



Picking Winner Funds

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Investment Strategies Conference**

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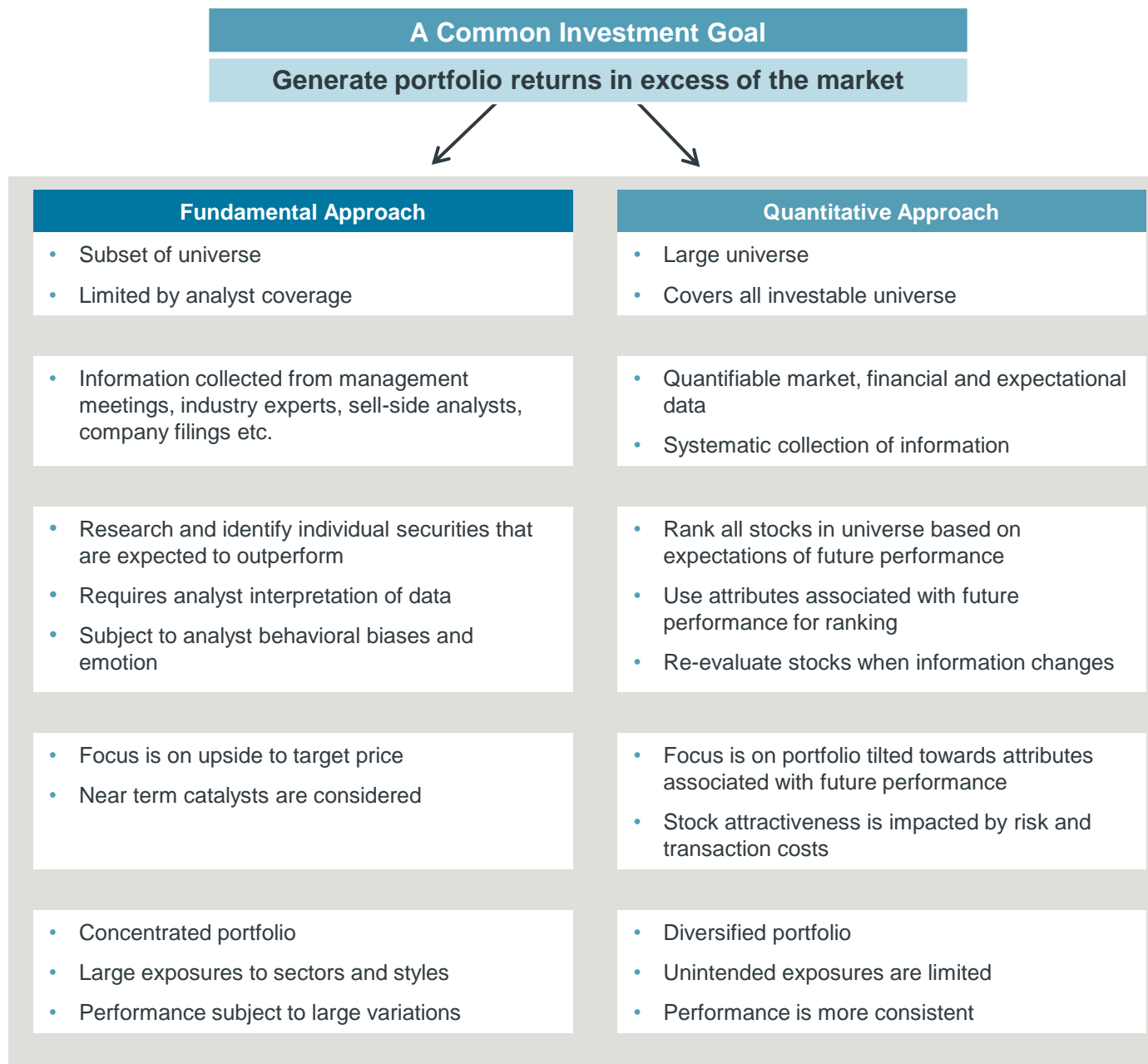
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About QMA

- QMA is a quantitative investment firm that applies disciplined, research-driven approach that seeks to identify and capture alpha opportunities and combines factor exposures to create diversified, risk aware strategies designed for long-term, consistent performance.
- Founded in 1975, QMA manages portfolios for a worldwide institutional client base, including corporate and public pension plans, endowments and foundations, multi-employer pension plans, and sub-advisory accounts for other financial services companies.
- Wholly owned, independently operated subsidiary of Prudential Financial, Inc.

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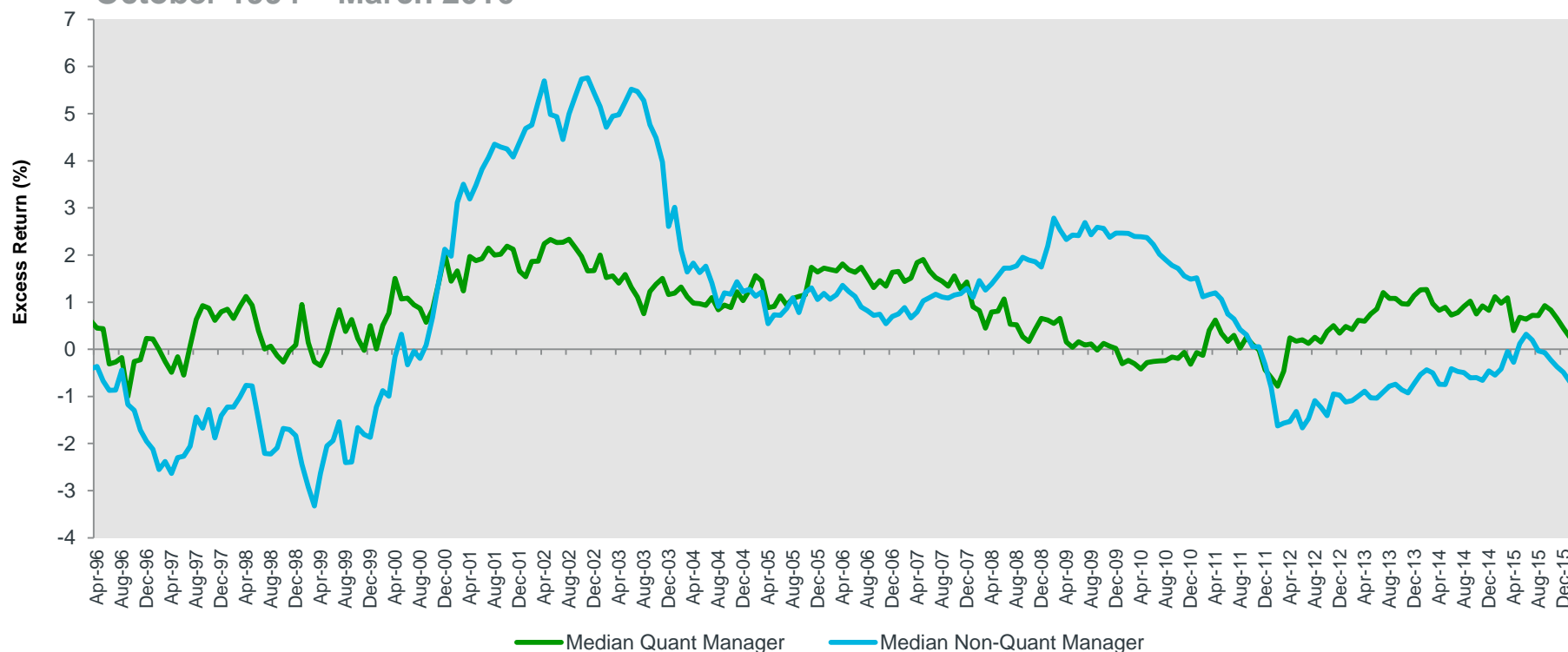
How do Fundamental and Quantitative Investment Processes Differ?



Comparison of Median Excess Returns Fundamental Managers vs. Quantitative Managers

- Quants have a lower target alpha but generate more consistent returns. Fundamental managers have a higher return potential but experience higher return variability.
- Quant and fundamental managers are complimentary – both can outperform over time, however, excess returns are not highly correlated.

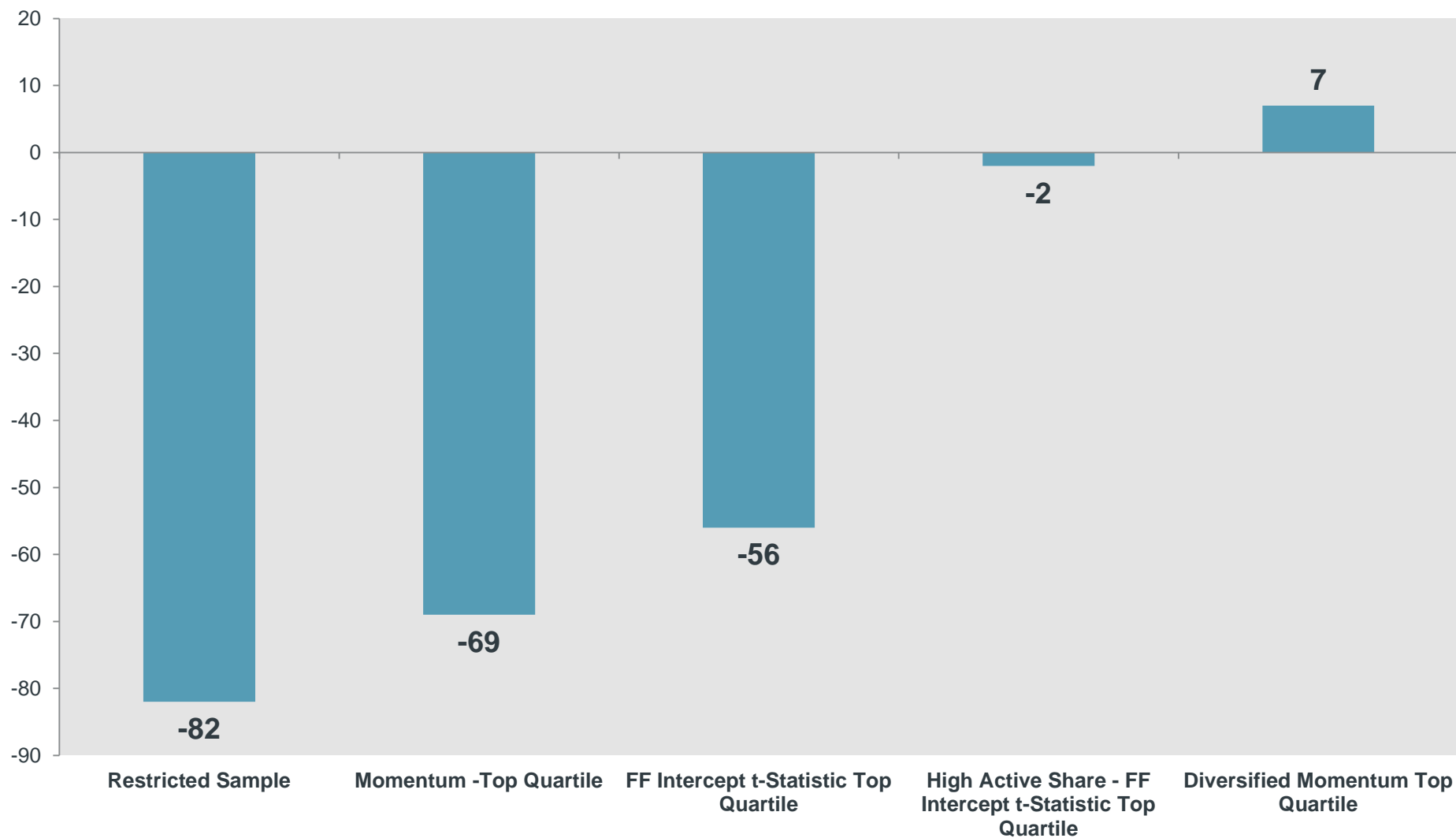
ROLLING THREE-YEAR MEDIAN GROSS EXCESS RETURNS VS. S&P 500
October 1994 – March 2016



Source: QMA, eVestment.

Data derived from eVestment US Large Cap Core Universe, including inactive products, with S&P 500 as the benchmark. For Median Quant Managers, the primary investment approach of quantitative was selected. For Median Non-Quant Managers, the primary investment approach excludes quantitative. eVestment is an outside vendor whose software has been used to create this exhibit. QMA pays a fee for this software. QMA has made efforts to confirm accuracy/reliability of the data provided by eVestment but we disclaim responsibility for its accuracy or completeness. Please see 'Notes to Disclosure' page for Important Information including risk factors and disclosures. Past performance is not a guarantee or a reliable indicator of future results.

Mean Annual Excess Return of Mutual Funds



As of 2014.

Source QMA, CRSP Survivorship Bias Free Mutual Fund Database.

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Research Objectives:

- Superiority of diversified over concentrated funds.
- Compare diversified funds and funds with high active share.
- Can we find a better predictor of future fund performance?

Research Design:

- CRSP Survivorship-Bias Free database of mutual funds with 36 months of prior returns, active share and number of portfolio positions 2002-2013.
- We examine the performance of these funds in the subsequent year for various measures.

Acknowledgements

- Active share data obtained from Antti Petajisto's website which relates to his 2013 FAJ study.
- Recent active share data provided by Joseph Mezrich at Nomura Securities.

Short Literature Survey

- Momentum and tracking error were shown to be predictive of future fund returns.
- Active share and activeness of a fund.
- Regression of fund returns on FF factors to identify manager's skill.
- Sparse work on IR.

Future Performance of Funds

- We assume selection of funds takes place at the end of December.
- We examine excess returns for the following year ($t+1$).
- Excess returns are cumulative fund returns minus cumulative returns on the fund's benchmark.

Data and Variables

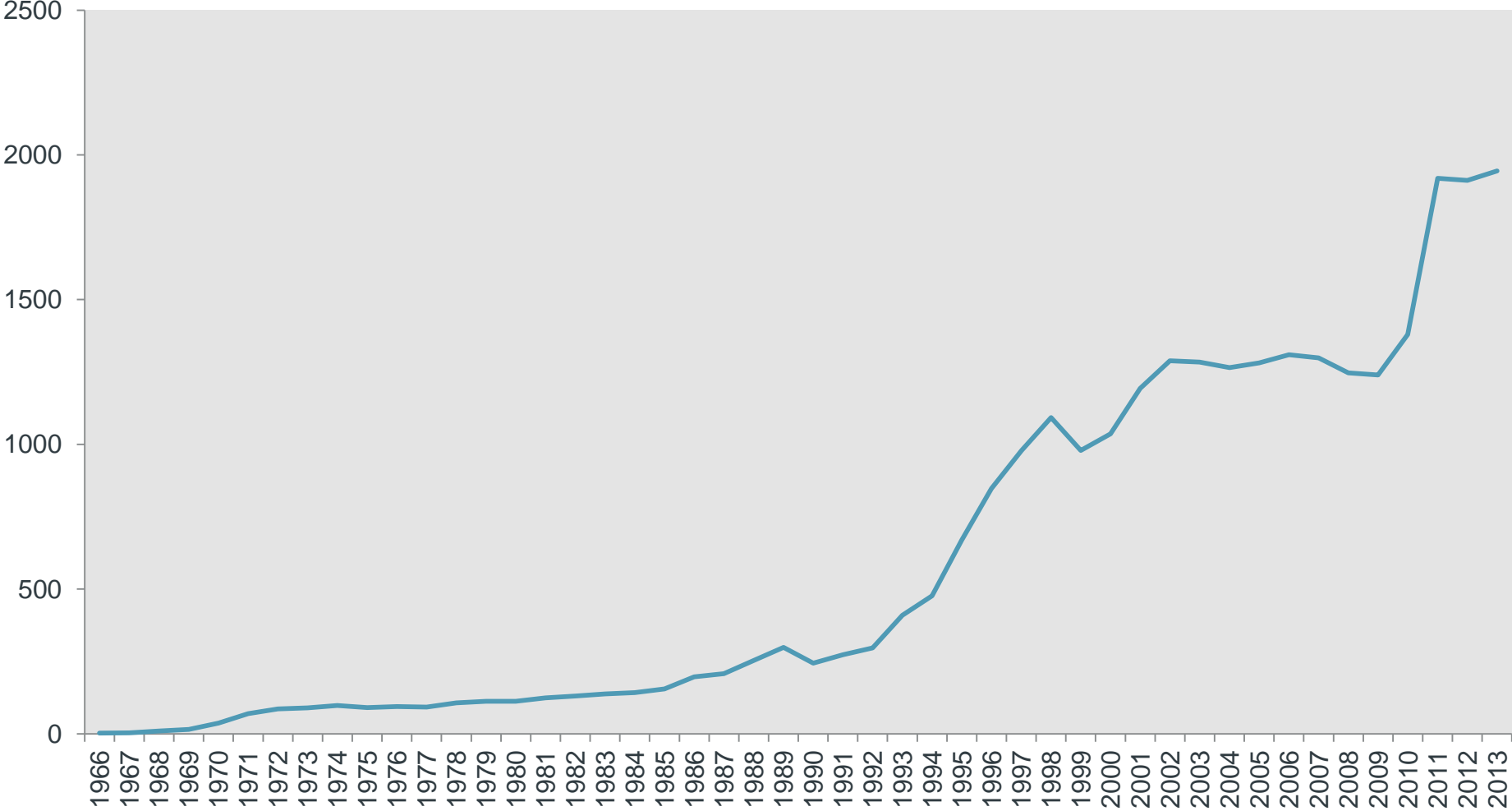
- Data are from CRSP survivorship bias free database.
- Fund benchmark is from Petajisto's active share data. If unavailable, we use the benchmark from Nomura's active share data. Otherwise, we assume the S&P 500 Index.
- We also examine the results of regressing the fund returns on the FF factors of market, value, size, momentum and short-term reversals.
- All variables are weighted averages over all classes of shares, where the weight is Total Net Assets (TNA).

Selection Criteria

- Funds are domestic equity funds with 36 months of prior returns.
- Eliminate index or sector funds.
- Eliminate funds with assets below \$15 million.
- Monthly returns are from CRSP.
- Fund data (such as expense ratios, turnover ratios, number of positions, etc.) are all from CRSP.

Distribution of Sample Funds

Number of Funds



As of 2014.
Source QMA, CRSP Survivorship Bias Free Mutual Fund Database.
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Variables Used to Select Funds

Momentum - The cumulative return on the fund in the past 36 months minus the cumulative return on the benchmark.

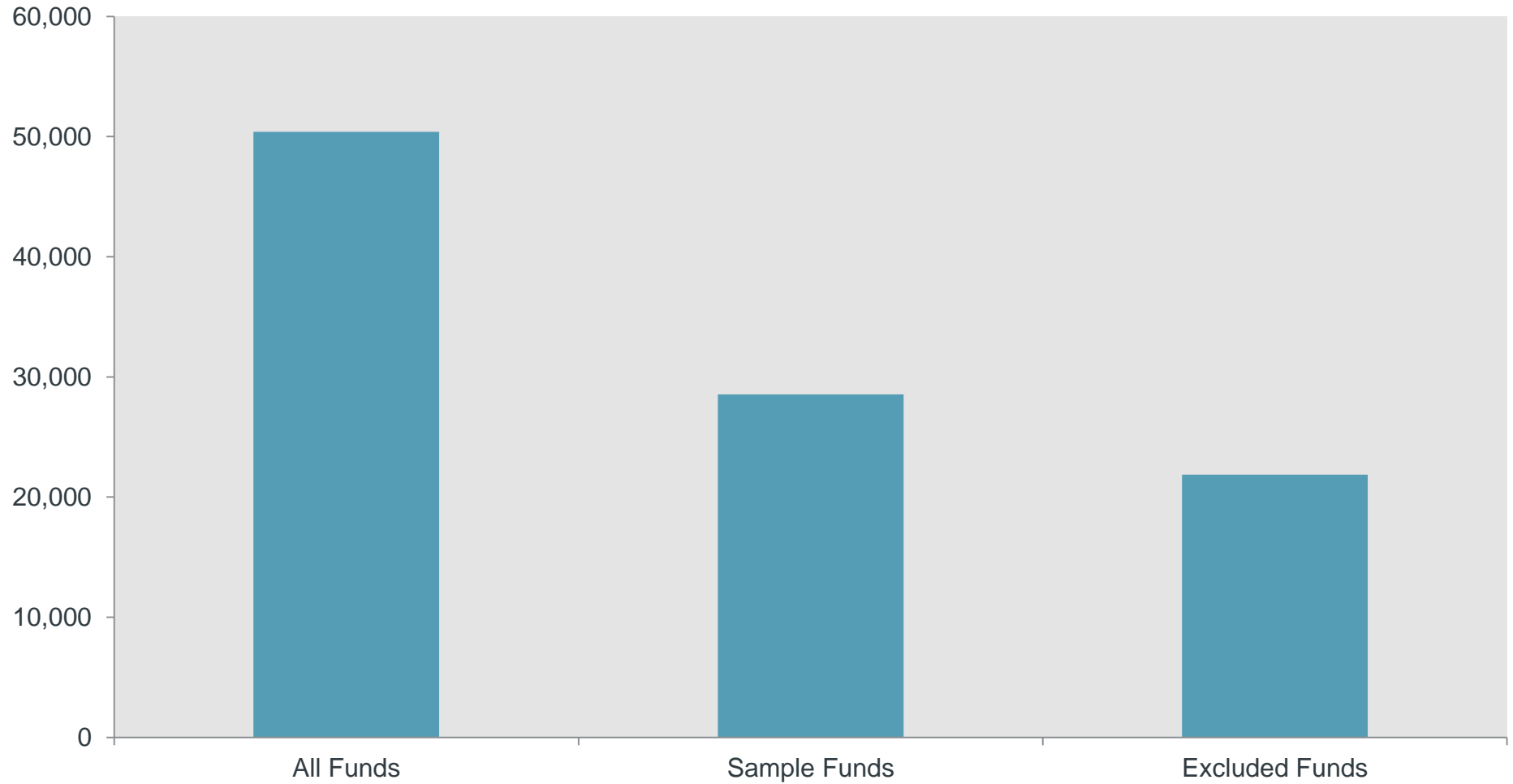
Tracking error – The standard deviation of the fund return minus the benchmark return during the past 36 months.

Information Ratio – The average monthly excess return (over benchmark) divided by tracking error.

Variables Used to Select Funds

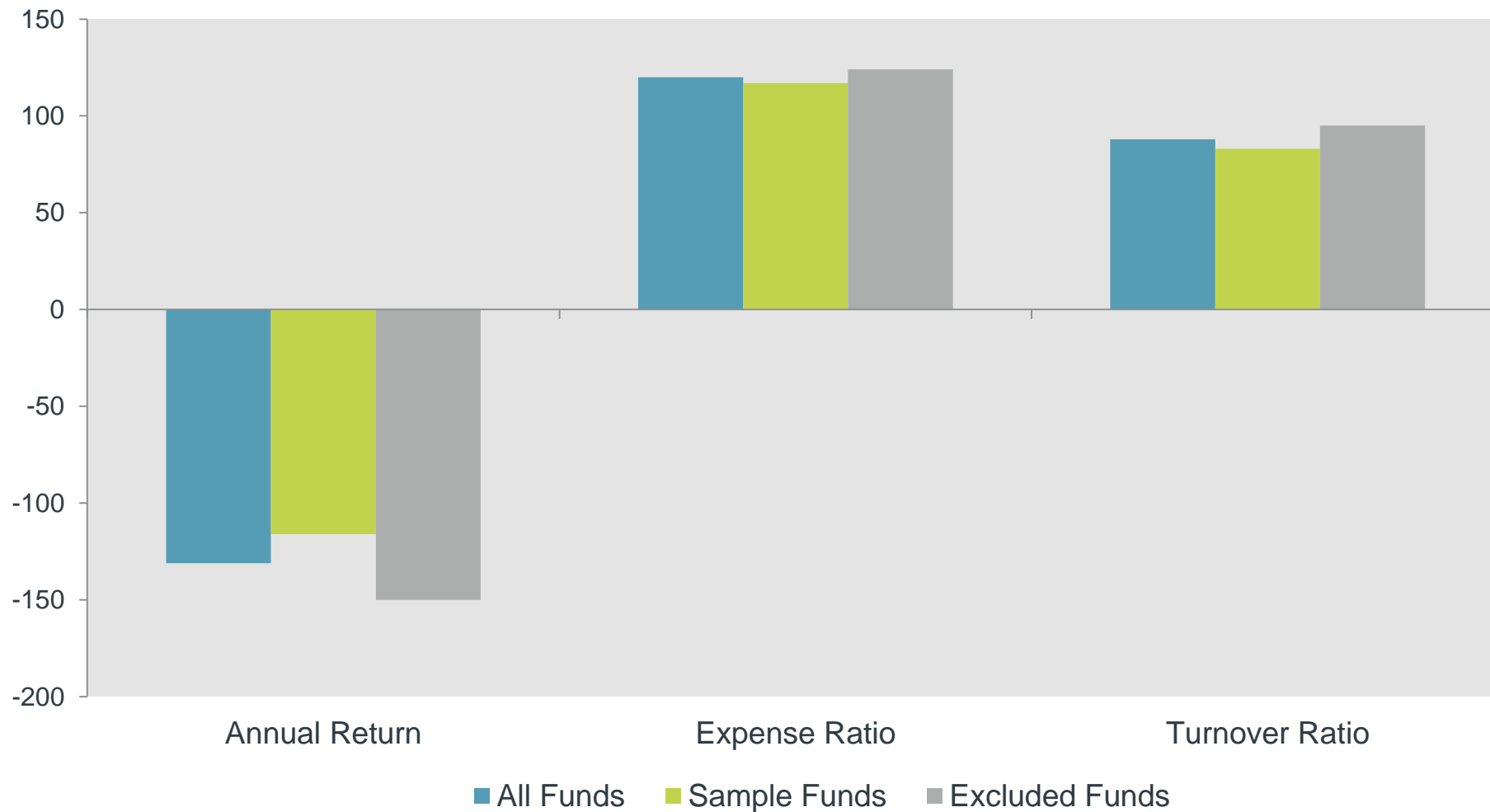
- Active share from Petajisto, or from Nomura if unavailable.
- Intercept from FF regression.
- Intercept t-statistic from FF regression.
- R-square from FF regression. This is the only selection variable where low values are preferred; most of the fund return cannot be explained by the FF risk factors.
- Number of positions is from CRSP.

Number of Observations



As of 2014.
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Fund Characteristics



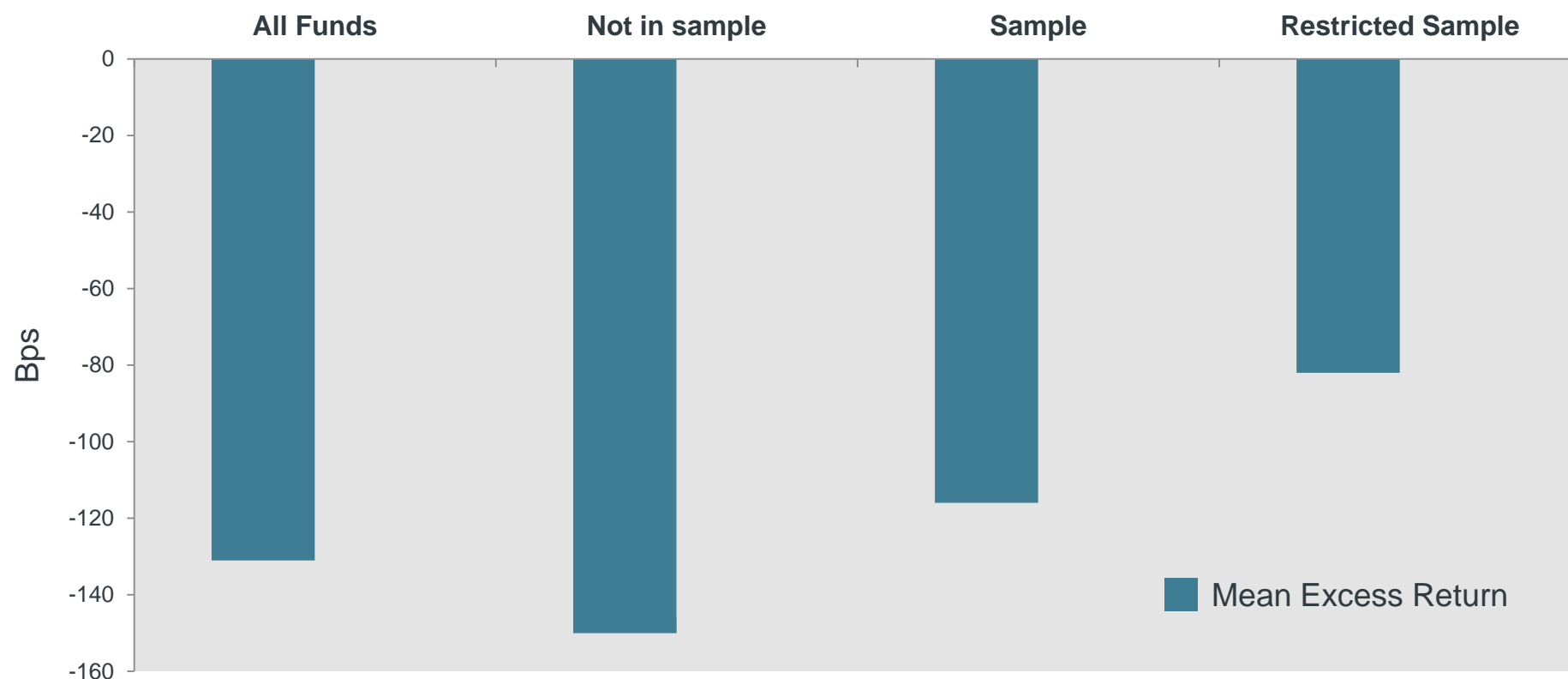
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Restricted Sample

Required active share data **and** number of positions from CRSP.

Data for 2002-2013.

As before, 36 months of prior returns.



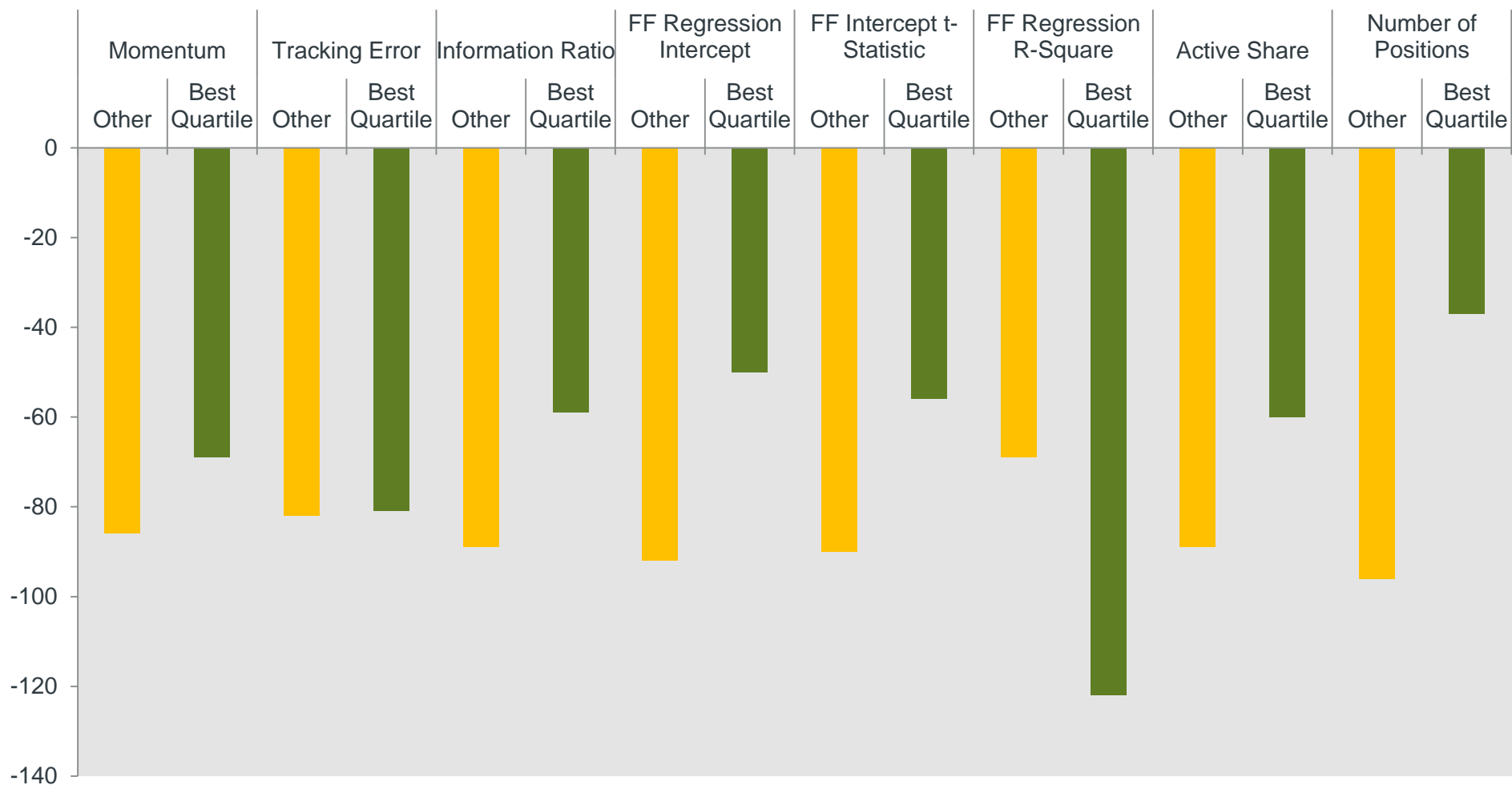
As of 2013.

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Comparison of Best Quartile and Others

Mean Annual Excess Return



As of 2014.
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Top Performers

Measure	Active Share		Difference Significance	Number of Positions		Difference Significance	Total
	Low	High		Concentrated	Diversified		
Momentum							
N	476	1042		754	783		3031
Mean Excess Return (BP)	24	-45	0.083	-88	7	0.0052	-69
10th %	-590	-900		-980	-580		-800
% Beat	45	47	0.079	42	50	0.001	

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“Unconventionally Skilled” Managers

Measure	Active Share		Difference Significance	Total
	Low	High		
FF Intercept t-Statistic				
N	511	969		3055
Mean Excess Return (BP)	-90	-2	0.0067	-56
10th %	-550	-890		-750
% Beat	35	47	0.0001	

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Comparing Diversified Top Performers to “Unconventionally Skilled”, High Active Share Managers Managers

	Top F-F Intercept t-Statistic and Top Active Share	Top Information Ratio and Top Diversified	Difference Significance
Panel A- All Funds			
N	932	803	
Mean	1	11	0.7574
% Beat	48	51	0.2060
Panel B- 5 Most Uncorrelated Funds			
N	12	12	
Mean	-8	36	0.7571
% Beat	58	42	0.4363

As of 2014.

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Among “Unconventionally Skilled” managers, high Active Share is a good predictor of future performance.

However, among top performers, Diversified funds outperform, and have more consistent returns than Concentrated funds.

Can We Suggest a Better Predictor of Fund Performance?



We saw that momentum is a good predictor of future returns.

We also show that consistency of returns is important for predicting future returns.

The Information Ratio combines both.

However, it suffers from another issue.

Fund Choice

Which fund should you choose?

Fund A has an IR of 1. Fund B has an IR of 0.5.

Fund Choice



Which fund should you choose?

Fund A has an IR of 1. Fund B has an IR of 0.5.

Fund A has an alpha of 1BP and tracking error of 1BP.

Fund B has an alpha of 200BP and tracking error of 400BP.

You cannot pay your mortgage with IR.

Modified IR

The conventional IR is alpha (α) divided by tracking error (σ), i.e.

$$\mathbf{IR = \alpha / \sigma}$$

We modify IR by subtracting a desired alpha (α^*) from the numerator:

$$\mathbf{IR^* = (\alpha - \alpha^*) / \sigma}$$

Note that to achieve a higher modified IR^* , a fund is likely to have a higher tracking error (σ).

Note that the desired alpha is a preference parameter by the investor. Not to be confused with target alpha of the fund.

Modified IR – Pros and Cons

- Combines momentum and tracking error.
- Requires a minimum return.
 - A passive index investment has an infinite negative IR if there is a cost to the investor.
- Can be calculated from past returns and does not need holdings data as in active share.
- However, it typically requires a long history of data to make meaningful comparisons.

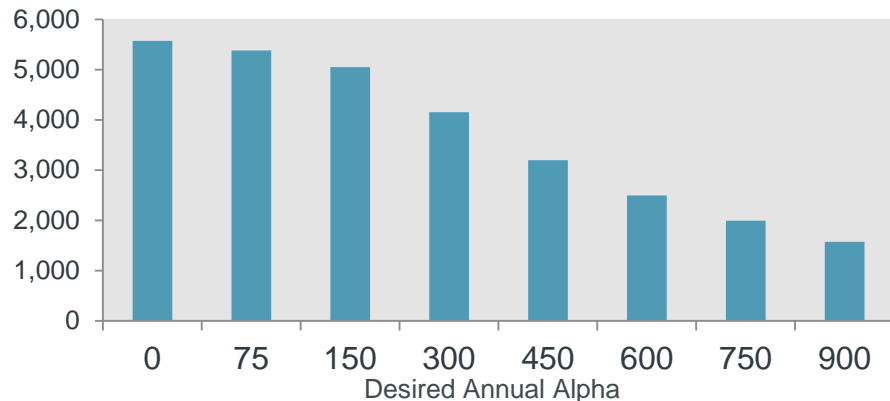
Modified IR

- We examined the performance of the modified IR measure, where an investor specifies a desired alpha (above benchmark).
- We simulated a desired annual Alpha of 0, 75, 150, 300, 450, 600, 750 and 900.
- We examined those funds that were both in the top quintile of modified IR, **and** that exceeded their desired alpha in the prior 36 months.

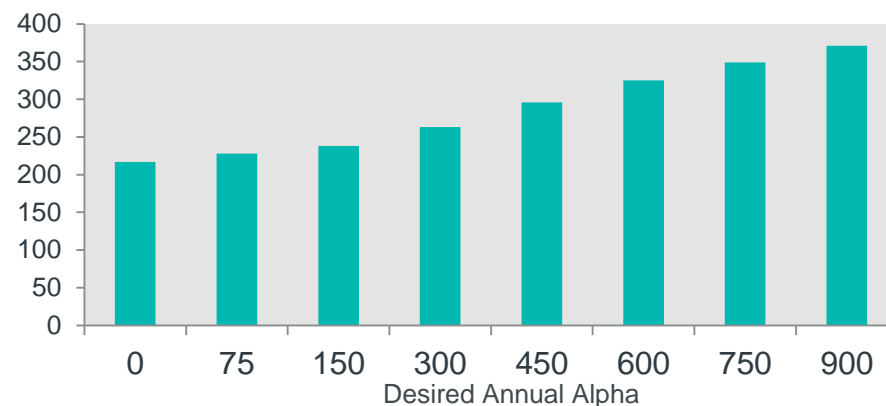
Characteristics



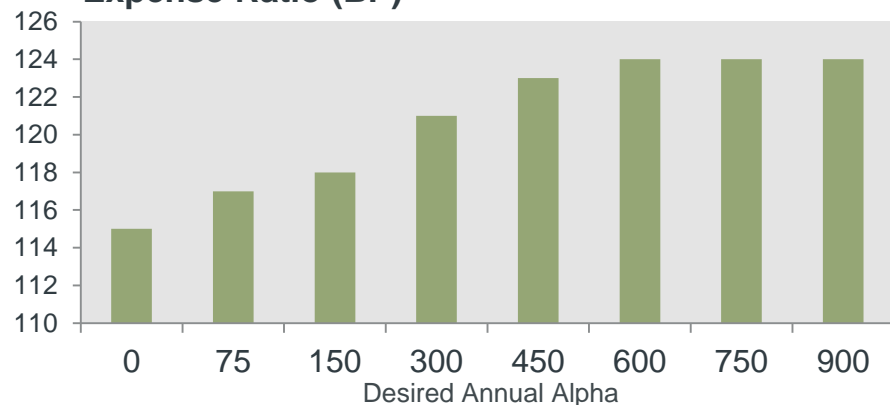
Number of Funds



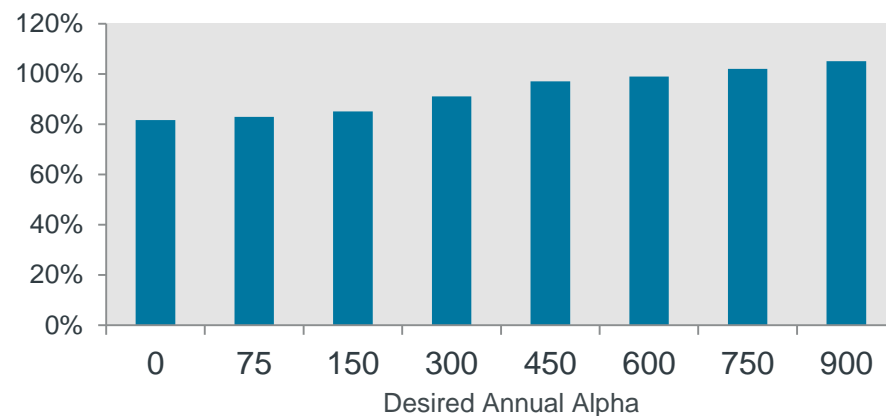
Tracking Error (BP/year)



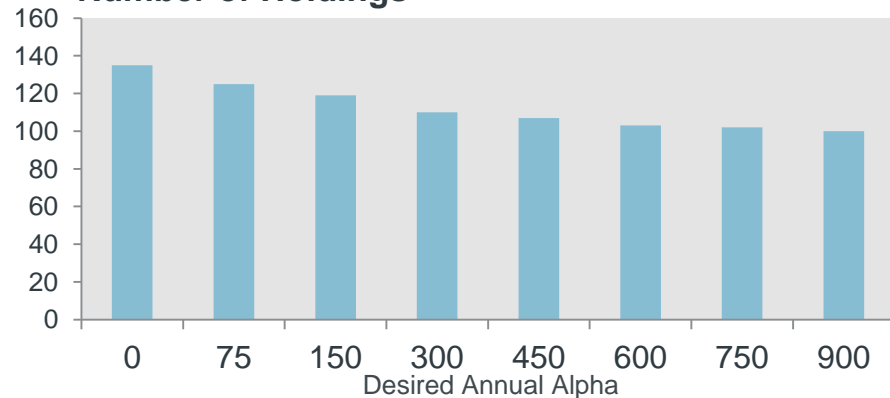
Expense Ratio (BP)



Turnover Ratio



Number of Holdings



As of 2014.

Source QMA, CRSP Survivorship Bias Free Mutual Fund Database.

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But, Actual Subsequent Return

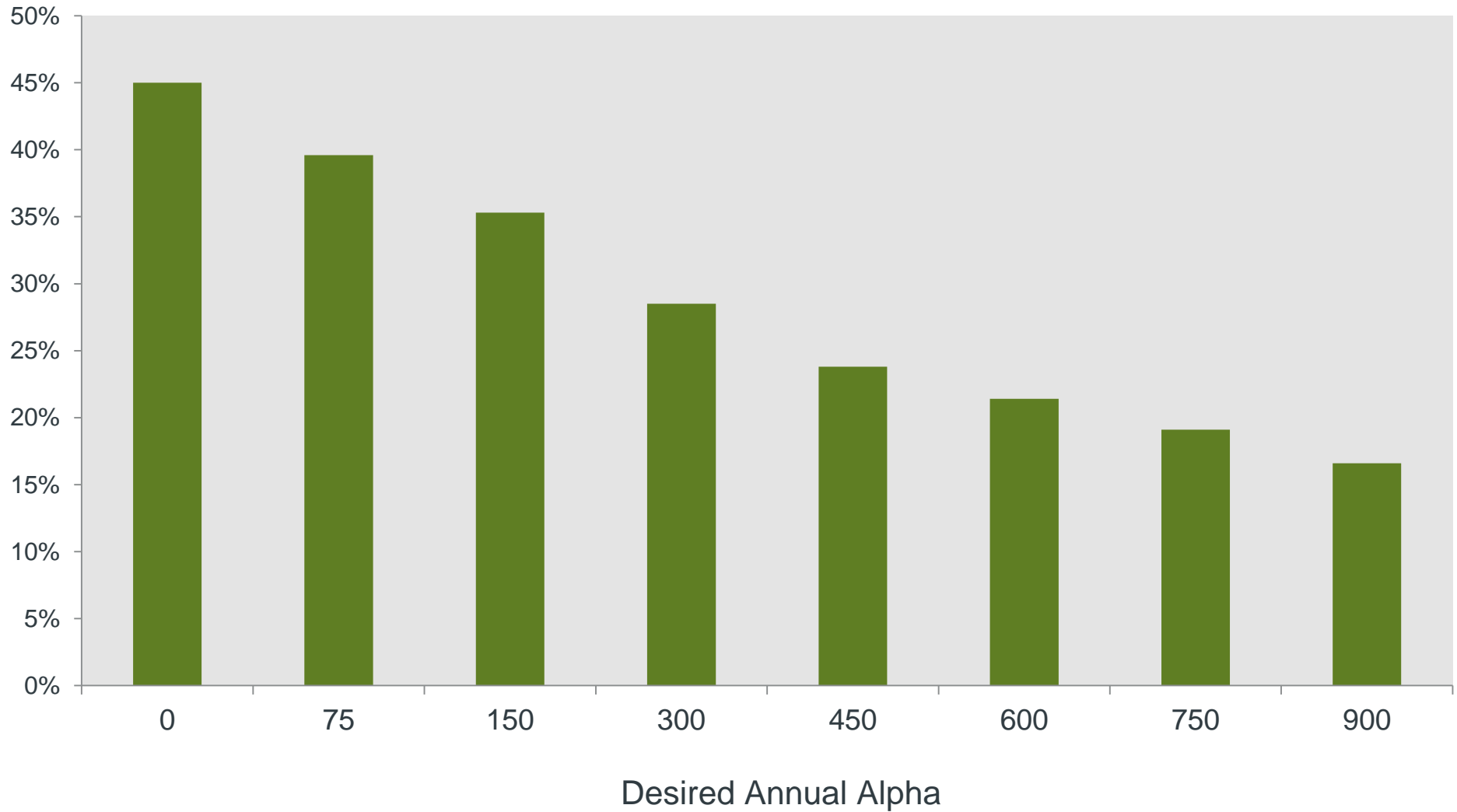


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Percentage of Funds Exceeding Desired Alpha – Subsequent Year



% Beating Target



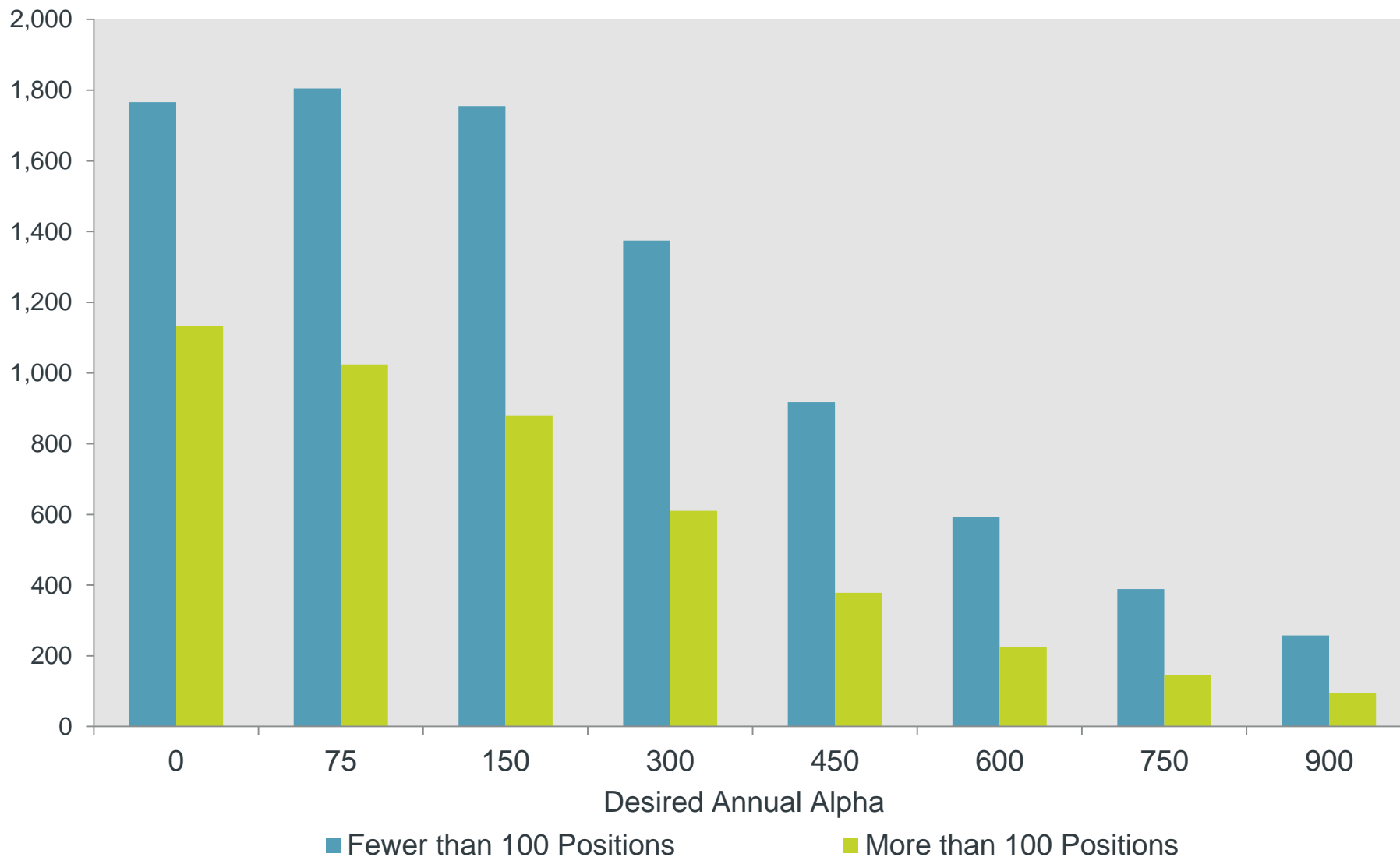
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- Selecting a desired alpha has implications for the type of funds that will be selected based on their past performance, and more important for their future performance.
- With higher desired alpha levels, top funds tend to be more concentrated, have higher tracking error, incur higher expenses, and have higher turnover.
- However, actual future performance is not necessarily better with higher desired alpha.

Examination of Top Funds Given a Desired Alpha Level

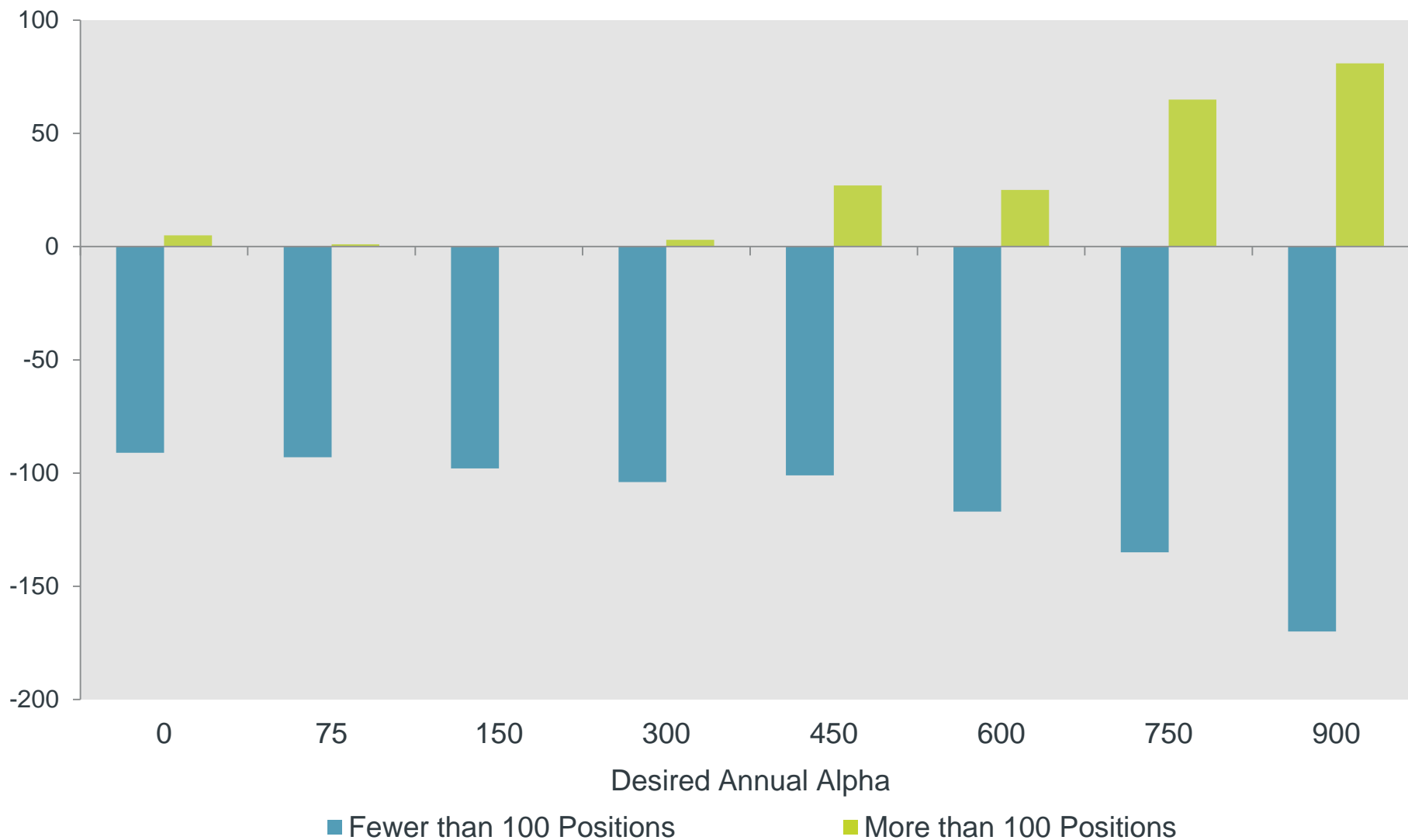
- In the following analyses, we again require both top quintile of modified IR and exceeding the desired alpha in the prior 36 months.
- We then classify the funds according to their concentration (number of positions).
- We examine the future performance of diversified and concentrated funds.
- Data for 2002-2013.

Number of “Best” Funds



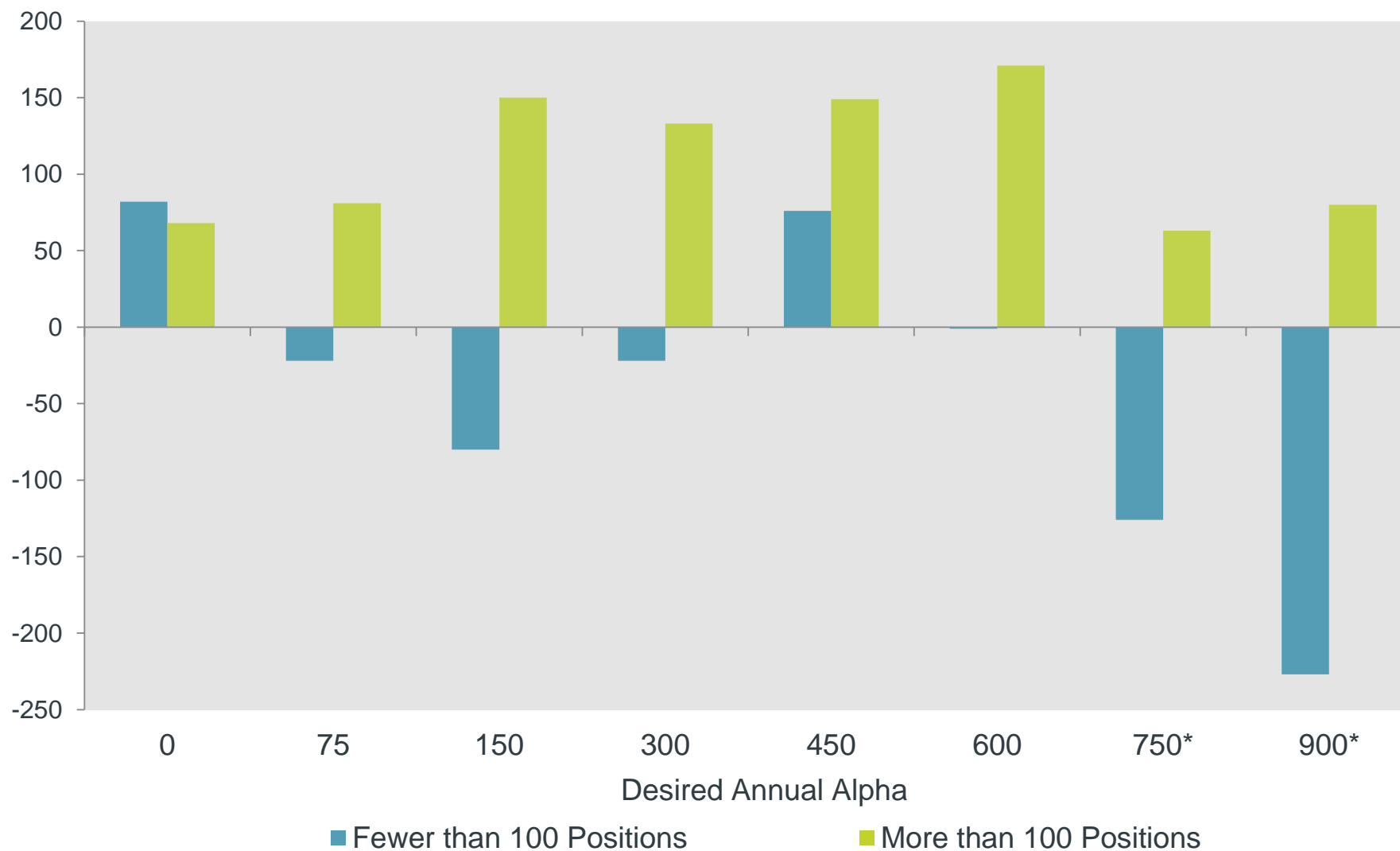
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Actual Subsequent Annual Returns



As of 2014.
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Simulation Uncorrelated 5 Funds Mean Subsequent Annual Return



As of 2014.

*Based on fewer than 12 years.

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Replication with eVestment Data

- Similar results were obtained using the eVestment data during 1996 - 2013.
- IR is a good predictor of future excess returns.
- Top quintile of Modified IR funds that exceeded their desired alpha in the prior 36 months had similar characteristics to those observed for the CRSP database.
- Quantitative “winner” funds typically did better than Fundamental “winner” funds.

Conclusions

- Having specified a desired alpha, select funds with past modified IR that exceeded the desired alpha.
- The best funds among top past performers are not necessarily those with high active share or the most concentrated.
- Diversified funds (with many positions) typically have better future performance than concentrated funds among the top past performers.

Notes to Disclosure

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