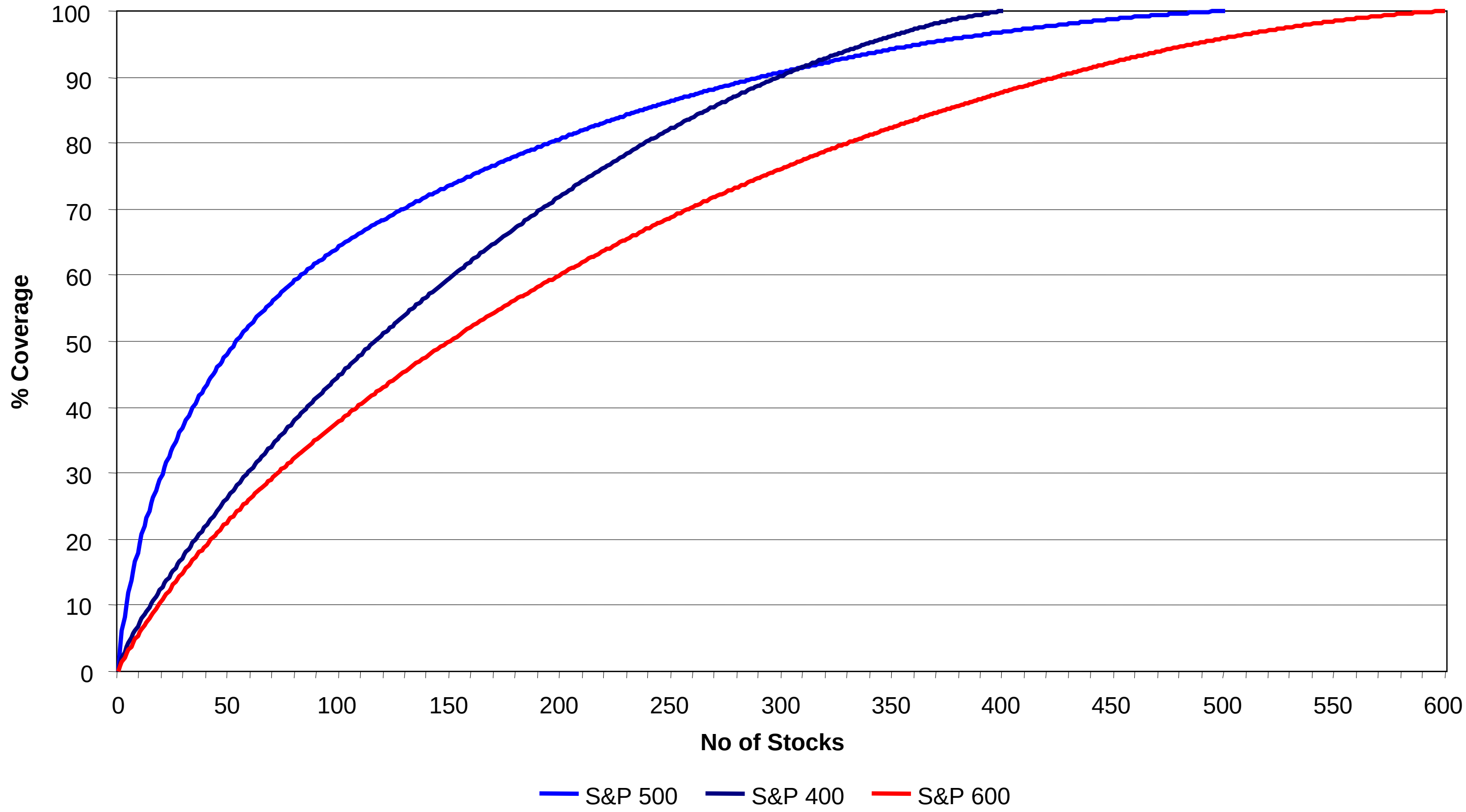
Stock Concentration – a Constraint on Long only Strategies

Stock Concentration in the S&P 500, 400 & 600



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The impact of concentration on active strategies

- In the first description of the Information Ratio the breadth of available active portfolio bets is an important factor
- High levels of stock concentration severely limit the available active bets
- So for example in the S&P 500, 54 stocks cover over 50% of the index and 254 stocks have a weight of less than 10bps; there are not 500 available meaningful active bets from a long only perspective
- In the case of MSCI Europe, 53 stocks cover 50% of the index and 388 stocks (66% of the index) have a weight below 10bps; so again close to 600 stocks in the index but actually a low number of potential active bets
- In the STOXX 600, 57 stocks cover 50% and 389 stocks have a weight below 10bps (65% of the index)

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Stock Concentration is a Global Problem

Concentration in US, Regional and European Indices

Index	No for 50%	50% as % of No of stocks	Herfindahl Index	Equal weigt	Ratio of H to Eq	Stocks below 10bps Number	Stocks below 10bps % of total
S&P 500	54	10.8%	74.6	20.0	3.73	254	50.8%
S&P 400	117	29.3%	33.8	25.0	1.35	49	12.3%
S&P 600	150	25.0%	16.3	16.7	0.98	208	34.7%
S&P 1500	73	4.9%	57.9	6.7	8.69	1275	85.0%
MSCI Indices							
World	164	8.7%	25.6	3.3	7.87	1662	88.3%
EAFE	96	8.3%	39.1	8.7	4.51	922	79.9%
Europe	53	9.0%	67.0	16.9	3.97	388	65.5%
EM World	69	8.2%	62.5	16.3	3.83	626	74.3%
STOXX							
STOXX 600	57	9.5%	62.0	16.7	3.72	389	64.8%

Stock Concentration is a Global Problem

Concentration in European

European indices	No for 50%	50% as % of No of stocks	Herfindahl Index	Equal weigt	Ratio of H to Eq	Stocks below 100bps Number	Stocks below 100bps % of total
EURO STOXX 50	16	32.0%	256.9	100.0	2.57	12	24.0%
AEX	5	20.0%	871.2	400.0	2.18	6	24.0%
CAC	9	23.1%	470.2	164.4	2.86	10	25.6%
DAX	7	23.3%	600.1	333.3	1.80	6	20.0%
FTSE 100	13	12.7%	277.2	98.0	2.83	76	74.5%
IBEX 35	4	11.4%	876.3	285.7	3.07	16	45.7%
S&P MIB	4	10.0%	838.2	250.0	3.35	19	47.5%
OMX	6	20.0%	639.4	333.3	1.92	5	16.7%
SMI	4	16.0%	1122.6	400.0	2.81	12	48.0%

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The impact of concentration on active strategies

- With low effective opportunity sets for active bets investors can only source significant overweight positions by going to zero weighting in stocks that will offer limited value to overall returns
- Furthermore investors can only do this in the context of their overall tracking error
- So active investors remain significantly constrained by their benchmark
- As already seen this has lead to consistently high levels of underperformance
- However, it is possible to use passive index products within the context of active strategies in order to enhance returns
- Here we have looked at opportunities using STOXX sectors
- These are easily traded via ETFs, futures, options and index swaps

Expanding the opportunity set of long only returns

- We explore the potential for long only funds to enhance returns whilst being constrained by benchmark factors
- The aim is to explore the range of positive and negative returns that a STOXX 600 fund could achieve based on simulated sector holdings over the past year
- The main constraint is tracking error and we show the maximum and minimum potential returns for each level of tracking error
- We then model two constraints on the % deviation of the sector holding from the benchmark (+/-5% and +/-3%)
- The potential alpha is not symmetrical and the limits to sector weights constrains the potential returns for a given level of tracking error

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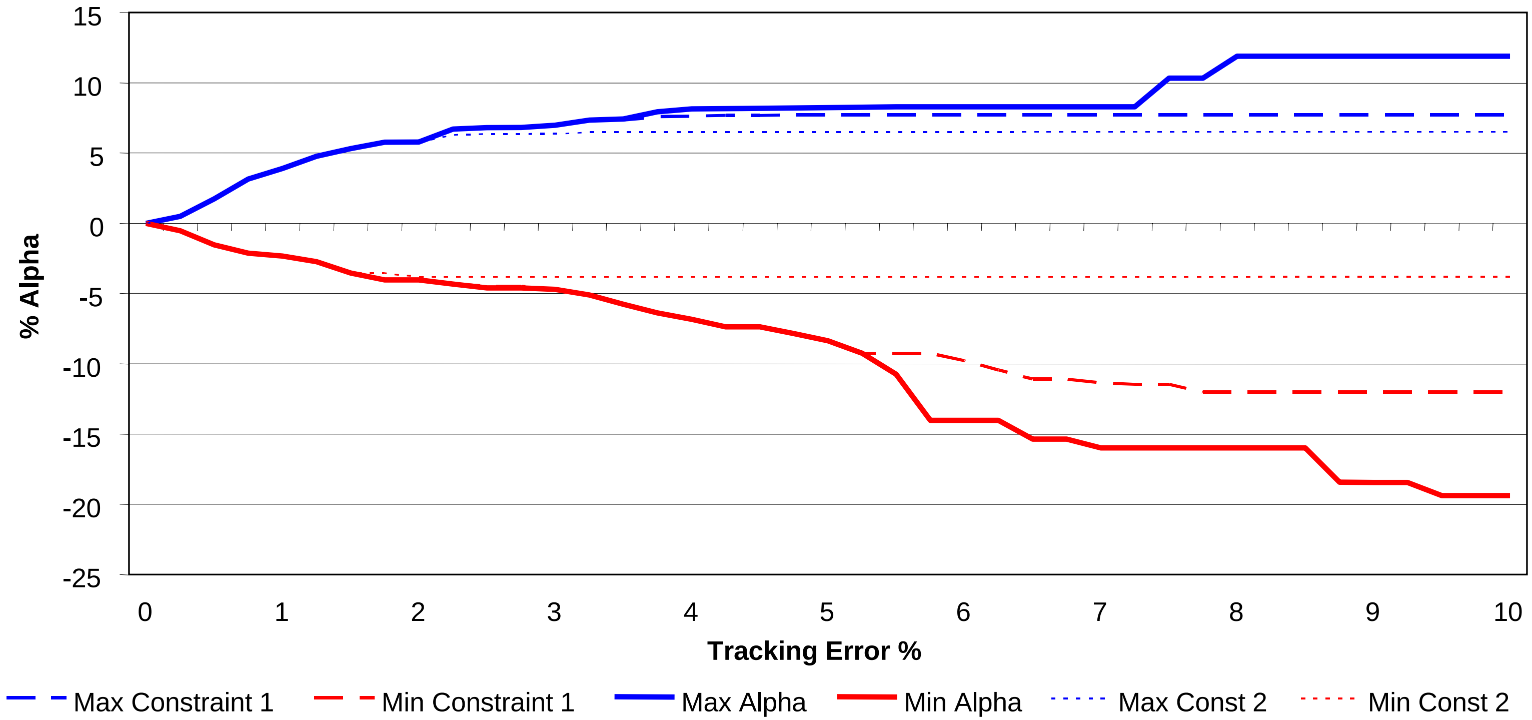
Simulating the Opportunity Set of Long Only Returns

STOXX 600 Constrained and Unconstrained Active Sector Strategies



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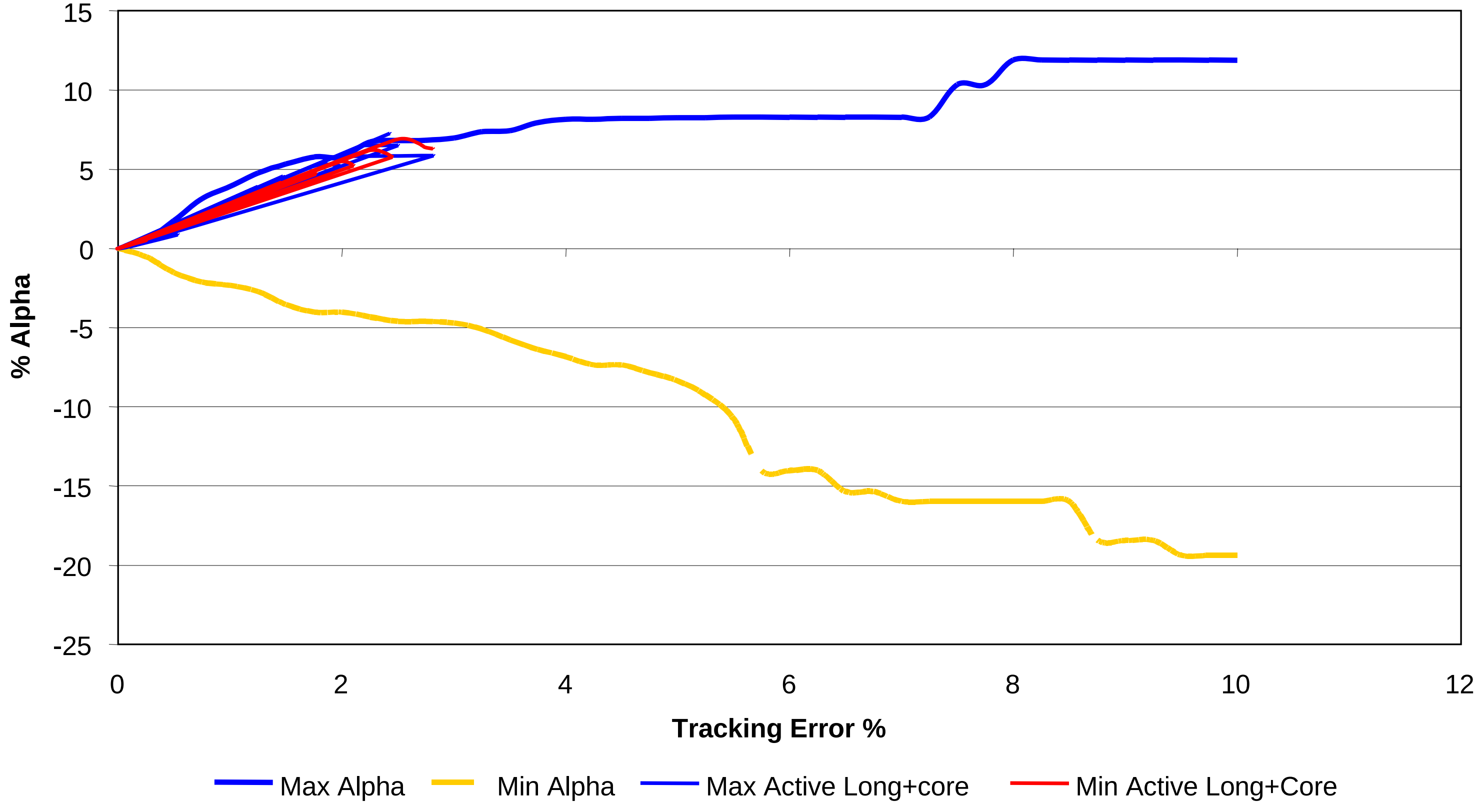
Shifting to a core / satellite approach

- An extension to this active constraint is to consider the potential returns based on running a passive core and active satellite strategy
- Assume that the portfolio manager has an IC of 1 with correctly identified outperforming sectors
- In the context of having tracking error constraints we find that the alpha generating opportunities remain limited
- So even with the benefit of being overweight in the best performing sectors the tracking error is the dominant constraint on potential returns

Shifting to a Core Satellite Approach

Long Only STOXX 600 – Passive Core/Active Sector Strategy



Long / short portfolio extensions

- If we extend the portfolio construction process from a passive core and active satellite to a passive core and an active long / short satellite
- There are different ways to create long / short extensions
- Our assumption is based on a passive core and active sector holdings on the long and short side but constrained by overall tracking error
- We can see that the long short strategy allows for enhanced alpha across a relatively wide range of tracking error limits
- There is also an expansion of the opportunity set of likely outcomes
- These results are also applicable to simulations done using the S&P 500 and a single stock strategy for the EURO STOXX 50

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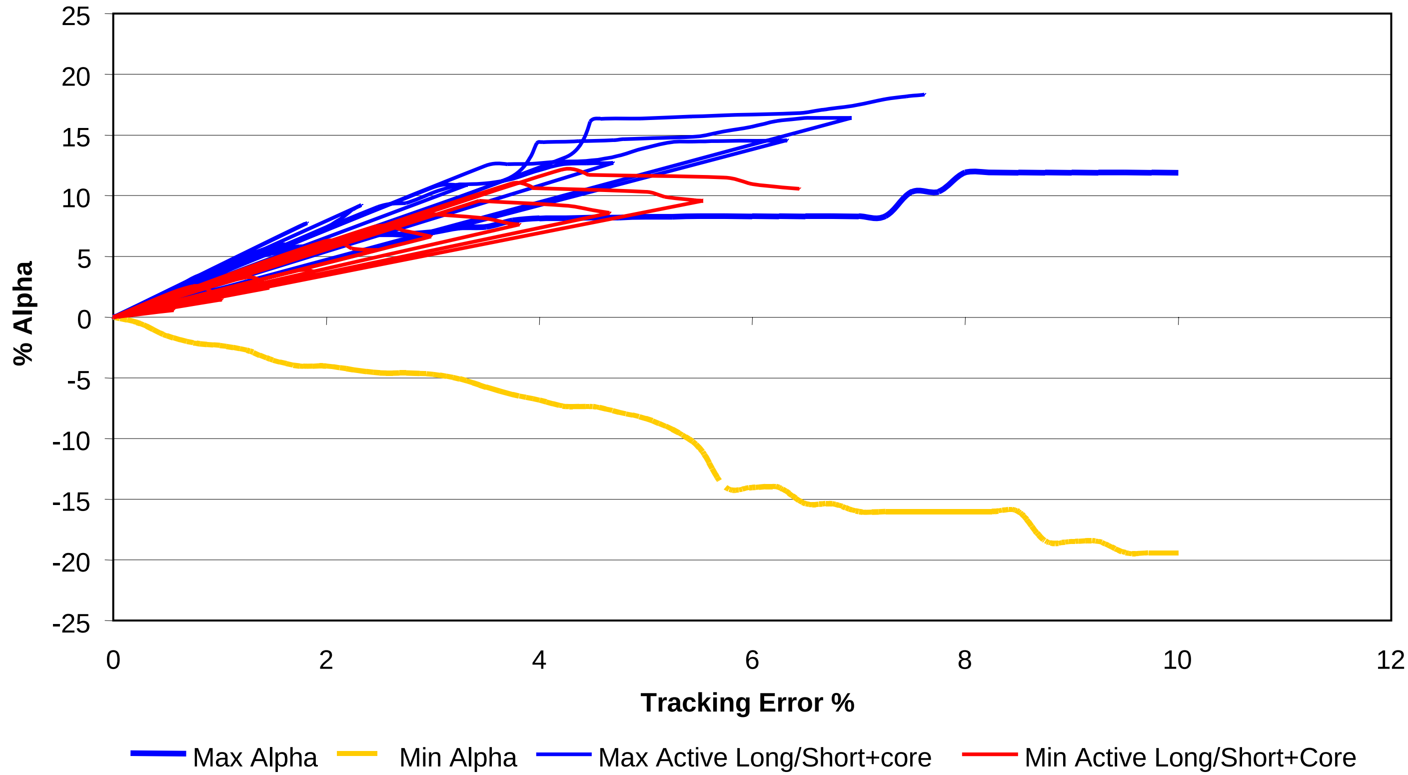
Long Short Portfolio Extensions

Long Short STOXX 600 Active Sector Strategy



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Long short strategies and the Information Ratio

- The Information Ratio is the ratio of alpha to tracking error
- Therefore it encompasses the two main areas of focus for active investors
- We can now consider the previous results for both long only core / satellite portfolios and long / short strategies in the context of the information ratio
- We can also assess different Information Ratios and the level of gearing
- In the STOXX 600 we find the highest IR with a 140/40 strategy, whilst the long only strategy has a lower IR with 50% in the active portfolio
- However we should note a couple of features – the optimal level of gearing will change over time and that for each level of gearing there is wide dispersal of Information Ratios

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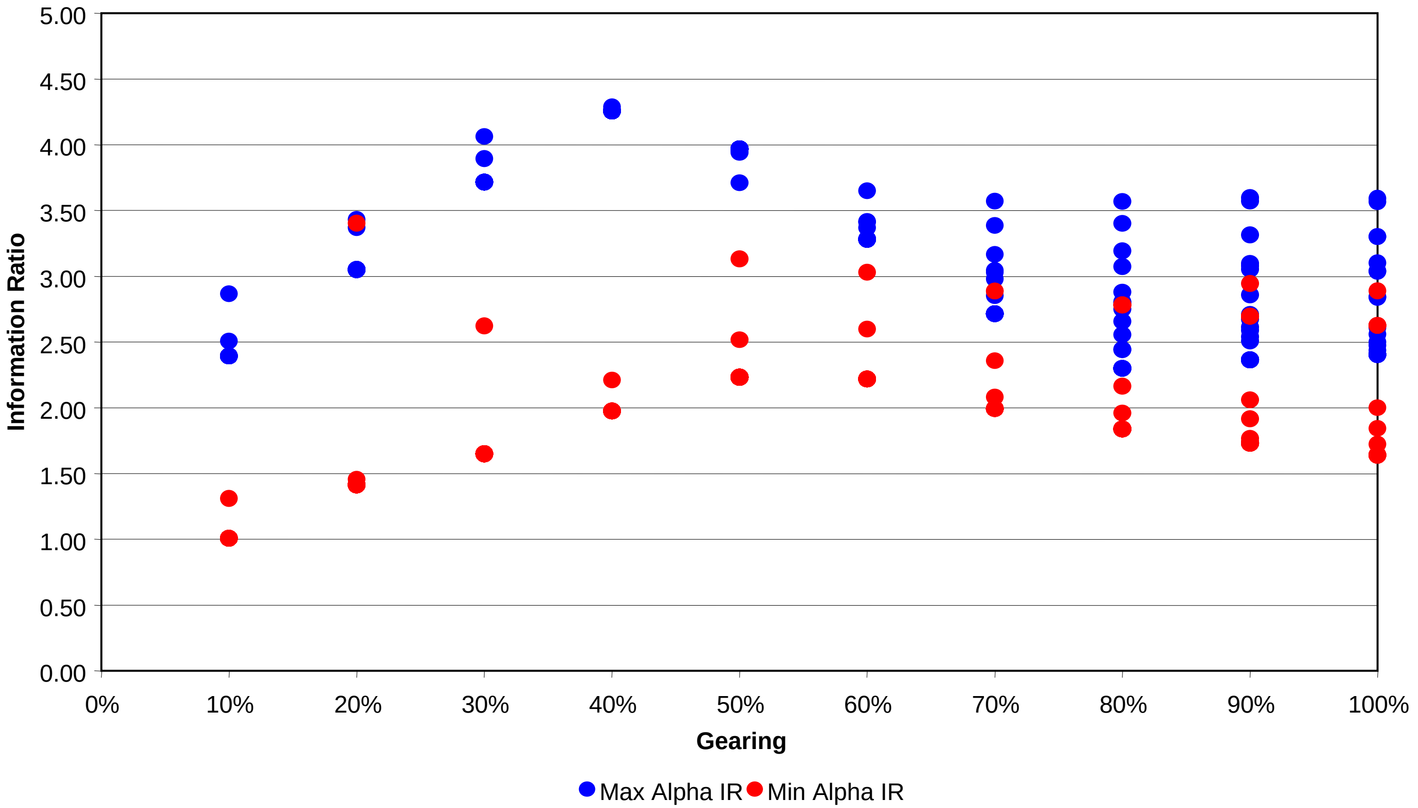
Comparisons of Information Ratio and Gearing

STOXX 600 Long Short Strategies – Gearing and Information Ratios



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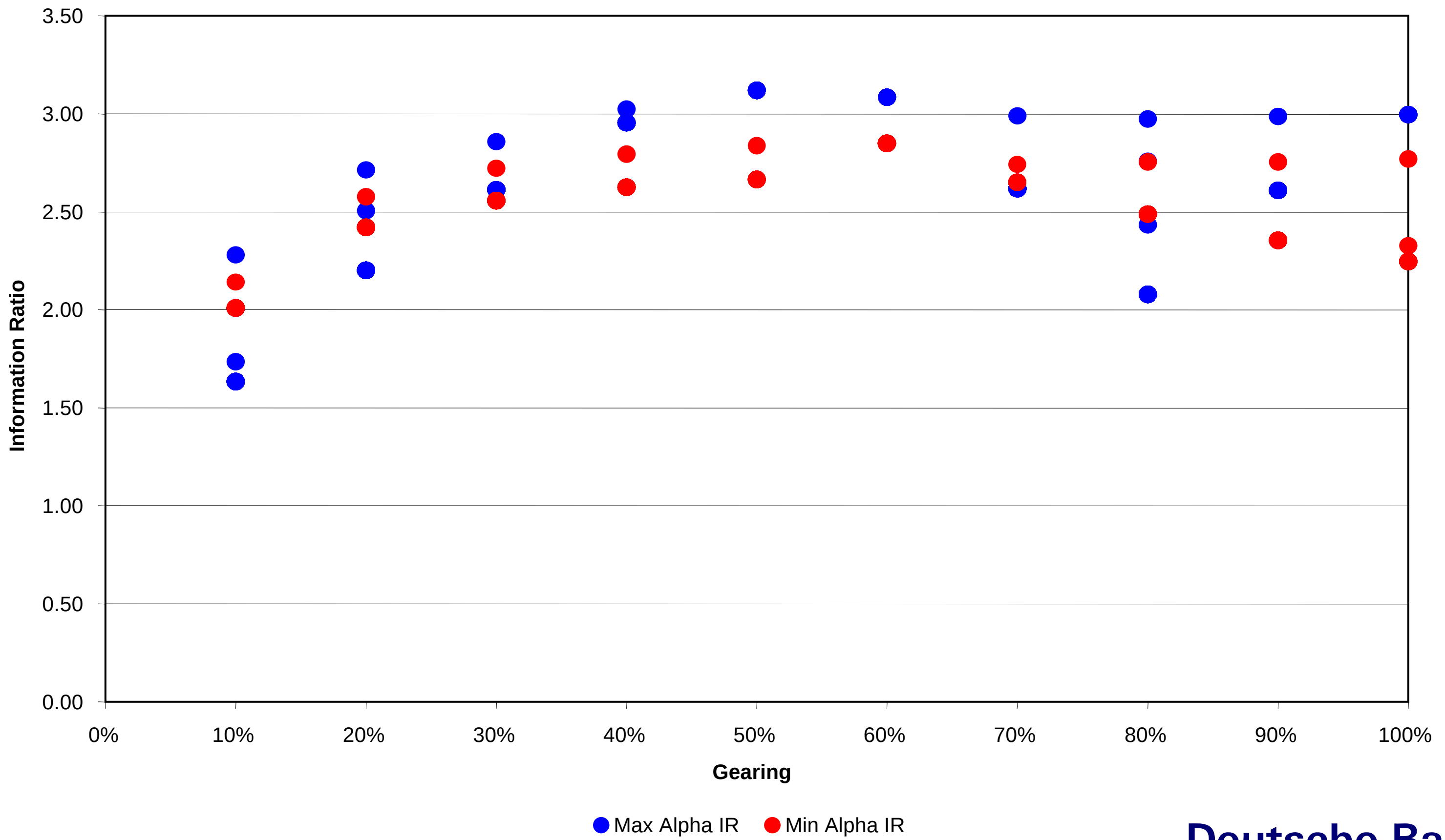
Comparisons of Information Ratio and Gearing

STOXX 600 Long Only Strategies – Gearing and Information Ratios



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Optimal Gearing and Short Factors

- Whilst many strategies are focussed on 130/30 or 120/20 portfolios there is little to suggest that these are optimal
- Optimal gearing is a function of all the main variables that determine the Information Ratio
- Higher levels of gearing do not imply higher risk as it depends on where the risk budget is deployed
- Another factor to impact gearing is the expected Information Coefficient – how good an estimate are the forecast returns

- Investors also need to consider the complexities of adding short positions into the management of active strategies
  - Swaps and synthetic equity products can simplify the management of long / short strategies
  - Single stock futures can play an important role in active stock strategies

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Factor and active strategies

- Active portfolio strategies are often based on a particular investment style or feature of the market
- Thus portfolio tilts can often amount to decomposing portfolio risk into different aspects of style and risk factors
- These factors lend themselves to being well represented by rules based, methodical indices

- This is effectively the trend that we are witnessing in the index world
- And this is becoming the dominant area of issuance in the ETF market

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Passive Investment Trends - Summary

- Passive investment remains a dominant theme for all investors but the nature of investing is changing
- There is an important trend to decompose alpha and beta and represent both in index-based passive strategies
- New indices and new product offerings such as the growth in ETF best represent this trend – on a European and US level
- Part of this trend is the shift to new portfolio construction strategies
- Relaxing the long only constraint to a long / short strategy allows for a general enhancement to alpha generation opportunities
- Long short strategies offer higher Information Ratios

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Appendix 1

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