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Vanguard on Active vs. Passive
Christopher Philips and Francis Kinniry Jr.

Concentration Drivers of Active Performance
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Alpha/Beta Separation
Robert Whitelaw, Salvatore Bruno and Anthony Davidow

A Better Correlation Measure
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Plus Active vs. Passive Roundtable, Hougan on Leverage, and Blitzer

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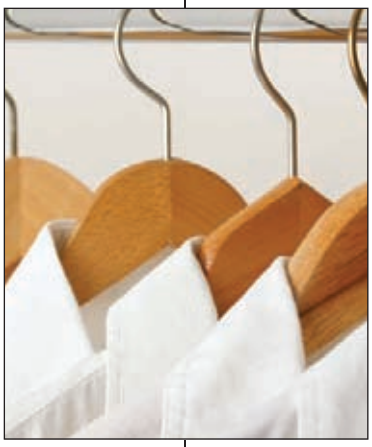

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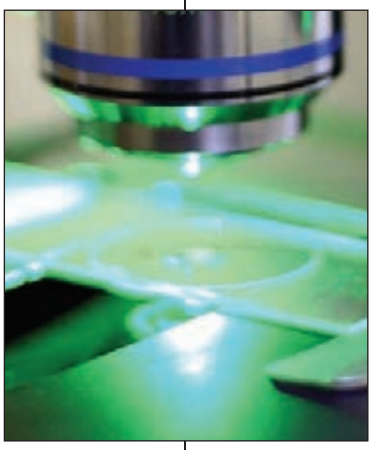

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Contributors

David Blanchett

David Blanchett is a full-time M.B.A. candidate at the University of Chicago Booth School of Business in Chicago, class of 2010. Before returning to school, he worked as an internal consultant for Unified Trust Company in Lexington, Ky., and as a financial planner for Hilliard Lyons in Louisville, Ky. Blanchett has completed an M.S. in financial services through the American College and is a Chartered Financial Analyst, a Certified Financial Planner practitioner and an Accredited Investment Fiduciary Analyst.

David Blitzer

David Blitzer is managing director and chairman of the Standard & Poor's Index Committee. He has overall responsibility for security selection for S&P's indices and index analysis and management. Prior to becoming chairman, Blitzer was chief economist for S&P. He previously served as corporate economist at The McGraw-Hill Companies, S&P's parent corporation, and senior economic analyst with National Economic Research Associates. Blitzer is the author of "Outpacing the Pros: Using Indexes to Beat Wall Street's Savviest Money Managers," McGraw-Hill, 2001.

Gregory Hight

Gregory Hight is president of Hight Capital Management, Inc., a Minnesota research and educational firm that specializes in developing applications of financial mathematics, statistics and algorithms for practical investment problems. His articles have appeared in *Barron's*, *Offshore Financial Review* and other publications. Hight has a B.A. from Auburn University and an M.B.A. from St. Cloud State University.

Matt Hougan

Matt Hougan is editor of Index Publications LLC, the leading financial media company focused on indexes, index funds and exchange-traded funds. In this capacity, he serves as editor of IndexUniverse.com and the *Exchange-Traded Funds Report*, and senior editor of the *Journal of Indexes*. An expert on ETFs, Hougan's writings have appeared in *SmartMoney*, MarketWatch, *Institutional Investor*, Yahoo Finance and *Financial Advisor* magazine. He is widely quoted in *The Wall Street Journal*, *Barron's*, TheStreet.com and other publications, and is a regular guest on CNBC.

Francis Kinniry

Francis Kinniry Jr., CFA, is a principal of Vanguard and a senior member of Vanguard's Investment Strategy Group. He and his team are responsible for ongoing capital market research, portfolio design, development and implementation of customized investment solutions, investment market commentary, and research. Before joining Vanguard in 1997, Kinniry was a partner and senior portfolio manager for Executive Investment Advisors, LLC., and a portfolio manager for H. Katz Capital Group, a venture capital and hedge fund manager. He received his B.A. and M.B.A. from Drexel University.

Christopher Philips

Christopher Philips, CFA, is an analyst in Vanguard's Investment Strategy Group. The department is responsible for conducting the research and formulating the investment methodology used to support advisory services, products and strategies for institutional and high net worth clients. It also publishes Vanguard's proprietary research on a variety of investment, economic and portfolio management issues. Philips has published and presented research on various topics, such as indexing, real estate and benchmark selection. He earned his B.A. from Franklin & Marshall College.

Robert Whitelaw

Robert Whitelaw, Ph.D., is the chief investment strategist of IndexIQ. He is also the Edward C. Johnson 3d Professor of Entrepreneurial Finance and chairman of the Finance Department at the Leonard N. Stern School of Business, New York University. His papers have been published in multiple academic and practitioner journals. Whitelaw has a Ph.D. in finance from Stanford University, Graduate School of Business, and a B.S. in mathematics from MIT.

Portfolio Concentration And Mutual Fund Performance

Why active managers are better off looking at sectors than individual stocks

By David Blanchett

What impact does portfolio concentration have on mutual fund performance? Some of the best-known and most successful investors (such as Warren Buffett) employ concentrated portfolio strategies. In theory, a portfolio manager taking a concentrated investing approach is able to exploit his or her best ideas and has lower monitoring costs when compared with managing a large portfolio. However, just because a portfolio manager holds fewer securities does not mean the approach will outperform a more diversified one. Moreover, the term "portfolio concentration" can mean many things, including (critically) whether that concentration is spread across individual stocks or across sectors.

This paper will explore how "concentrated" portfolios perform using the historical performance of mutual funds, and will determine the relative impact of different types of concentration on an absolute-return, a risk and a risk-adjusted basis.

Literature Review

Past research on portfolio concentration has tended to note the potential benefits of concentrated portfolios over less-concentrated portfolios, although the approaches to defining "concentration" have differed considerably. In perhaps the most expansive study, Kacperczyk, Sialm and Zheng [2005] found that mutual funds with higher levels of industry concentrations yield an average abnormal return of 1.58 percent per year before deducting expenses and 0.33 percent per year after deducting expenses. Kacperczyk et al. attribute this outperformance to superior stock selection ability and also note that the trades of concentrated portfolios added more value than the trades of diversified portfolios.

Brands, Brown and Gallagher [2005] conducted a study of active Australian equity managers and found a positive relationship between portfolio concentration and fund performance at the stock, industry and sector levels. They defined portfolio concentration as "the extent to which the portfolio weights held in stocks, industries and sectors deviate from the underlying index or market portfolio."

Ivkovich, Sialm and Weisbenner [2006] found that stock investments made by households that choose to concentrate their brokerage accounts in a few stocks outperform those made by households with more diversified accounts (especially among those with large portfolios). They found that when controlling for households' average investment abilities, their trades and holdings perform better when their portfolios include fewer stocks. Ivkovich et al. use the term "concentrated" to refer to investors who hold only one or two stocks in their brokerage accounts, and use the term "diversified" to refer to investors who are not as highly focused with their portfolio (i.e., hold three or more stocks).

The Benefits Of Diversification

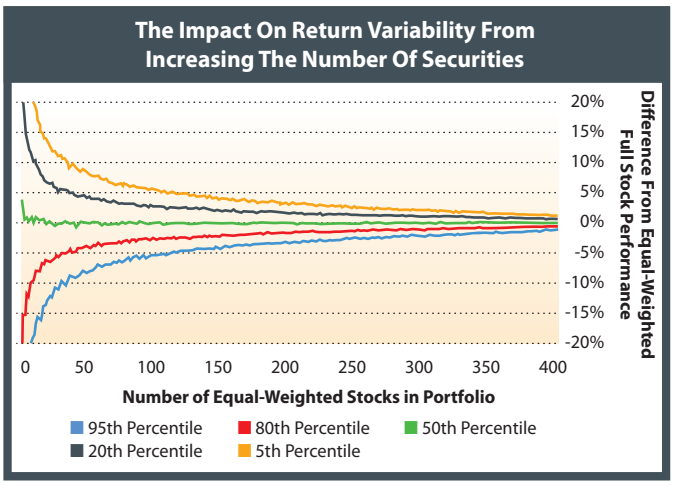
The benefits of portfolio diversification have been well-documented. In one of the first studies on portfolio stock diversification, Evans and Archer [1968] noted that there is little diversification benefit beyond holding eight to 10 stocks for an equal-weighted portfolio. This confirmed earlier advice from Benjamin Graham, who in his 1949 book, "The Intelligent Investor," recommended owning from 10 to 30 stocks to achieve proper diversification based on instinct and experience. More recent research by Statman [1987], though, suggested that a well-diversified portfolio of randomly chosen stocks must include at least 30 stocks for a borrowing investor and 40 stocks for a lending investor.

While the number of securities necessary to achieve diversification has varied, according to past research (and over time, according to Campbell, Lettau, Malkiel and Xu [2001]), adequate diversification is an important consideration when addressing the risk component of a portfolio. De Wit [1998] has noted that even a well-diversified portfolio can benefit from additional diversification. Holding multiple stocks does not necessarily create a diversified portfolio, though, if the correlations among the stocks within a portfolio are high (Goetzmann and Kumar [2005]). Often, the reason a portfolio manager increases the total number of holdings is not out of a desire to own the new stocks per se, but rather as a means to accommodate mutual fund inflows (Shawky and Smith [2005]).

Since there is no clear consensus on the number of securities necessary for adequate portfolio diversification, Figure 1 has been provided as a reference. Figure 1 includes the 95th (worst 1 in 20), 80th (worst 1 in 5), 50th (median), 20th (best 1 in 5), and 5th (best 1 in 20) percentile returns for randomly created equal-weighted portfolios holding differing numbers of securities. The portfolios' number of holdings range from one stock to 400. The securities included in the portfolio are the components of the S&P 500 as of June 10, 2008, with available full-year 2007 performance (which reduced the test set to 490 securities). For each security set (e.g., five stocks, 100 stocks, 250 stocks, etc.), 1,000 equal-weighted random combinations were tested (from which the percentile bands are determined). The performance of the percentiles is compared against the performance for the equal-weighted full stock portfolio for the period.

Figure 1 demonstrates that as the number of securities in a portfolio increases, the more likely it will achieve a return that is similar to the composite index, and vice versa. Portfolio managers who wish to exhibit low levels of tracking error are more likely to hold more securities and to weight the portfolio similarly to the benchmark index. While increasing the number of securities decreases tracking error,

Figure 1



Source: Morningstar

Figure 2

Number Of Funds Per Period With Percentage Of Total Funds Per Year

Asset Category	2001	2002	2003	2004	2005	2006
	Total Number Of Funds					
Large Growth	232	316	334	317	323	331
Large Blend	236	268	248	259	229	251
Large Value	236	206	225	225	217	232
Mid-Cap Growth	172	179	181	183	184	187
Mid-Cap Blend	37	62	61	45	60	67
Mid-Cap Value	62	39	53	50	49	54
Small Growth	158	193	179	176	168	189
Small Blend	46	76	68	69	72	99
Small Value	53	46	47	62	58	69
Total	**1,232**	**1,385**	**1,396**	**1,386**	**1,360**	**1,479**
	Percentage Of Total Funds Per Year					
Large Growth	18.83%	22.82%	23.93%	22.87%	23.75%	22.38%
Large Blend	19.16%	19.35%	17.77%	18.69%	16.84%	16.97%
Large Value	19.16%	14.87%	16.12%	16.23%	15.96%	15.69%
Mid-Cap Growth	13.96%	12.92%	12.97%	13.20%	13.53%	12.64%
Mid-Cap Blend	3.00%	4.48%	4.37%	3.25%	4.41%	4.53%
Mid-Cap Value	5.03%	2.82%	3.80%	3.61%	3.60%	3.65%
Small Growth	12.82%	13.94%	12.82%	12.70%	12.35%	12.78%
Small Blend	3.73%	5.49%	4.87%	4.98%	5.29%	6.69%
Small Value	4.30%	3.32%	3.37%	4.47%	4.26%	4.67%
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source: Morningstar

it increases monitoring costs and reduces the ability of the portfolio manager to exploit his or her "best ideas."

Testing Portfolio Concentration

For this paper, three different definitions of "concentration" were tested:

1. **Sector Correlation to Benchmark (Correlation):** For this test, the correlation between the sector weightings of a mutual fund were compared with the sector weightings of a respective benchmark.
2. **Total Number of Holdings (# of Holdings):** This figure is calculated from the most recent available fund holdings. It does not include a fund's short positions (according to Morningstar.com).
3. **Percentage of Total Holdings in the Top 10 Holdings (Top 10):** This figure is calculated in-house by Morningstar using the most recent portfolio information it has available for the fund.

The use of both sector and security measures to define concentration is an important break with past research, which tends to focus primarily on concentration in individual securities. The increasing use of sector-based strategies has increased interest in the utility of sector-based portfolio concentration. This article aims to examine the importance of that issue by evaluating it separately from security-based diversification.

Another important break from past research is that while previous research on portfolio concentration has tended to use more-precise measures to classify a portfolio's market exposure (e.g., the three-factor model), mutual fund investors tend to rely on general definitions of a fund's market exposure based on "style boxes" or "investment categories." Morningstar's is one of the most common methodologies used by the investing public to classify mutual funds (as well as a variety of other investments), and is the classification methodology used for this analysis.

The primary test data set for the analysis was retrieved from six separate year-end Morningstar CDs over the six-year time period from 2001–2006 (i.e., Morningstar Principia Pro Plus for 2001 and Morningstar Principia for the years 2002–2006). These year-end periods provided the snapshot periods for test purposes, where each data set was independent of the others, minimizing any type of look-back or survivorship bias. For the analysis, only those funds categorized by Morningstar with the same fund category and same style box in the nine domestic style boxes (Large Growth, Large Blend, Large Value, Mid-Cap Growth, Mid-Cap Blend, Mid-Cap Value, Small Growth, Small Blend and Small Value) were considered. Only actively managed funds that were not classified as index funds, enhanced index funds or ETFs were included in the test set.

The mutual fund test population was limited to one share class per fund to ensure that those funds with multiple share classes were not overweighted relative to funds with fewer share classes. The share class with the lowest expense ratio

and complete information was used as the representative proxy for that mutual fund. The lowest-cost share class is used since it is assumed to be the most efficient and since it tends to have the lowest revenue share, which is an expense for distribution, not an expense for money management.

Mutual funds were only compared against other funds in the same investment category for each period. The results for each category for each test period were combined on a weighted basis, based on the total number of mutual funds in the period. For example, if there were 10 Large Growth funds, five Large Blend funds and five Large Value funds in the Large-Cap Equity category, Large Growth would represent 50 percent of the Large-Cap total, while Large Blend and Large Value would each represent 25 percent of the Large-Cap total. This would then be combined with the Small-Cap and Mid-Cap results on a relative-weighted basis to get the results for the period. The test population of funds for each of the categories for each of the year-end periods is included in Figure 2.

The information on the percentage each category represents of the total funds for each of the years is included in Figure 2 to give the reader an indication of the relative weight of each category for each period. Since certain categories (such as Large Growth) tended to have a larger number of funds than other categories (such as Mid-Cap Value), they will have a greater impact on the results.

The fundamental assumption of the weighting methodology is that there is a greater amount of information involved when analyzing a larger number of funds versus a smaller number of funds. Taking a simple average among the categories would ignore the fact that for some periods there are more than five times the number of funds in one category versus another. Note, though, that the aggregate results from each of the six different year-end periods are averaged on an equal-weighted basis.

The historical performance for each of the funds over the previous year is compared against the category average of that entire category for the period. Category average was used instead of category median to ensure that the net outperformance for each quintile and each category would be an approximate zero sum. All results are statistically significant since the data set represents the entire population of available mutual funds (i.e., it is not a sample).

The benchmarks selected to represent the appropriate sector weightings for each annual period were based on the Russell iShares ETFs, which are listed in Figure 3. Russell was selected as the benchmark proxy because it is one of the most common institutional benchmarks. ETFs were selected since they represent investible benchmark composites for the respective investment categories and because data was available on each ETF for the entire test period.

An additional test was performed to determine what the impact on the results would have been had the S&P iShares ETFs been used as the benchmark proxy. Using S&P iShares ETFs had no material impact on the results of the study versus using the Russell iShares ETFs. As a note, the average sector correlation among the investment categories of the Russell iShares ETFs to the S&P iShares ETFs over the test period was 0.904.

For each of the three tests, the test population of mutual funds was segmented into quintiles (or 20th percentile groups), from 1 to 5. The "1s" for each test would be considered those mutual funds that are the **least** concentrated, diversified or correlated to the respective benchmark, while the "5s" would be those mutual funds that are the **most** concentrated, diversified or correlated to the respective benchmark. The average attributes for each of the quintiles for each of the categories is included in the Appendix for informational and relative comparison purposes.

The respective performance of each quintile is based on the returns over the preceding year versus the average performance for that category for that period. Three main tests were conducted:

1. **Relative Performance:** For this test, the relative performance for each quintile for each category for each period was compared against the category average performance for the period. The average outperformance (versus the category average) and the probability of each fund outperforming the category average were calculated for each quintile.
2. **Relative Risk:** For this test, the mean absolute deviation and the downside deviation were calculated for each fund. The mean absolute deviation was calculated by determining the difference in the performance for each fund in each quintile versus the respective category average. The downside deviation was calculated in a similar manner, but only those funds with returns below the category average were considered (i.e., where the category average return was the MAR, or minimum acceptable return).
3. **Relative Risk-Adjusted Return:** For this test, the relative outperformance for each quintile for each category for each period was divided by its relative risk for the period, as represented by both mean absolute deviation and downside deviation.

Results

Since relative outperformance is the most common metric investors use when comparing mutual funds, this information will be reviewed first and is included in Figure 4.

The slope of each test set is included to give the reader

Figure 3

ETF Sector Benchmark Proxies

Ticker	Investment Name	Category
IWF	iShares Russell 1000 Growth Index	Large Growth
IWB	iShares Russell 1000 Index	Large Blend
IWD	iShares Russell 1000 Value Index	Large Value
IWP	iShares Russell Midcap Growth Index	Mid-Cap Growth
IWR	iShares Russell Midcap Index	Mid-Cap Blend
IWS	iShares Russell Midcap Value Index	Mid-Cap Value
IWO	iShares Russell 2000 Growth Index	Small Growth
IWM	iShares Russell 2000 Index	Small Blend
IWN	iShares Russell 2000 Value Index	Small Value

Figure 4

Performance Results

Average Outperformance Vs Category Average By Quintile			
Quintile	**Correlation**	**# of Holdings**	**Top Ten**
1	0.73%	-0.44%	-0.08%
2	0.57%	-0.30%	-0.15%
3	-0.38%	-0.10%	-0.22%
4	-0.40%	0.19%	-0.06%
5	-0.52%	0.67%	0.54%
Slope	-0.345%	0.270%	0.132%
% of Funds Outperforming Category Average By Quintile			
1	52.53%	46.53%	48.35%
2	52.02%	45.07%	47.21%
3	46.52%	48.21%	46.56%
4	46.89%	50.04%	48.95%
5	46.96%	55.15%	53.96%
Slope	-1.626%	2.221%	1.296%

Source: Morningstar

an indication of the strength of the relationship among the quintiles and the relative "cost" of moving between quintiles. For example, the slope for the Correlation group is negative; this means that those mutual funds with higher levels of sector divergence (i.e., lower correlations to the benchmark proxy) tended to under-perform those funds with lower levels of divergence. Contrast this with the slopes for the # of Holdings and Top Ten tests, which are both positive, suggesting that more-diversified portfolios are more likely to outperform less-diversified portfolios.

Based upon the data in Figure 1, the greater the deviation from the sector benchmark (i.e., the lower the correlation), the higher the performance. This suggests portfolio managers were, in the aggregate, able to add value by overweighting and underweighting certain sectors based on their expectations. However, the portfolio managers did not appear to add value through security selection, since both portfolio concentration (or diversification) performance tests revealed that less-concentrated (or more-diversified) portfolios tended to outperform more-concentrated (or less-diversified) portfolios. Taken together, it would appear that a portfolio manager's time would be best spent analyzing sector trends, and then—instead of allocating to the stocks he or she deemed to be the "best"—diversifying across a number of different securities within favored sectors.

The results of the risk analysis, which focused on mean absolute deviation and downside deviation, are included in Figure 5.

Not surprisingly, the more-concentrated portfolios (the 1s) had higher mean absolute deviations and downside deviations than less-concentrated portfolios. Each of the test sets had roughly the same negative slope, implying that those mutual funds that were the most diversified (or least concentrated) exhibited the lowest risk. Higher levels of portfolio concentration are common among those funds exhibiting the highest levels of tracking error to a benchmark index.

The final results that will be discussed are the risk-adjusted results, which are included in Figure 6.

The risk-adjusted results in Figure 6 roughly mirror the performance results in Figure 4; however, the strength of the relationship of the risk-adjusted relative outperformance (i.e., slope) for the Correlation test decreased when viewed from a risk-adjusted perspective. This should not surprise the reader, since the top Correlation quintile had both high relative outperformance and high relative risk. In other words, the benefit of the higher performance for the concentrated portfolios (as defined by sector divergence) came at the cost of a higher level of risk.

Figure 5

Risk Results

Mean Absolute Deviation Vs Category Average By Quintile			
Quintile	**Correlation**	**# of Holdings**	**Top Ten**
1	8.55%	8.11%	8.97%
2	6.45%	6.50%	6.11%
3	5.82%	5.49%	5.55%
4	5.05%	5.43%	4.98%
5	4.61%	4.95%	4.69%
Slope	-0.93%	-0.74%	-0.97%
Downside Deviation Vs Category Average As MAR By Quintile			
1	5.29%	5.54%	6.02%
2	4.08%	4.52%	4.02%
3	4.19%	3.81%	3.96%
4	3.59%	3.40%	3.45%
5	3.36%	3.11%	3.02%
Slope	-0.43%	-0.60%	-0.66%

Source: Morningstar. MAR is minimum acceptable return.

Figure 6

Risk-Adjusted Results

Risk-Adjusted Performance & Mean Absolute Deviation By Quintile			
Quintile	**Correlation**	**# of Holdings**	**Top Ten**
1	0.051	-0.050	-0.010
2	-0.032	-0.055	-0.085
3	-0.019	0.026	-0.018
4	-0.013	0.062	0.032
5	-0.028	0.039	0.074
Slope	-0.014	0.030	0.028
Risk-Adjusted Performance & Downside Deviation By Quintile			
1	0.130	-0.080	-0.025
2	-0.040	-0.075	-0.124
3	-0.008	0.038	-0.042
4	-0.006	0.092	0.046
5	-0.155	0.082	0.023
Slope	-0.053	0.049	0.027

Source: Morningstar

Conclusion

The research conducted for this paper suggests that a portfolio manager's time is best spent determining sector weightings and adequately diversifying across that sector versus maintaining concentrated positions in indiviual stocks within sectors. Mutual funds with higher levels of sector concentration outperformed those mutual funds with lower levels of sector concentration (by 35 bps per quintile), while more-diversified mutual funds (defined as those with a higher number of total holdings and a lower percentage of total holdings in the top 10 holdings) outperformed less-diversified mutual funds (by 27 bps and 13 bps per quintile, respectively). These findings differ slightly with the results of previous research, although this can likely be attributed to the different classification methodology employed in this piece (i.e., Morningstar investment categories), the different definitions of concentration and the different combination methodology used to aggregate the results.

Appendix: Average Quintile Attributes

Average Benchmark Sector Correlations

Quintile	Large Growth	Large Blend	Large Value	Mid-Cap Growth	Mid-Cap Blend	Mid-Cap Value	Small Growth	Small Blend	Small Value
1	0.474	0.588	0.556	0.475	0.153	0.356	0.577	0.456	0.327
2	0.705	0.826	0.801	0.698	0.582	0.640	0.753	0.705	0.646
3	0.802	0.906	0.887	0.796	0.737	0.785	0.826	0.825	0.822
4	0.874	0.950	0.939	0.865	0.847	0.877	0.878	0.892	0.914
5	0.947	0.981	0.978	0.932	0.926	0.947	0.938	0.952	0.971

Average Total Number Of Holdings

Quintile	Large Growth	Large Blend	Large Value	Mid-Cap Growth	Mid-Cap Blend	Mid-Cap Value	Small Growth	Small Blend	Small Value
1	31	28	39	41	34	36	57	48	46
2	50	58	58	64	55	59	83	83	82
3	66	86	76	80	81	78	102	121	125
4	87	126	95	102	128	98	129	182	213
5	196	434	209	200	379	179	250	821	588

Average % of Assets In The Top Ten Holdings

Quintile	Large Growth	Large Blend	Large Value	Mid-Cap Growth	Mid-Cap Blend	Mid-Cap Value	Small Growth	Small Blend	Small Value
1	52.31%	63.01%	44.51%	43.88%	48.76%	49.94%	36.77%	40.76%	41.86%
2	38.54%	34.76%	32.61%	29.74%	34.72%	33.52%	26.43%	26.53%	26.72%
3	33.23%	28.60%	28.94%	24.52%	26.67%	25.40%	21.74%	21.17%	19.35%
4	28.90%	24.83%	25.95%	20.46%	19.55%	21.12%	17.97%	15.86%	14.63%
5	23.07%	19.76%	21.70%	14.98%	12.54%	15.31%	12.88%	9.34%	9.52%

1 = Lowest Correlation/Least Holdings/Least Diversified
5 = Highest Correlation/Most Holdings/Most Diversified
Source: Morningstar

Works Cited

Brands, Simone, Stephen J. Brown and David R. Gallagher. (2005), "Portfolio Concentration and Investment Manager Performance," *International Review of Finance*, vol. 5, no. 3-4 (September/December): 149–174.

Campbell, John Y., Martin Lettau, Burton G. Malkiel and Yexiao Xu. (2001), "Have Individual Stocks Become More Volatile? An Empirical Exploration of Idiosyncratic Risk." *The Journal of Finance*, vol. 56, no. 1 (February): 1–43.

De Wit, Dirk P.M. (1998), "Naive diversification." *Financial Analysts Journal*, vol. 54, no. 4: 95–100.

Evans, John L. and Stephen H. Archer. (1968), "Diversification and the Reduction of Dispersion: An Empirical Analysis." *The Journal of Finance*, vol. 23, issue 5 (December): 761–767.

Graham, Benjamin. (1986), "The Intelligent Investor: A Book of Practical Counsel," Collins; 4th Rev edition (January).

Goetzmann, William, N. and Alok Kumar. (2005),"Equity Portfolio Diversification" working paper: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=627321.

Ivkovich, Zoran, Clemens Sialm and Scott J. Weisbenner. (2006), "Portfolio Concentration and the Performance of Individual Investors." Available at SSRN: http://ssrn.com abstract=568156 (forthcoming in the *Journal of Financial and Quantitative Analysis*).

Kacperczyk, Marcin T., Clemens Sialm and Lu Zheng. (2005), "On the Industry Concentration of Actively Managed Equity Mutual Funds," *The Journal of Finance*, vol. 60, no. 4: 1983–2011.

Shawky, Hany A. and David Smith. (2005), "The Optimal Number of Stock Holdings in Mutual Fund Portfolios Based on Market Performance," *The Financial Review*, vol. 40, no. 4: 481–495.

Statman, Meir. (1987), "How Many Stocks Make a Diversified Portfolio?" *Journal of Financial and Quantitative Analysis*, vol. 22, no. 3 (September): 353–363.