



QUANTIFYING RISK, ENABLING OPPORTUNITY

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Investments Seminar
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Active Share and Mutual Fund Performance

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Papers on Active Share

- Active Share and Mutual Fund Performance
 - Financial Analysts Journal, 2013
- How Active Is Your Fund Manager? A New Measure that Predicts Performance
 - Review of Financial Studies, 2009
- Active Management and Performance by Large Institutions
 - Work in progress
- Papers available online for free download

Active and Passive Components of a Portfolio

- Decompose portfolio into two parts:

$$\text{Portfolio} = \underbrace{(\text{Index})}_{\text{Passive}} + \underbrace{(\text{Portfolio} - \text{Index})}_{\text{Active}}$$

- E.g. Growth Fund of America:
 - Passive: 100% in S&P 500
 - Active: 54% in long bets, 54% in short bets

A New Measure of Active Management

- Define a measure based on active portfolio holdings:

$$\text{Active Share} = \frac{1}{2} \sum_{i=1}^N |w_{fund,i} - w_{index,i}|$$

- Indicates the size of the active positions as a fraction of the entire portfolio
- Always between 0 and 100% for mutual funds
 - E.g., 54% for Growth Fund of America

Contributions of This Paper

- Active Share
 - New measure of active management
- Characterize active management in US mutual funds
 - Explain active management across funds
 - Document time-series evolution
- Active Share predicts mutual fund returns
 - Before fees: Evidence of managerial ability
 - After fees: Helps investors select mutual funds

Active and Passive Components Again

- Consider the same portfolio decomposition:

$$\text{Portfolio} = \underbrace{(\text{Index})}_{\text{Passive}} + \underbrace{(\text{Portfolio} - \text{Index})}_{\text{Active}}$$

- Expressed in terms of **returns**:

$$R_{\text{Portfolio}} = R_{\text{Index}} + R_{\text{Active}}$$

- **Tracking error** is commonly defined as:

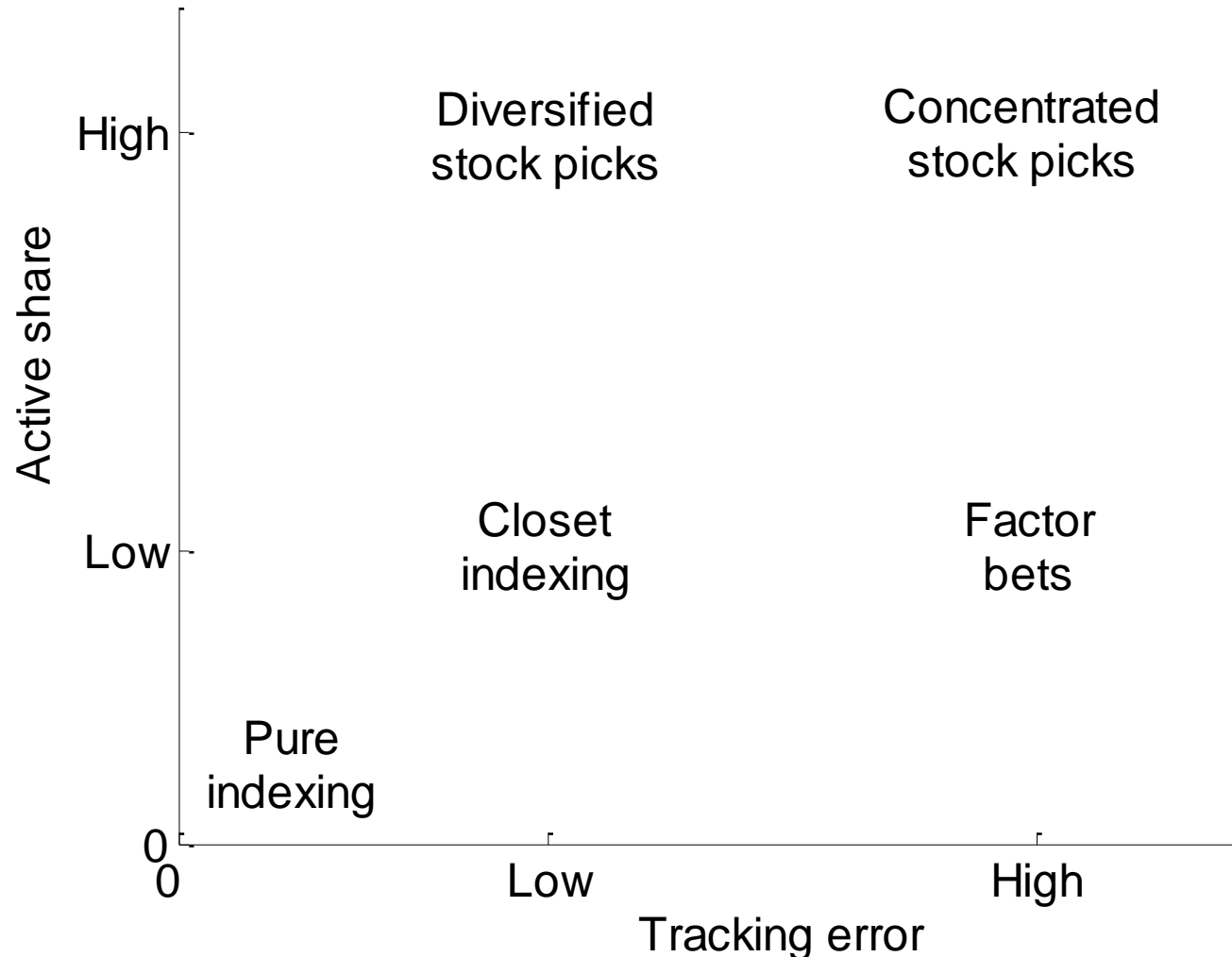
$$\begin{aligned}\sigma_{\varepsilon} &= \text{Stdev}[R_{\text{Active}}] \\ &= \text{Stdev}[R_{\text{Portfolio}} - R_{\text{Index}}]\end{aligned}$$

Interpretation: Active Positions vs. Volatility

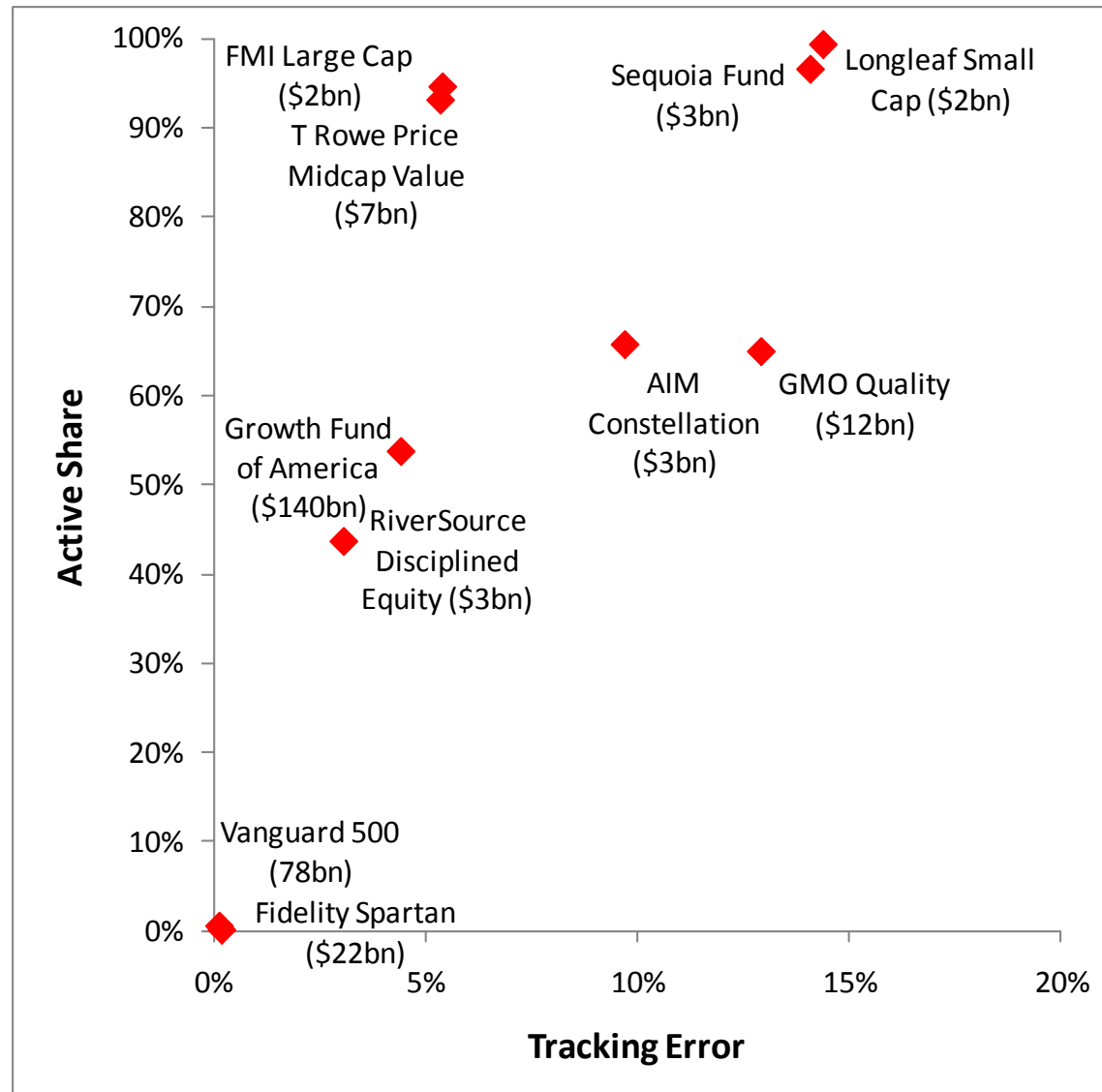
Does it matter which measure we use?

- Consider a portfolio with 50 stocks
- Crucial question: Do the active positions have net exposure to **systematic** risk?
 - If Yes → **High** tracking error
 - Holds even if active positions relatively small
 - If No → **Low** tracking error
 - Holds even if active positions relatively large
- Active share and tracking error emphasize different aspects of active management

Combining Active Share and Tracking Error

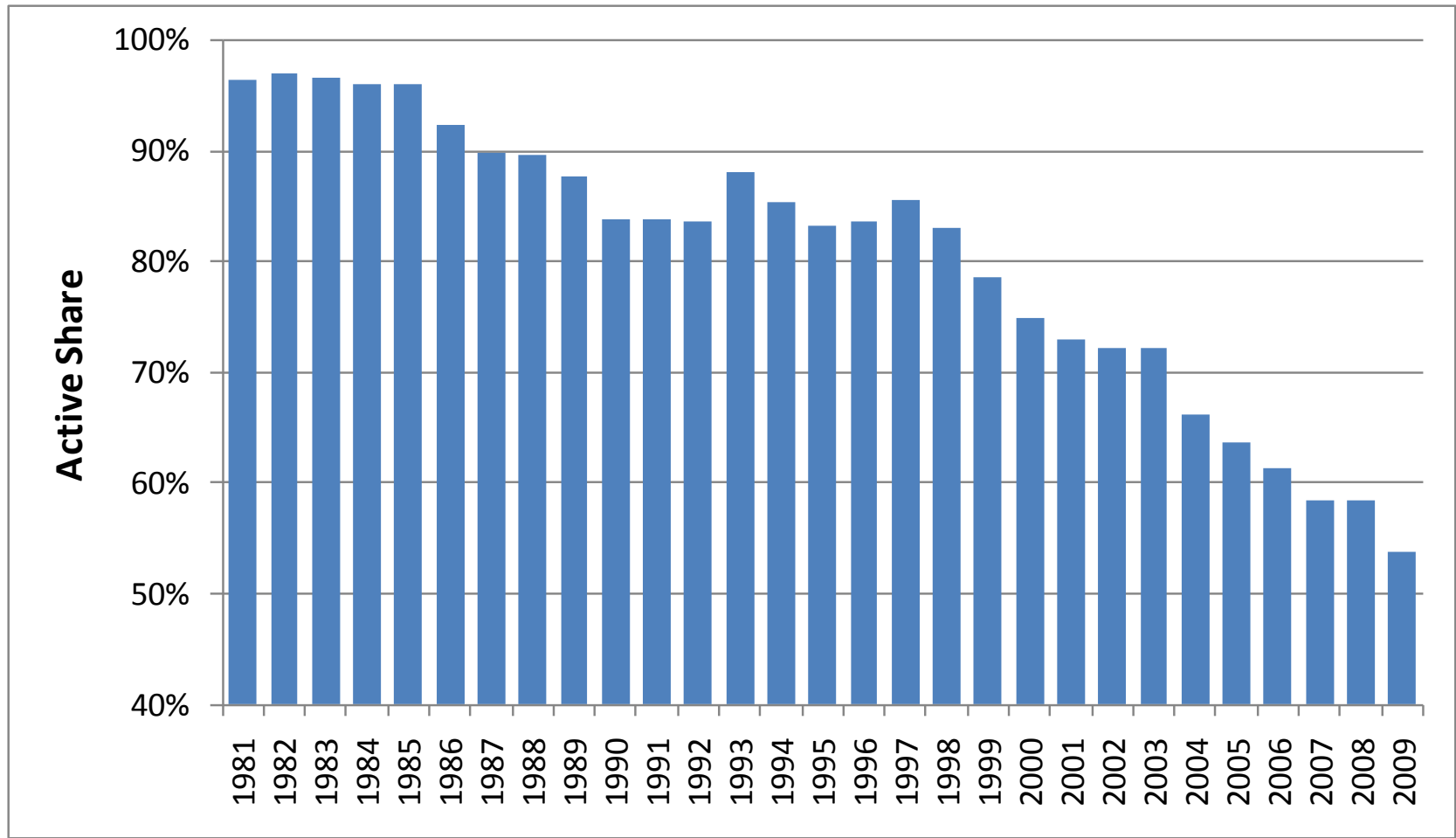


Active Management Types in 2009



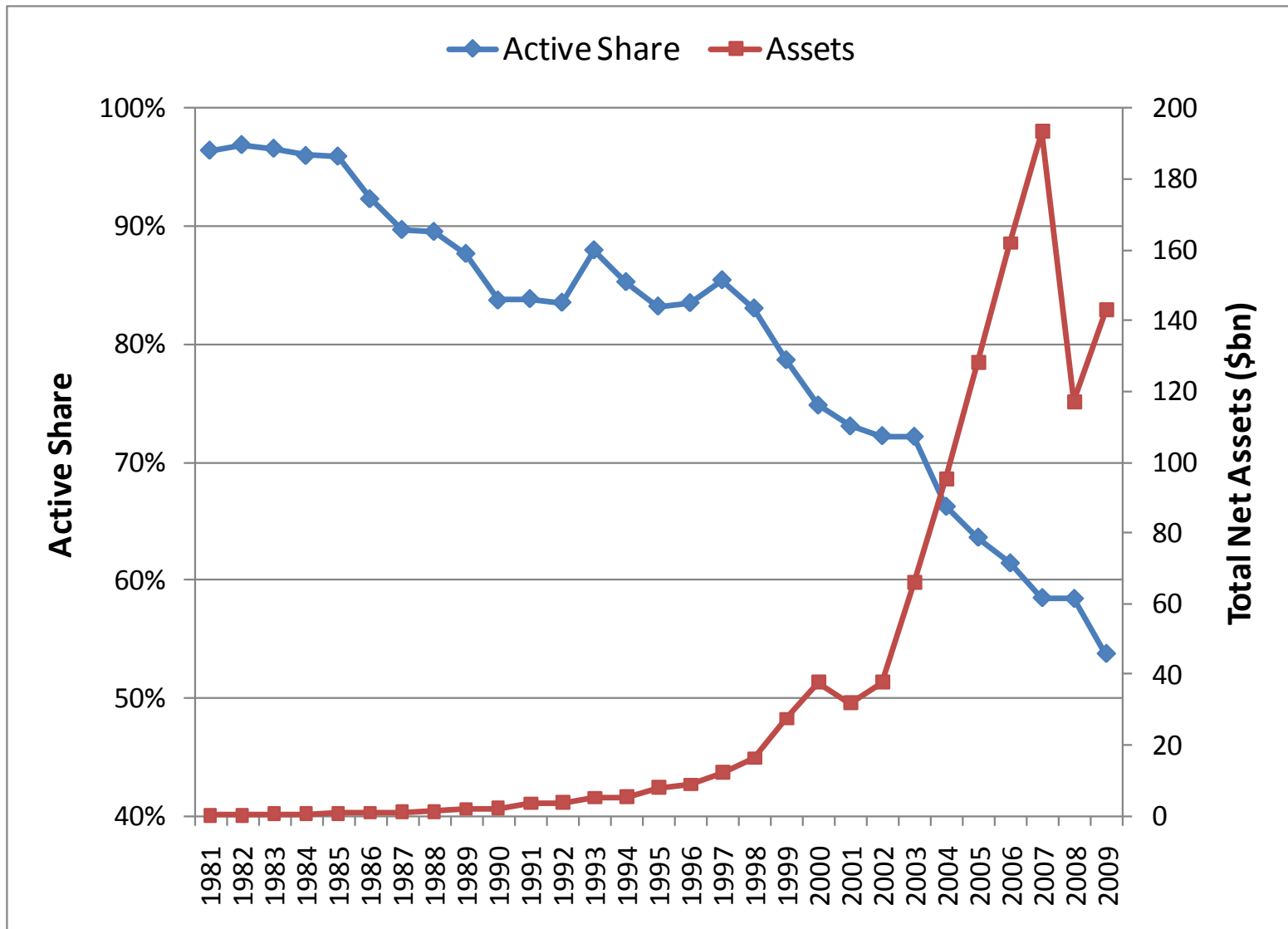
From Active Management to Closet Indexing

Growth Fund of America

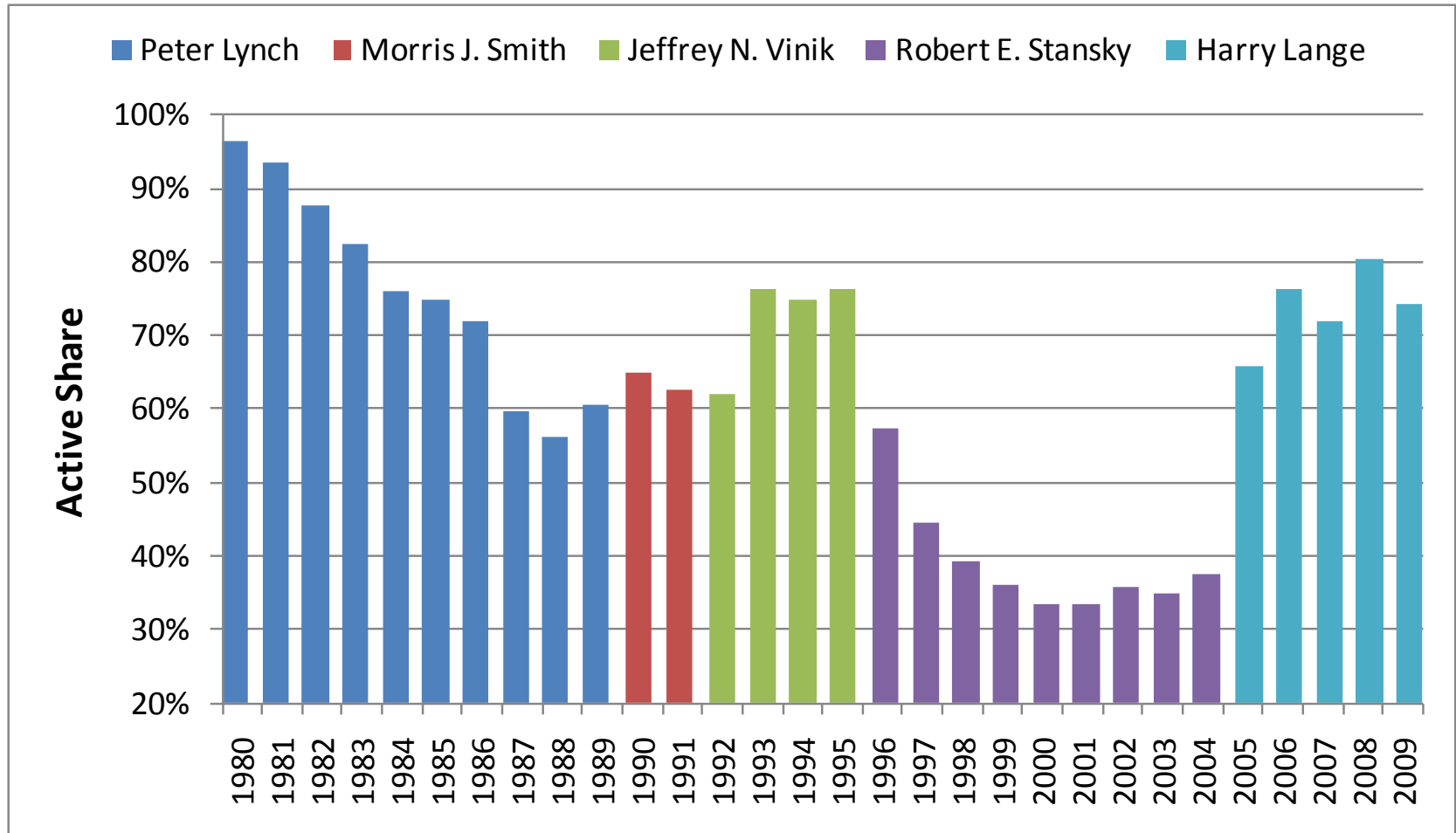


More Assets, Less Active Management

Growth Fund of America



Magellan's Period of Closet Indexing



Active Share as a Summary Statistic

Benefits relative to other measures include:

- Easy economic interpretation
- Not subject to statistical errors (cf. tracking error)
- Can be computed at any point in time
 - Requires no prior history
 - Can measure sudden changes in active management
- Comparable across different benchmark indexes
- Hard to “game” (cf. turnover)

Both Measures Could Predict α

- **Ex ante** either measure could predict α
 - This relationship is an empirical question
- **Ex post** it turns out only Active Share predicts α
 - Stock picking is rewarded in the market
 - Systematic factor bets are not rewarded

Data Sources

- Mutual fund portfolio holdings
 - Thomson Reuters
- Benchmark index holdings
 - Directly from index providers
- Fund returns
 - Monthly returns from CRSP
 - Daily returns from CRSP, Yale ICF, and S&P
- Index returns
 - Monthly returns from index providers
 - Daily returns from index providers

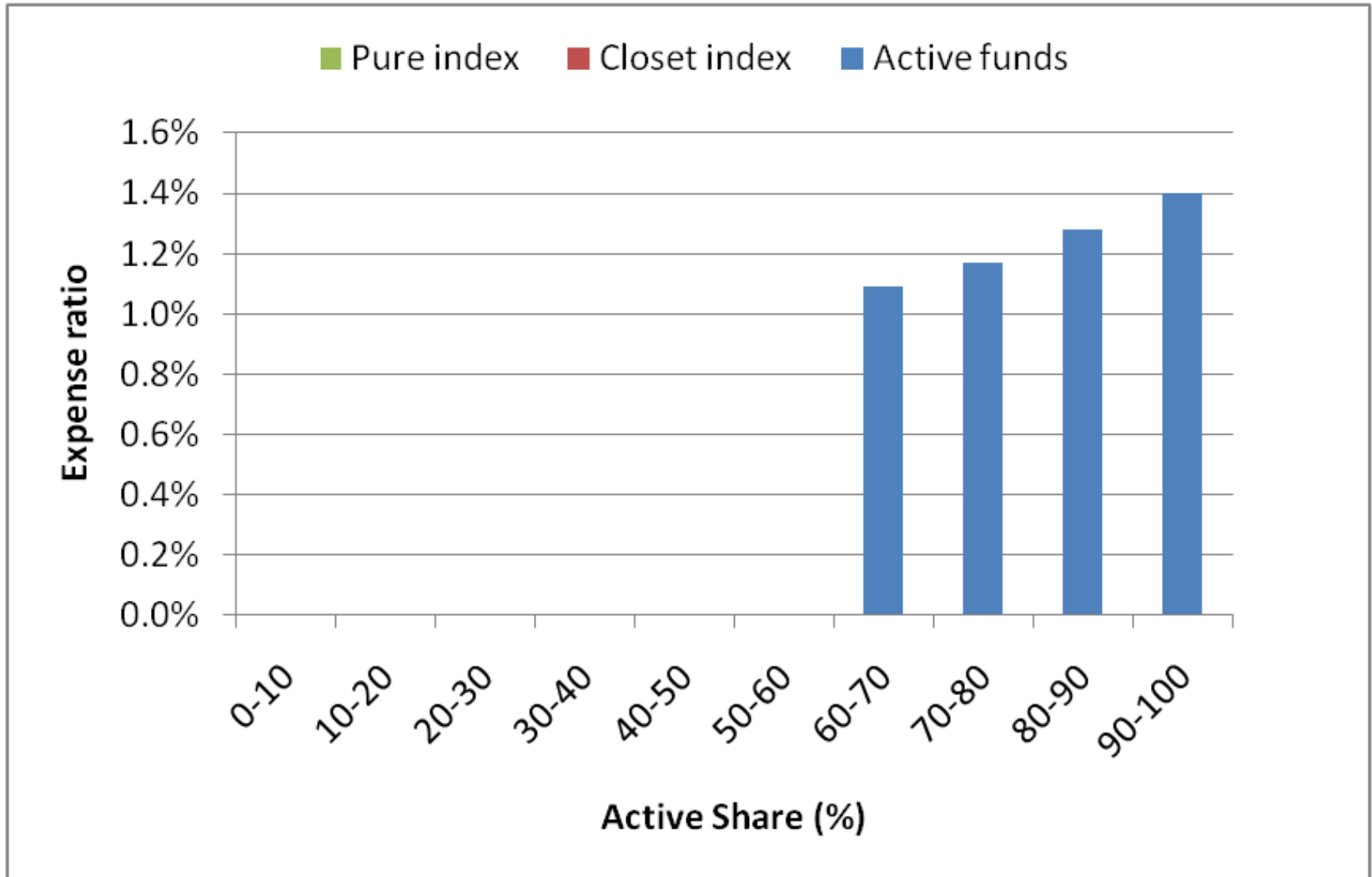
Methodology: Sample Selection

Pick all-equity US mutual funds

- Exclude balanced, asset allocation, bond, international, precious metal, and sector funds
- Final sample:
 - 2,740 funds in 1980-2009
 - 81,158 fund-rdate observations

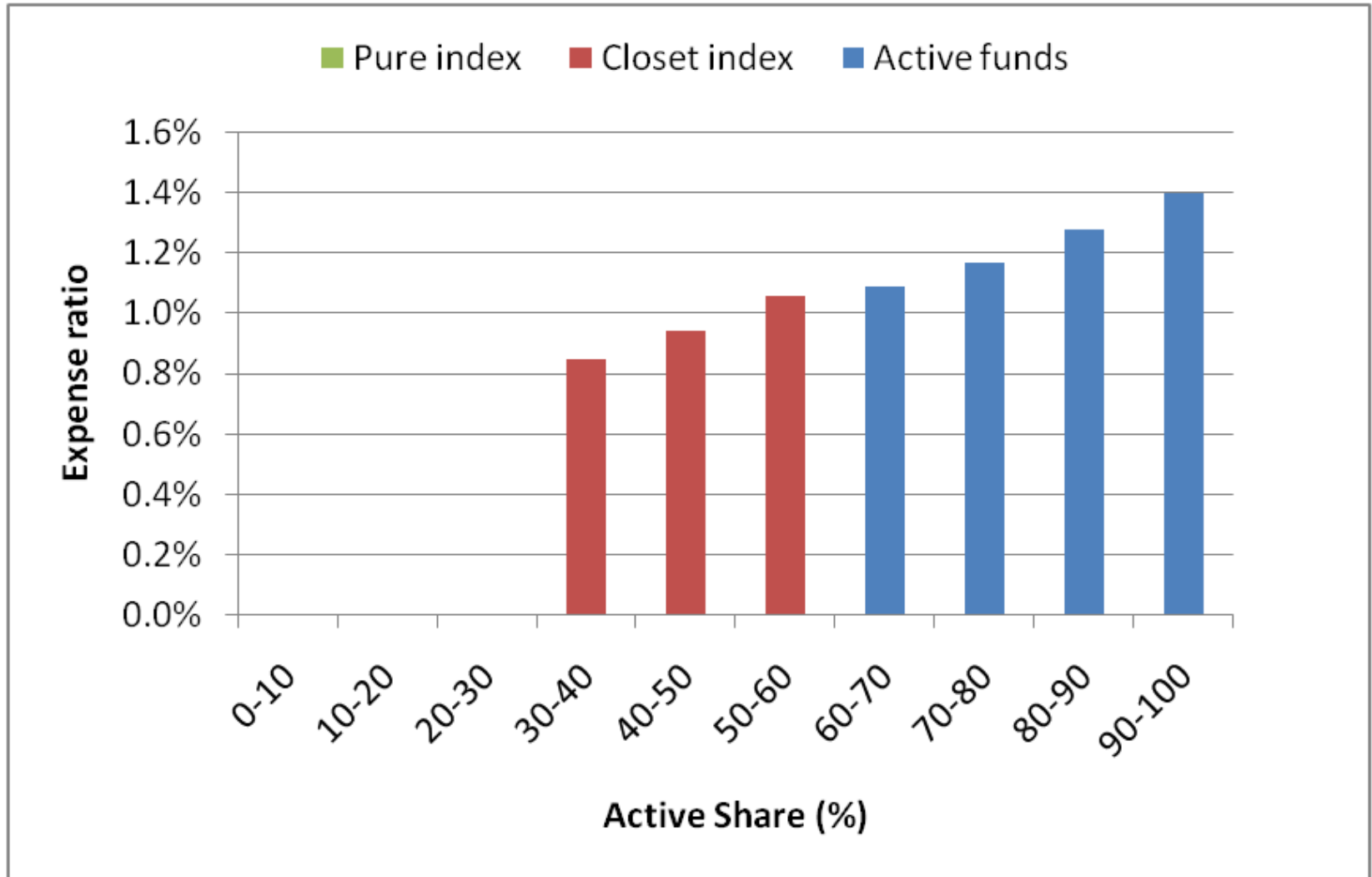
Fees and Closet Indexing

Equal-Weighted Total Expense Ratio (%)



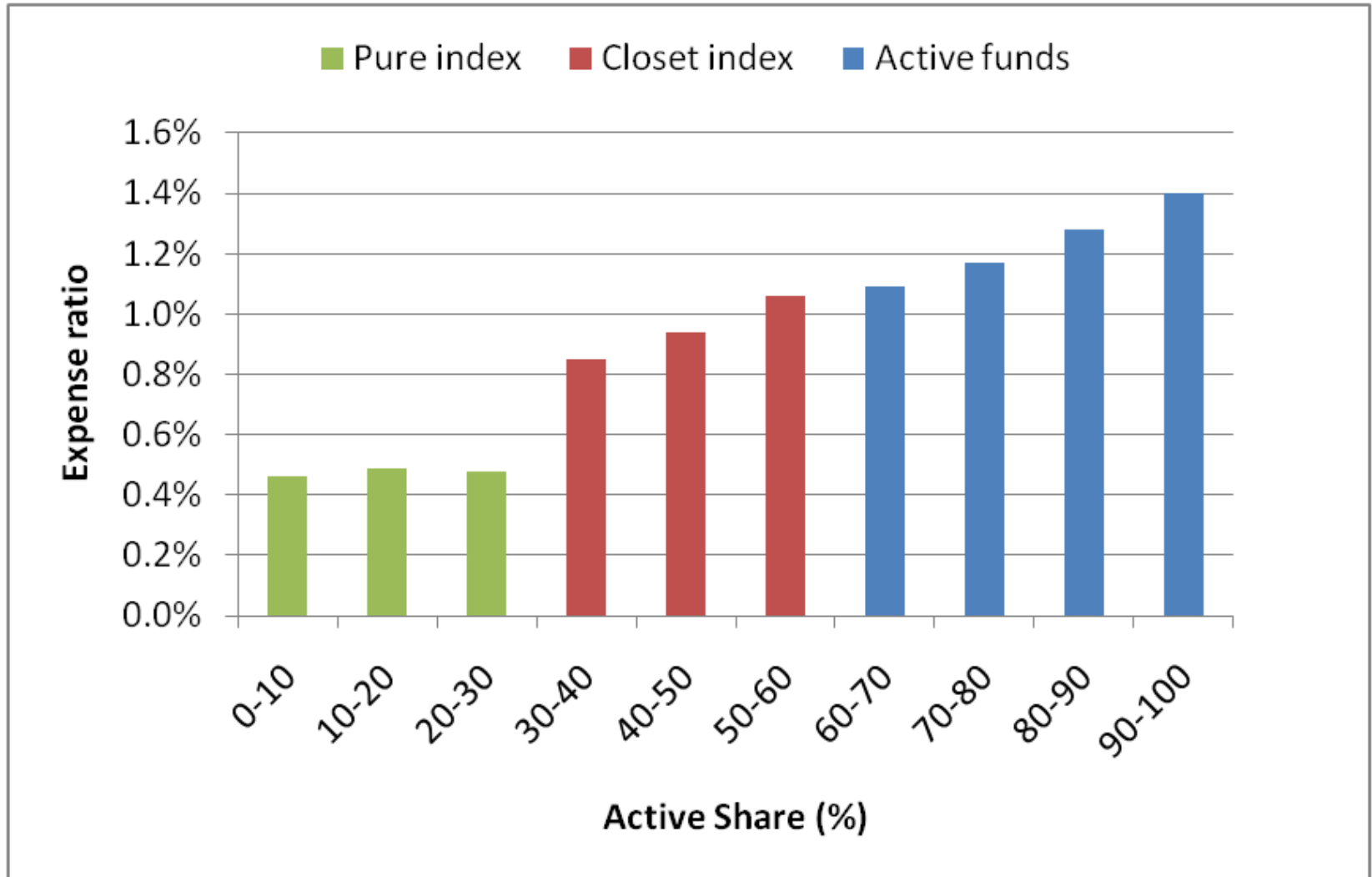
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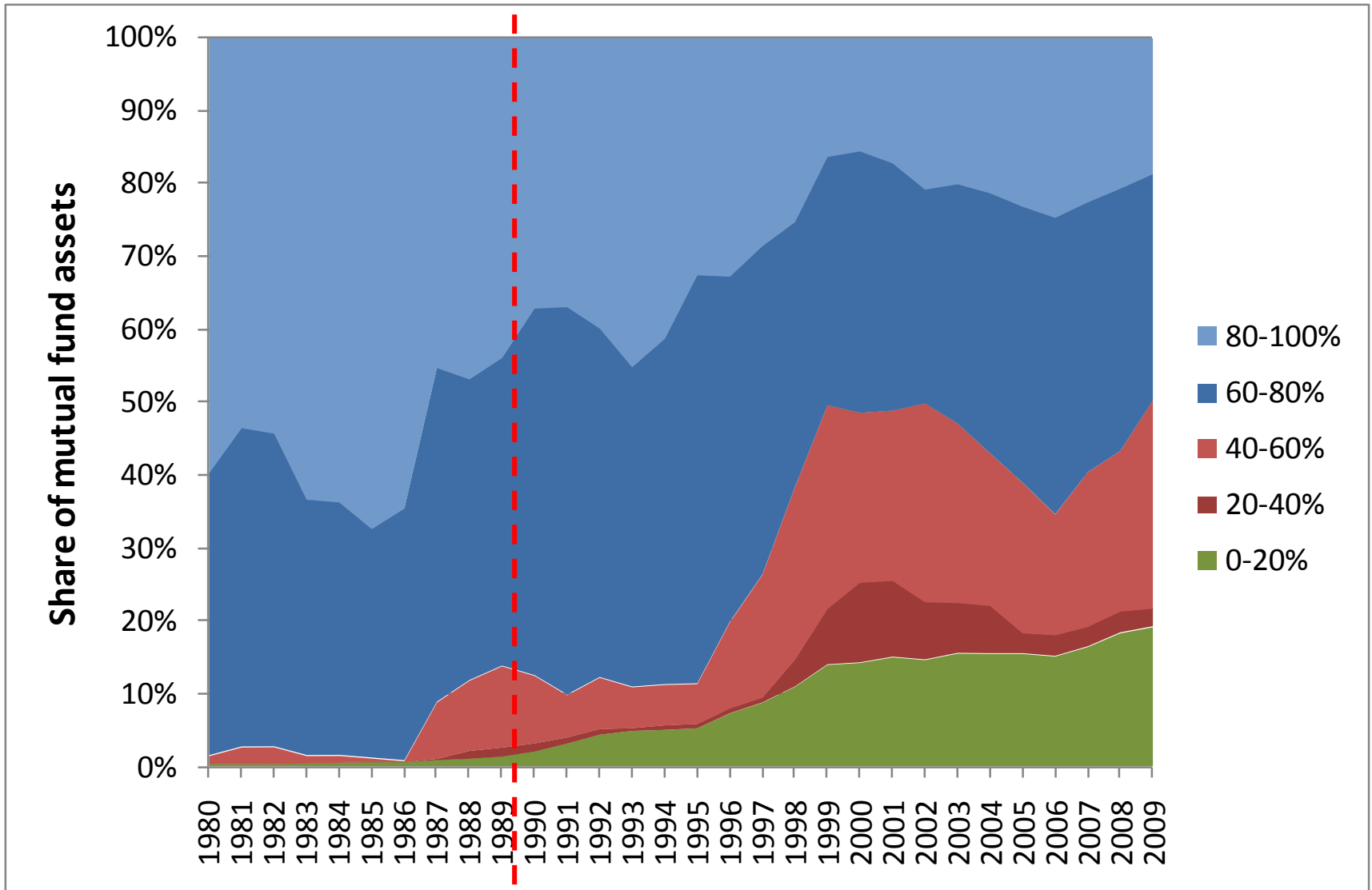


Fees and Closet Indexing

Equal-Weighted Total Expense Ratio (%)



Evolution of Active Share over Time



What Does Average Active Share Depend on?

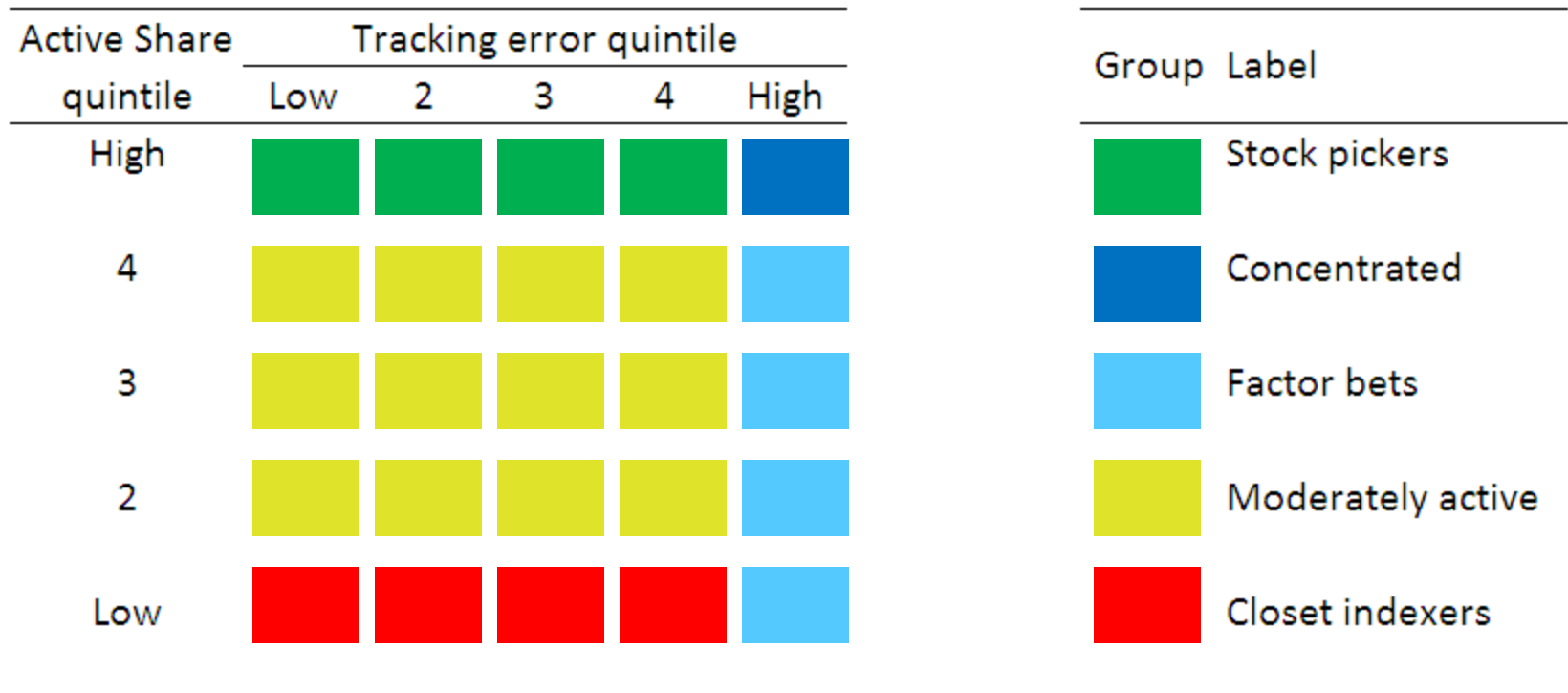
Regression of Average Active Share on volatility and prior returns

- Managers less active after high volatility and low market returns

	(1)	(2)	(3)	(4)	(5)	(6)
VIX	-0.2462** (-2.30)				0.0973 (0.88)	
CrossVol		-0.8749*** (-3.78)			-1.0127*** (-5.34)	-0.8044*** (-3.23)
Index return			0.0409*** (2.85)		0.0468** (2.43)	0.0345*** (3.05)
Active return				-0.2211 (-1.53)	0.0895 (0.69)	
<i>N</i>	239	239	239	239	239	239
<i>R</i> ²	25.2%	38.7%	21.8%	11.4%	55.1%	53.9%

note: *** p<0.01, ** p<0.05, * p<0.1

Creating Categories of Active Management



The Most Active Funds Have Skill

Benchmark-Adjusted Gross Return (Before Expenses)

Group	Label	Benchmark-adjusted	Four-factor alpha
5	Stock pickers	2.61 (3.42)	2.10 (2.72)
4	Concentrated	1.64 (0.90)	0.52 (0.40)
3	Factor bets	0.06 (0.06)	-1.02 (-1.47)
2	Moderately active	0.82 (1.63)	0.20 (0.39)
1	Closet indexers	0.44 (1.67)	0.13 (0.51)
	All	0.96 (1.70)	0.31 (0.61)
5 - 1	Difference	2.17 (3.31)	1.96 (3.04)

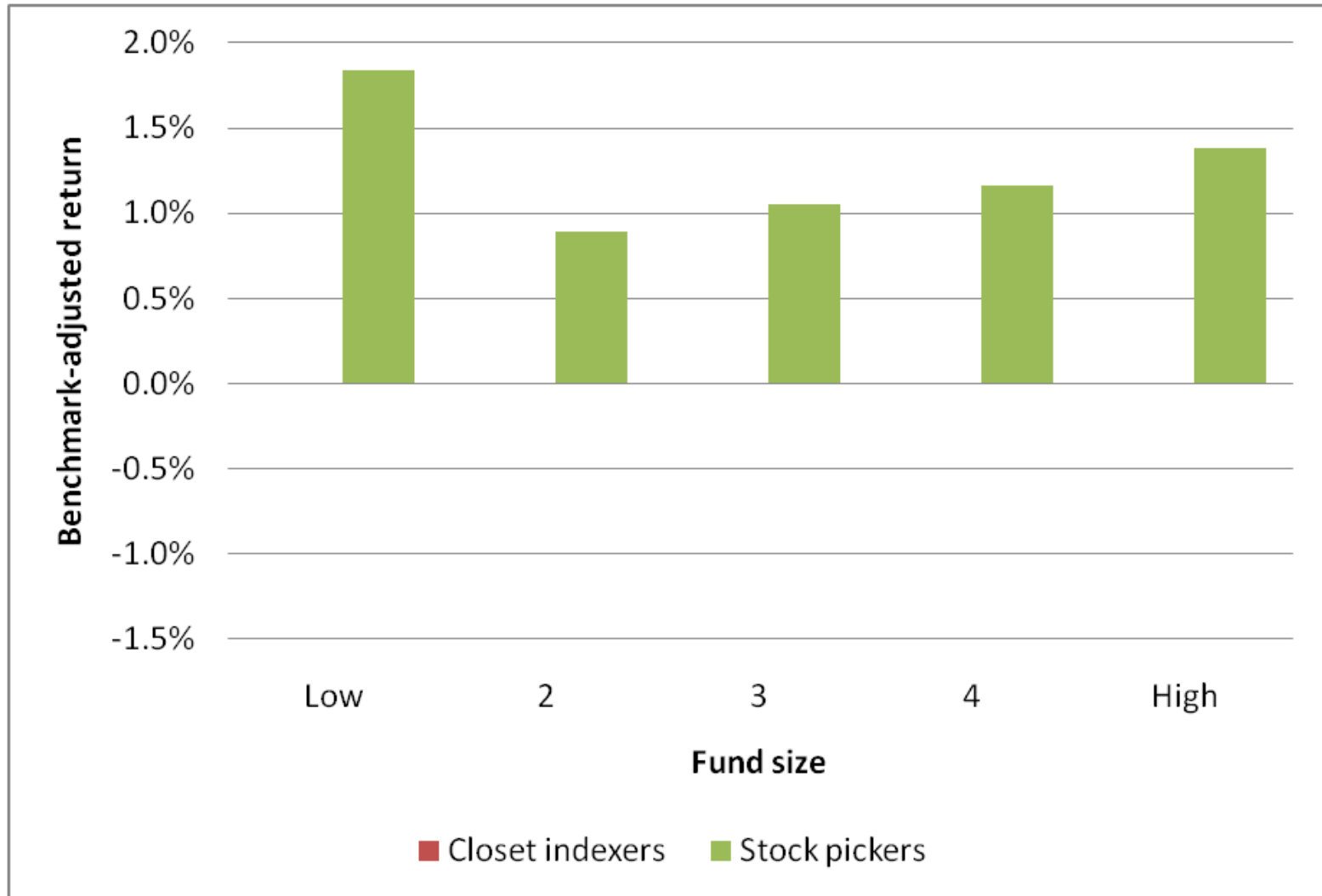
Investors Should Avoid Less Active Funds

Benchmark-Adjusted Net Return (After Expenses)

Group	Label	Benchmark-adjusted	Four-factor alpha
5	Stock pickers	1.26 (1.95)	1.39 (2.10)
4	Concentrated	-0.25 (-0.17)	-0.89 (-0.72)
3	Factor bets	-1.28 (-1.31)	-2.19 (-3.01)
2	Moderately active	-0.52 (-1.16)	-0.78 (-1.81)
1	Closet indexers	-0.91 (-3.38)	-1.07 (-4.46)
	All	-0.41 (-0.86)	-0.71 (-1.59)
5 - 1	Difference	2.17 (3.48)	2.45 (4.00)

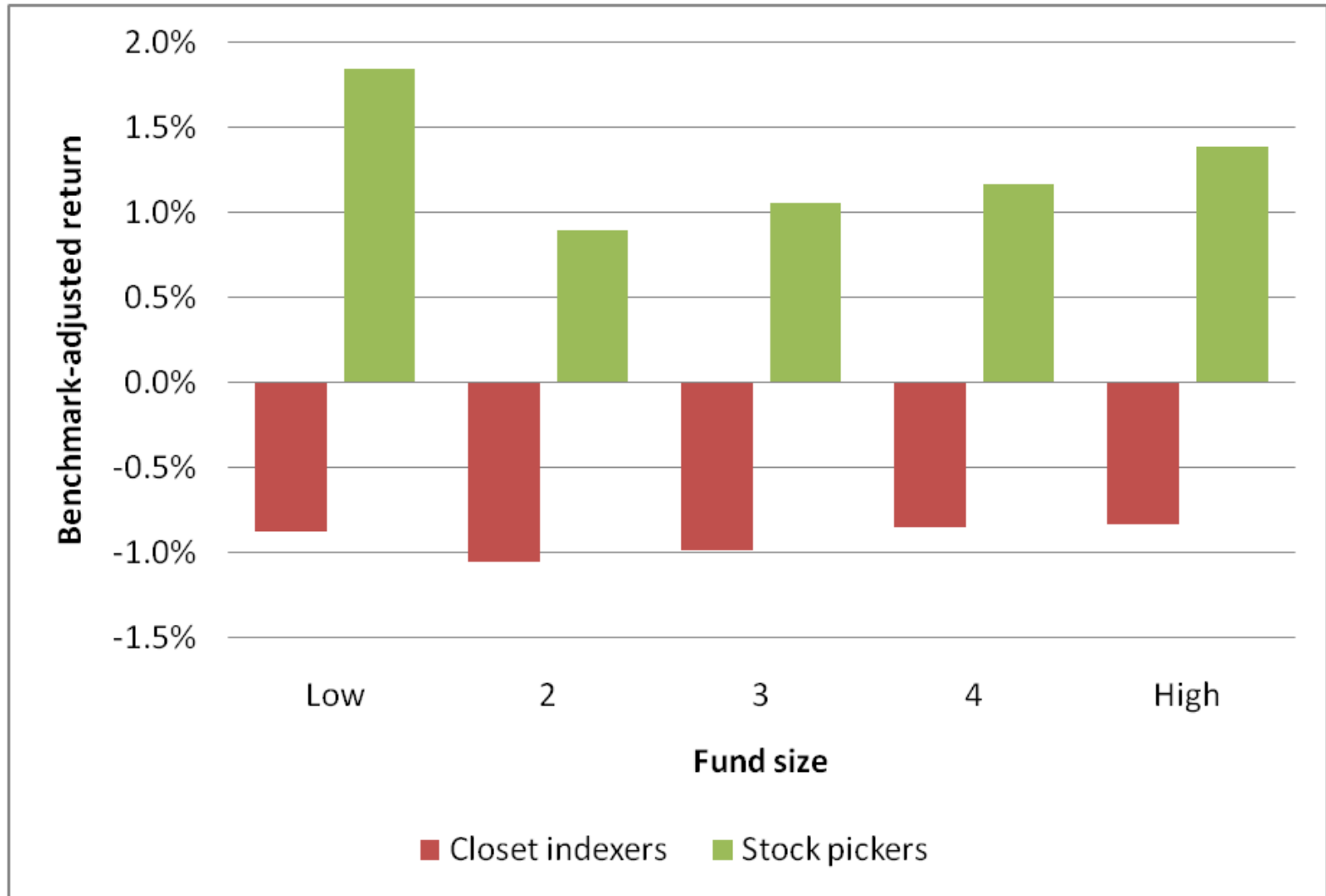
Similar Performance Across Small and Large Funds

Benchmark-Adjusted Net Return (After Expenses)



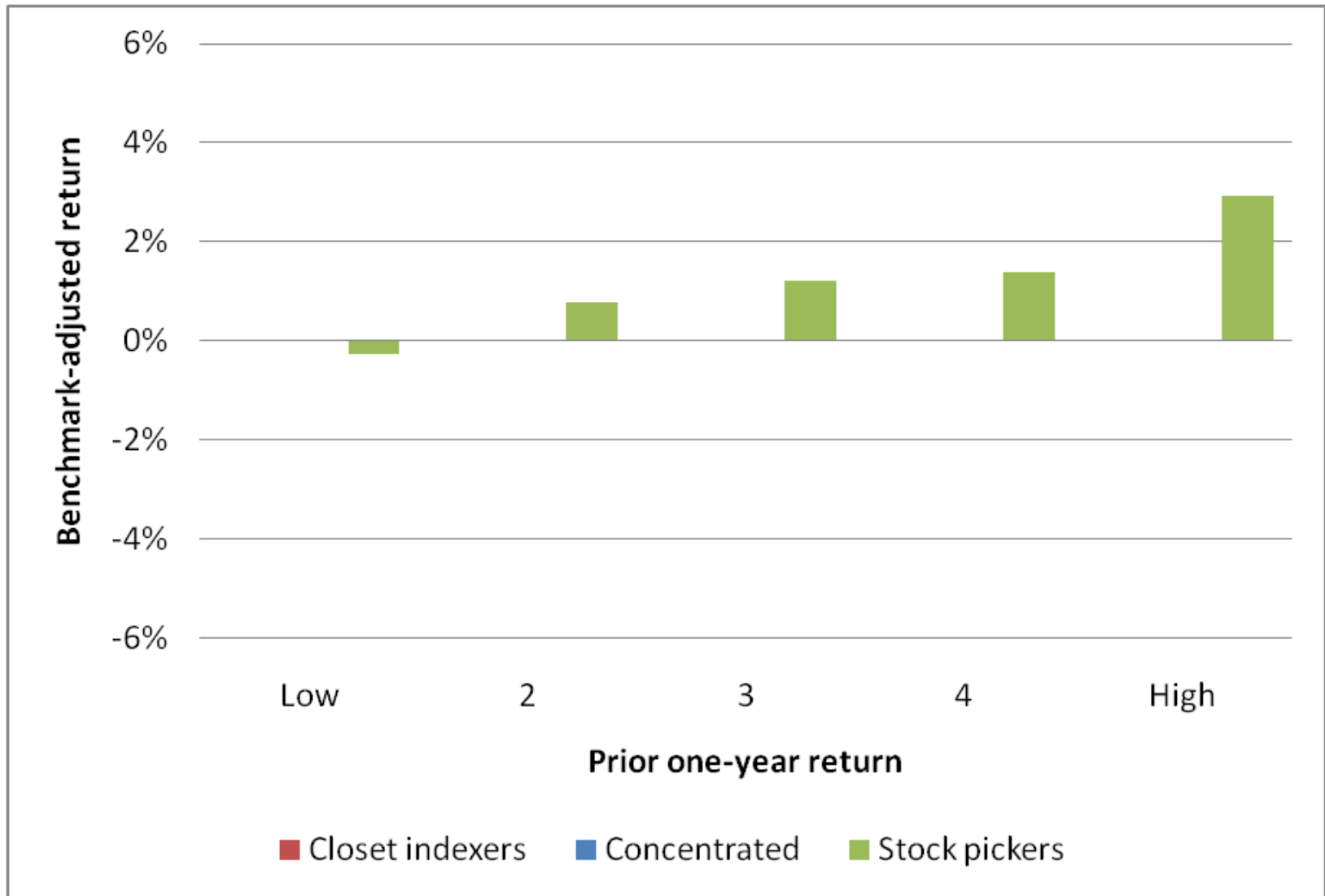
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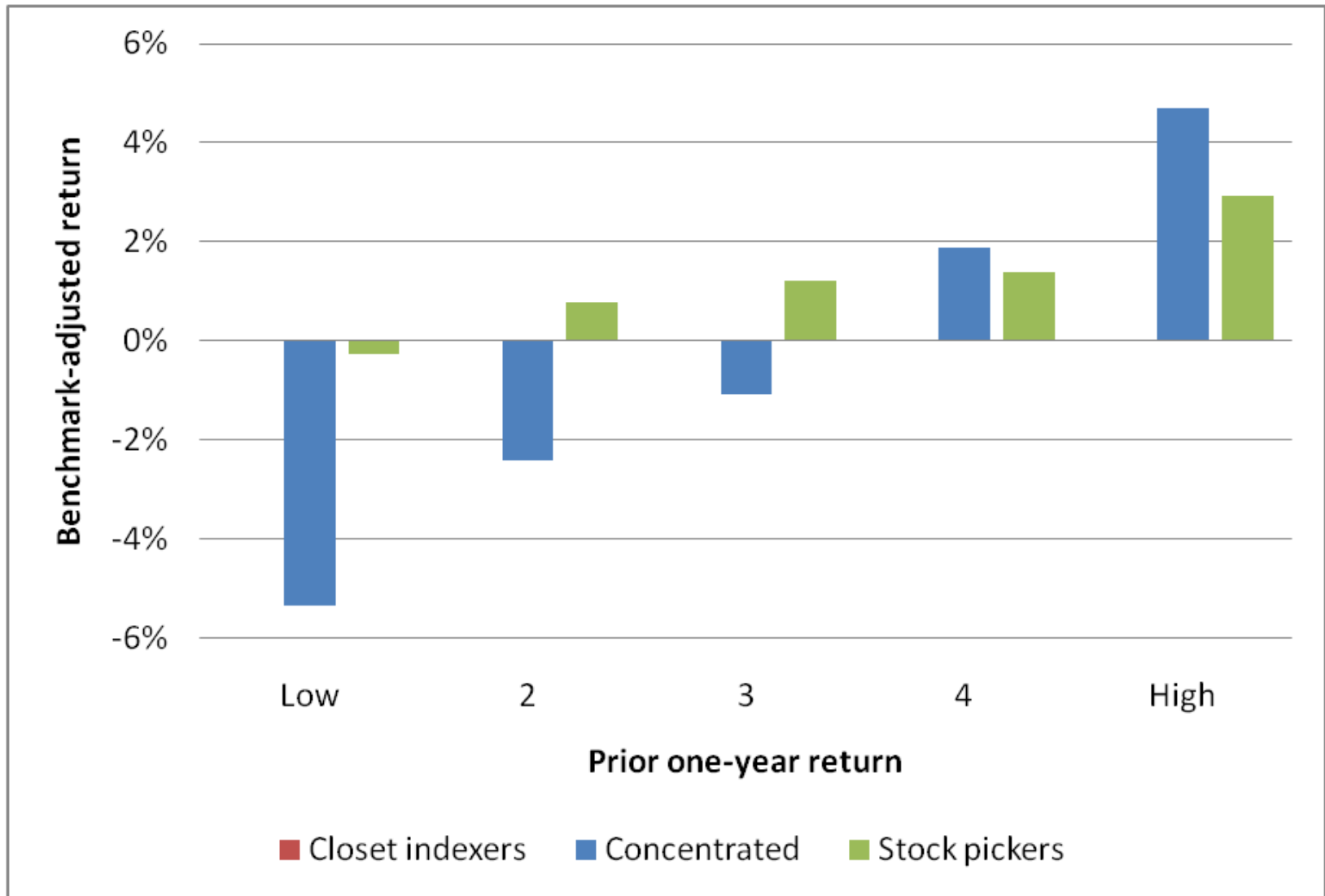
Greater Performance Persistence for Active Funds

Benchmark-Adjusted Net Return (After Expenses)



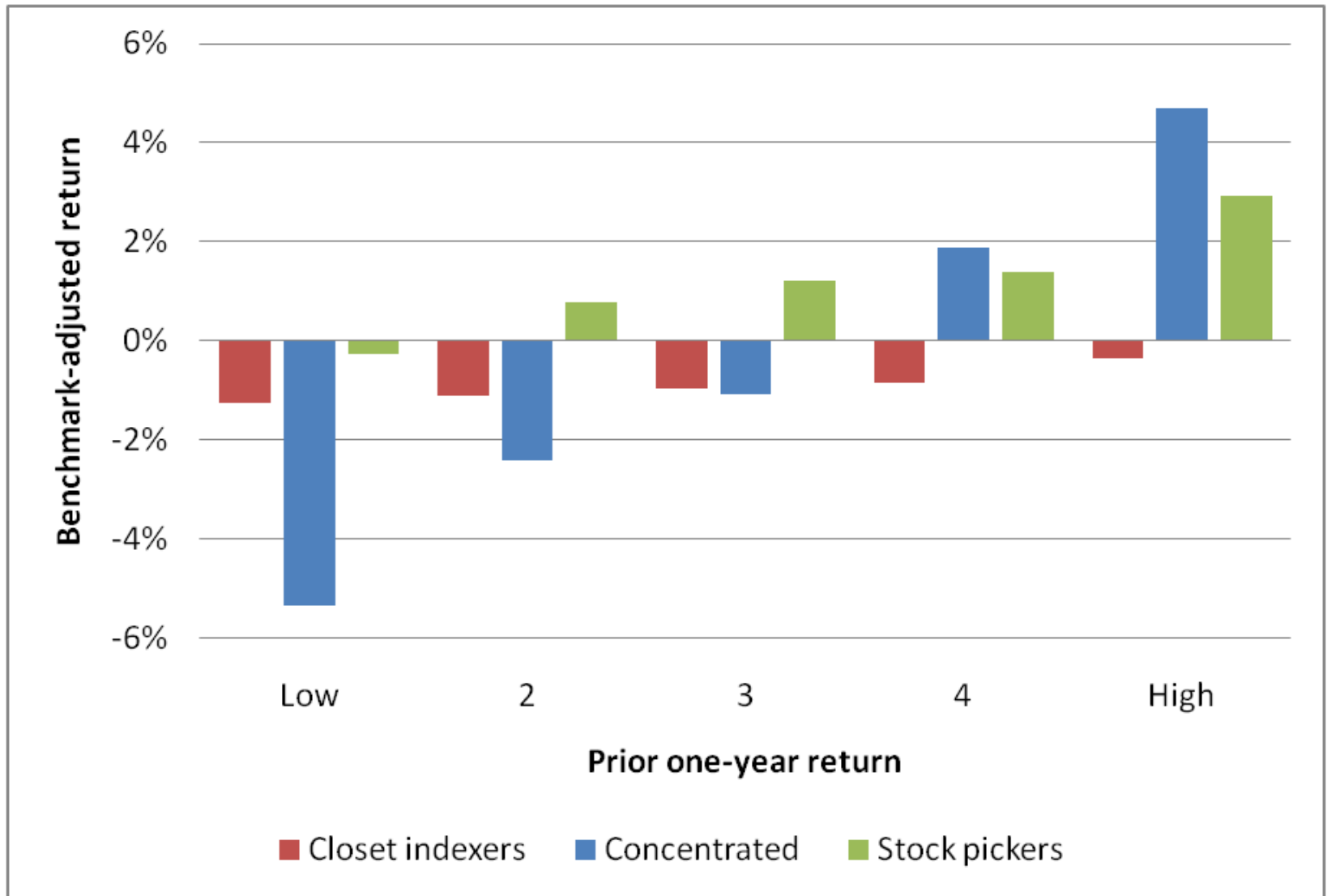
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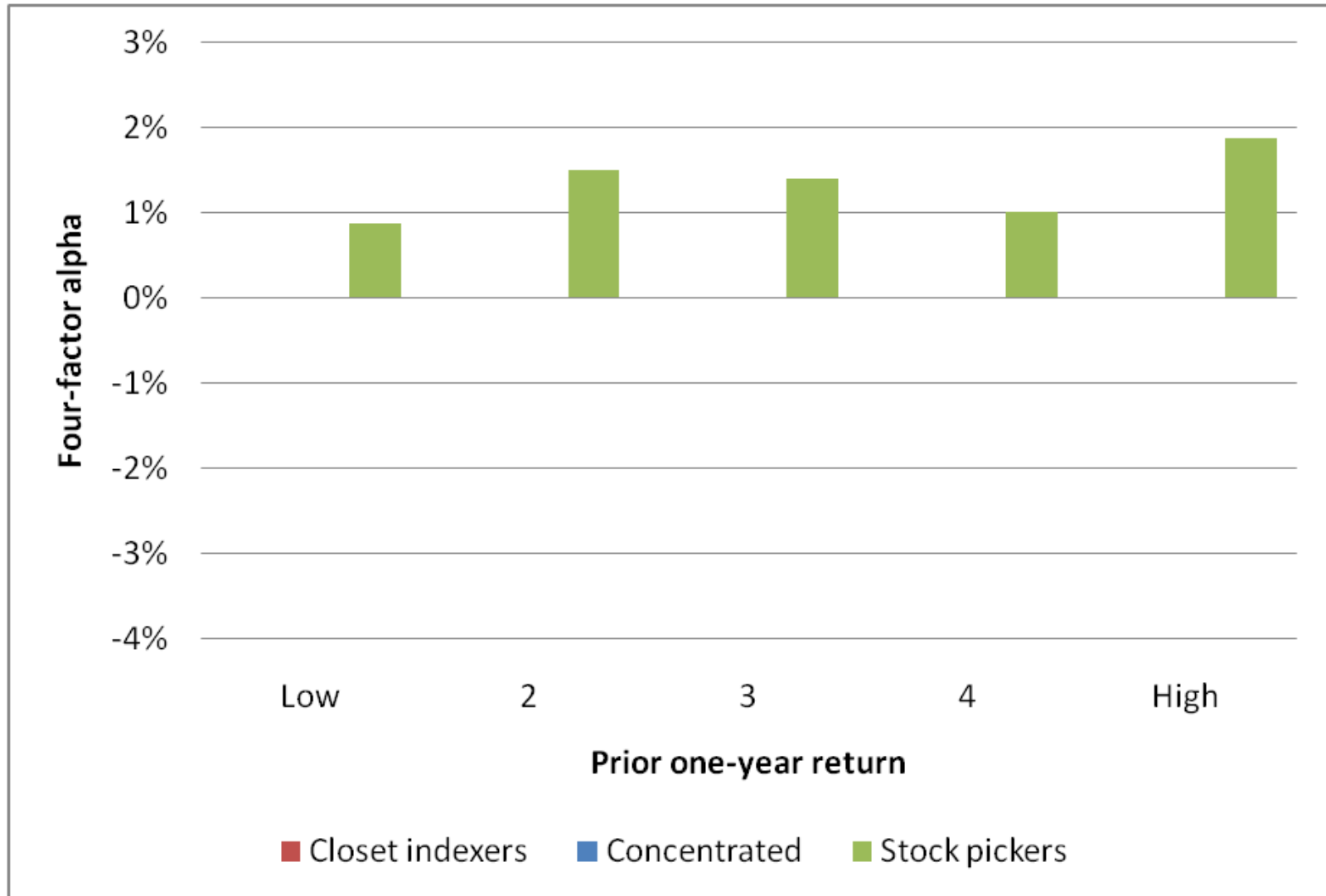
Greater Performance Persistence for Active Funds

Benchmark-Adjusted Net Return (After Expenses)



Momentum Eliminates Some of the Persistence

Four-Factor Alpha of Net Return (After Expenses)



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Four-Factor Alpha of Net Return (After Expenses)



Momentum Eliminates Some of the Persistence

Four-Factor Alpha of Net Return (After Expenses)



Active Share Predicts Returns within Fund Style

Regression of Benchmark-Adjusted Net Return on Fund Characteristics

	Benchmark-adjusted	
	(1)	(2)
Active Share	0.0739*** (2.76)	
Active Share * large cap		0.0867** (2.09)
Active Share * mid cap		0.1023* (1.84)
Active Share * small cap		0.1635** (2.03)
Tracking error	-0.0827 (-0.54)	-0.1019 (-0.69)
Expenses	-1.3423*** (-3.31)	-1.3281*** (-3.45)
Control variables	Yes	Yes
<i>N</i>	11,534	11,534
<i>R</i> ²	11.0%	11.3%

Identifying Stock Pickers' Markets

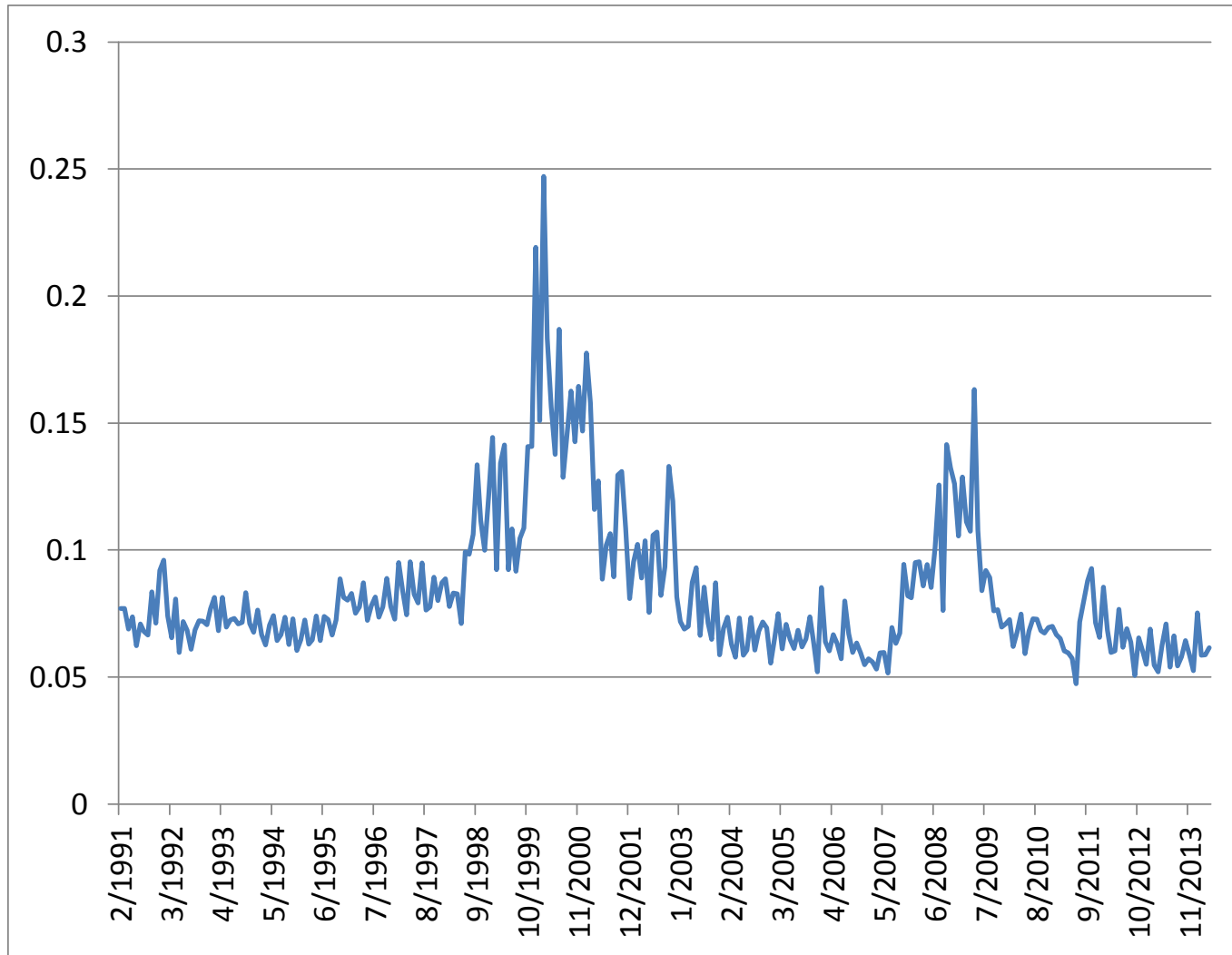
Regression of Stock Pickers' Net Return on Cross-Sectional Volatility

- Higher fund return on stock pickers if
 - Level of cross-sectional volatility is high
 - Cross-sectional volatility unexpectedly declines
- It is possible to time stock selection

$E_{t-1}[\text{CrossVol}(t)]$	0.1205*** (3.10)	0.1195*** (3.36)
$\varepsilon_{\text{CrossVol}(t)}$		-0.1637*** (-3.13)
N	159	159
R^2	12.4%	24.7%

Cross-Sectional Volatility over Time

Broad U.S. Equity Market 1/1991–4/2014



Performance over the Crisis of 2008-2009

Group	Label	2008-2009	2009
5	Stock pickers	0.97 (0.42)	6.09 (1.84)
4	Concentrated	-2.59 (-0.56)	9.41 (2.11)
3	Factor bets	-1.72 (-0.63)	2.21 (0.82)
2	Moderately active	-0.32 (-0.24)	1.12 (0.54)
1	Closet indexers	-0.83 (-1.09)	-0.66 (-0.67)
	All	-0.51 (-0.32)	2.13 (1.01)
5 - 1	Difference	1.79 (0.89)	6.75 (2.28)

How Can a Practitioner Use Active Share?

- Use Active Share to identify better-performing funds
- Should we expect this to hold also in the future?
- Yes, for two reasons:
 - 1) Generating alpha requires deviating from benchmark
 - 2) No data mining in these results!
- Long-run outlook:
 - Any easy rule for earning positive alphas in the market is an anomaly which should not exist forever

How Can a Practitioner Use Active Share?

- Determine **how active** a fund is
 - Nice to know if you are paying for active management
- Determine the **type** of active management of a fund
 - Stock picking and factor bets
 - Better understand the risks you are exposed to
 - More objective comparison across funds

Where Do I Find Active Share Data?

- Author's research page at <http://www.petajisto.net/>
 - Historical data available up to 12/2009
 - In both SAS and ASCII format
 - Available for free
- Morningstar Direct
 - Subscription-based service
 - Have to define a benchmark first

Conclusions

- Active Share
 - Measures active positions as fraction of the portfolio
 - Use alone or together with tracking error
- Characterize active management
 - Hard to explain with other variables
 - Shift toward less active management in the 1990s
- Stock pickers with high Active Share outperform
 - Before fees: Managerial skill
 - Beat benchmarks by 2.1-2.6%
 - After fees: Can invest in some active funds
 - Choose active stock pickers (with good prior performance)