DOES PERFORMANCE PERSIST?

Leigh Sneddon
State Street Global Advisors

The subject is excellently introduced by Kahn and Rudd in their 1995 FAJ paper: "The idea that winners repeat is so obvious and popular, it has spawned an entire mini-industry devoted to documenting past winners. Mutual fund performance reviews regularly appear in publications from *Barrons* to *Business Week* to *Consumer Reports*. Services such as Morningstar and Lipper exist to publish mutual fund rankings. Pension plan consultants closely examine past performance before recommending managers, and successful managers proudly document their past performance. All this activity demonstrates that everyone choosing active managers, from pension plan sponsors to individual investors, is acting as if past performance predicts future performance. But does it?"

The scholars are split. For example Sharpe (1966), Carlson (1970), an SEC study (1971), Lehmann and Modest (1987), Grinblatt and Titman (1988, 1992), diBartolomeo and Godfredsen(1990), and Goetzmann and Ibbotson (1994) all report evidence of persistence. On the other hand, studies by Jensen (1968), Kritzman (1983), Dunn and Thiesen (1983), Elton, Gruber and Rentzler (1990) reported negative results.

The following presentation is a literature review. It aims to identify the key issues in the debate, follow them through several recent papers, and provide a common basis for comparison and resolution.

Which performance?

"Performance" can clearly mean many things. It can be of stock or bond funds; of winners or losers; with or without various types of risk adjustment; relative to other managers or to market benchmarks; before or after expenses and fees; and with or without style adjustment. Risk adjustments and style adjustments can in turn be accomplished in a variety of ways. "Does performance persist?" has many meanings and so potentially many answers. With so many ways to define performance, it is not surprising to find papers appearing to disagree.

In active management, knowing how to pick the best of a bad bunch is of no consequence: if over time all managers can be expected to underperform market benchmarks, investors should simply index. To have positive investment implications, persistence research must show not only that past performance is a guide to future performance, but also that future performance so obtained is likely to outperform market benchmarks.

If we could show that managers on average outperform market indices, then evidence that manager rankings persist would have positive investment implications. There is an interesting literature on the performance of mutual fund managers relative to market indices. It includes papers by Sharpe (1966) and Jensen (1968), who reported that mutual funds underperform market indices. Ippolito (1993) concludes that the evidence is consistent with the hypothesis that

funds' risk-adjusted performance, net of expenses, is statistically indistinguishable from that of index funds. This literature, however, does not focus on the performance of funds that have recently been superior.

The possibility remains, therefore, that superior managers may be identifiable from their past performance and may outperform market indices over time.

Twists

The authors of the original papers have identified some interesting analytical "Twists". They include "rampant regression": the risk and return characteristics of a changing mix of mutual funds change over time, so regression coefficients based on time series data may be meaningless.

Survivor bias can also skew persistence results. Think of a casino full of monkeys, some making small bets, the others making large bets. At the end of each day, the losers quit, while the winners come back the next day to play on. The quant comes in on the third morning and asks all the remaining monkeys how much they won each day. Since he's talking only to survivors, the monkeys making larger bets will have won more both days than the monkeys making smaller bets. This looks like persistence; the monkeys who made more on the first day also made more on the second. Unless our quant thinks carefully about survivor bias, he will believe that he has identified the smart monkeys!

An issue that appears not to be explicitly discussed in the published literature is the usefulness of style-adjustment. Does Joe Investor really care why or how his manager generates returns? Is style sufficiently stable? Unless it stays substantially unchanged over the entire time period, which might be six years or more, adjusting for it may simply be introducing noise.

Finally there is the issue of data mining. To quote Sharpe (on his own study): "In no small measure, this is an exercise in data mining...As with any empirical study of this type, the reader is advised to proceed at his or her own peril."

Threads

Persistence studies identify at least two time periods. One is the selection period used to measure past performance. Another is the holding period, used to measure the persistence of that performance. For each study in each publication, we focus on the statistical technique used, the length of the selection and holding periods, whether risk adjustment or style adjustment was used in either or both periods, what evidence of persistence was found, and what the implications are for "Joe Investor".

Conclusions

Persistence is the hostage of adjustment. Depending on the risk adjustments and style adjustments that are applied, persistence can range from non-existent, to present but of only academic significance, to economically significant.

As the last slide in the presentation states, much of the evidence for persistence is really persistent underperformance: "hot hands" results are driven by "cold hands". Do *not* suppose that past underperformers are now "due" to outperform!

The statistical evidence for economically significant persistence of manager outperformance remains weak. The best positive evidence so far appears to be offered by Elton, Gruber, and Blake (1996), who show how a strategy using risk-adjusted returns and an optimal weighting system would have produced excess returns.

References

R.S. Carlson, 1970. "Aggregate Performance of Mutual Funds," J. *Financial and Quantitative Analysis*, vol. 5, pp. 1-32.

D. diBartolomeo, E.A. Godfredsen, 1990, "Investment Management: the Importance of Track Record," Annual Meeting of the Academy of Financial Services, Orlando, Fla.

S.J. Brown, W.N. Goetzmann, 1995, "Performance Persistence," *Journal of Finance*, forthcoming?

S.J. Brown, W. Goetzmann, R.G. Ibbotson, S.A. Ross (1992), "Survivorship Bias in Performance Studies," *The Review of Financial Studies*, vol. 5, no. 4, pp. 553-580.

P.C. Dunn, R.D. Theisen, 1983, "How Consistently Do Active Managers Win?," *Journal Portfolio Management*, vol. 9, pp. 47-50.

E.J. Elton, M.J. Gruber, 1992, "Portfolio Analysis with Non-Normal Multi-Index Return-Generating Process," *Review of Quantitative Finance and Accounting*, vol. 1, pp. 5-26.

E.J. Elton, M.J. Gruber, C.R. Blake, 1996, "The Persistence of Risk-Adjusted Mutual Fund Performance," *Journal of Business*, vol. 69, No. 2.

E.J. Elton, M.J. Gruber, S. Das, M. Hlavka, 1993, "Efficiency with Costly Information: A Reinterpretation of Evidence for Managed Portfolios," *Review of Financial Studies*, vol. 6, pp. 1-22.

E.J. Elton, M.J. Gruber, J. Rentzler, 1990, "The Performance of Publicly-Offered Commodity Funds," *Financial Analysts Journal*, vol. 46, July/August, pp. 23-30.

W.N. Goetzmann, R. Ibbotson, 1994, "Do Winners Repeat?," *Journal Portfolio Management*, vol. 20, Winter, pp. 9-18.

M. Grinblatt, S. Titman, 1992, "Performance Persistence in Mutual Funds," *Journal of Finance*, vol. 47, pp. 1977-84.

M. Grinblatt, S. Titman, 1988, "The Evaluation of Mutual Fund Performance: An Analysis of Monthly Returns," Working Paper, John E. Anderson School of Management, UCLA.

D. Hendricks, J. Patel, R. Zeckhauser, 1993, "Hot Hands in Mutual Funds: the Persistence of Performance 1974-1988," Journal of Finance, vol. 48, pp. 93-130.

R.A. Ippolito, "On Studies of Mutual Fund Performance, 1962-1991," *Financial Analysts Journal*, January/February, pp. 42-50.

M.C. Jensen, 1968, "The Performance of Mutual Funds in the Period 1945-1964," Journal of Finance, vol. 23, pp. 389-416.

R.N. Kahn, A. Rudd, 1995, "Does Historical Performance Predict Future Performance?," *Financial Analysts Journal*, November/December.

M. Kritzman, 1983, "Can Bond Managers Perform Consistently?," *Journal of Portfolio Management*, vol. 9, pp. 54-56.

B.N. Lehmann, D. Modest, 1987, "Mutual Fund Performance Evaluation: a Comparison of Benchmarks and a Benchmark of Comparisons," *Journal of Finance*, vol. 21, pp. 233-265.

A. Lobosco, D. diBartolomeo, 1996

SEC, 1971 See citation in E.J. Elton, M.J. Gruber, 1989, *Modern Portfolio Theory and Investment Management,* John Wiley and Sons, NY.

W.F. Sharpe, 1966, "Mutual Fund Performance," *Journal of Business*, vol. 39, pp. 119-38.

W.F. Sharpe, 1992, "Asset Allocation: Management Style and Performance Measurement," *Journal of Portfolio Management*, vol. 18, pp. 7-19.

W.F. Sharpe, 1996, "The Performance of Subsets of the LS100 Funds, 1985-1994," http://gsb-www.standford.edu/~wfsharpe/ls100_5.htm.

Does Performance Persist?

Leigh Sneddon, State Street Global Advisors

With thanks to Gordon Johnson, Colonial Management Associates

Do we expect persistence?

Yes, because

some managers (e.g. all Northfield clients) are skillful, and skill persists.

Just in case...

What if we find no persistence?

How would we explain that, given our persistent skill?

Fee increases?

EGB report successful funds do not impose greater fee increases!

What else?

Superior analysts get bid away once they build a track record.

Capacity: funds flow to successful performers, increasing market impact.

Relaxation! Urgency and drive are eliminated once a reputation is established.

Skill may be defeated by style mandates with mean-reverting styles.

Speaker's caveat

Somewhat random selection of research papers.

The scholars are split

For

Sharpe (1966): Sharpe ratio and Treynor index ranks from 1944 to 1953 predict Sharpe ratio ranks from 1954 to 1963.

Carlson (1970): funds with above-median returns over the preceding year typically repeat their superior performance.

An SEC study (1971): persistence in risk-adjusted mutual fund returns.

Lehmann and Modest (1987): persistent mutual fund alphas. Grinblatt and Titman (1988, 1992): the effect is statistically significant.

DiBartolomeo and Godfredsen(1990): historical mutual fund rankings are an effective means of forecasting future performance rankings.

Goetzmann and Ibbotson (1994): persistence in mutual funds from 1976-88.

Against

Jensen (1968):"..very little evidence that any individual fund was able to do significantly better than that which we expected from mere random chance".

Kritzman (1983): no evidence for persistence in data on 32 fixed-income managers retained by AT&T for at least 10 years.

Dunn and Thiesen (1983: no evidence of persistence in 201 institutional portfolios from 1973 to 1982.

Elton, Gruber and Rentzler (1990): performance did not persist for 51 publicly offered commodity funds from 1980 to 1988.

A hundred questions: which performance?

Performance can be

of stock or bond funds;

of winners or losers;

with or without various types of risk-adjustment;

relative to other managers or to market benchmarks;

before or after expenses and fees; and

with or without style adjustment.

"Does performance persist?"

has many meanings and so potentially many answers;

Our simple question is really more than 100 different questions!

Apparent disagreement may have less to do with disagreeing on the answer than not settling on the question.

What matters?

With index products available, outperforming other funds isn't enough.

To matter, research must show that

past performance is a guide to the future, *and*

a sufficiently good guide to beat the market.

A thread through the literature

Does the analysis simulate an executable strategy?

Are the returns risk- or style-adjusted?

What are the conclusions on persistence?

What are the statistical and investment-related 'twists'?

What do the results mean for Joe Investor?

Hendricks, Patel and Zeckhauser (1993)

Hot Hands in Mutual Funds:
Short-Run Persistence of Relative Performance, 1974-88

Autocorrelation analysis

Test		Autocorrelation: stacks of Xsnl regressions of residual returns on lagged returns.
Selection Period, 1	Length	1 qtr
	Risk/style adj	No
Holding Period, 2	Length	1 qtr, lagged
	Risk/style adj	Relative to mean; and to residuals from market model regressions.
Persistence?		Yes, for 4 qtrs, then reversal. 1% outperf ⇒ 30 bps over 4 qtrs, 20 over 8.
Joe Investor		No strategy simulation. No distinction between winners and losers.

HPZ (cont'd)

Strategy simulation

Test		Octile portfolios: alpha, t-stats, Spearman stats
Selection Period, 1	Length	1, 2, 4, 8 qtrs
	Risk/style adj	No
Holding Period, 2	Length	
	Risk/style adj	Jensen's alpha
Persistence?		Yes, with Spearman p-values < 1%.
Joe Investor		Spearman stats include losers. Winners' t-stat only significant w/ other funds as benchmark.

'Hot' really only means 'hot or cold'!

The title is "Hot Hands.."; the conclusion speaks of "substantial gains"; and the paper is widely represented as reporting persistence, *BUT...*

The case for persistent losers is much stronger than for winners.

The abstract claims only: "recent top performers do better, though not significantly so".

BGIR say "HPZ provide little reliable evidence of hot hands".

The difference between winners and losers is crucial for Joe Investor!

Twist #1 - Rampant regression

The characteristics of the top-performing funds change significantly over time, so a time series estimate of the intercept [alpha] is meaningless (EGB).

HPZ commit this sin, but

re-do the study, estimating fund betas separately,

assuming they remain constant over the sample period, and

using the mean of the fund betas in each quarter to determine portfolio alpha.

The "results are robust to .. changing composition of .. hot hands portfolios".

Twist # 2 - Survivor bias

Brown, Goetzmann, Ibbotson and Ross (1992): *Survivorship Bias in Performance Studies*

In a sample truncated by survivor bias, volatility differences create the appearance of persistence.

Screens out sample points on the negative side of the return distribution.

Restricting attention to the positive side means the more volatile funds will do better in both Period 1 and Period 2, creating the appearance of persistence.

Monkeys at the dime and $1,000 tables

Bad news: survivorship...

may create the appearance of persistence, even if it is so small it does not significantly affect average risk-adjusted returns.

is a total risk effect, so risk-adjustment using β may not fully correct for it.

Good news: impact is reduced if ...

it takes a long period of underperformance to kill a fund,

few funds actually terminate due to poor performance,

investors have advance notice of terminations.

HPZ say:

"Overall the results ... suggest that survivorship bias is probably not an important issue for performance studies with typical mutual fund samples"

Brown and Goetzmann (1995)

Performance Persistence

Contingency table counts funds in 4 groups, based on whether they were winners or losers in the selection and holding periods.

WW	WL
LW	LL

Test		Contingency table, plus bootstrapped probabilities
Selection Period, 1	Length	1 year
	Risk/style adj	With and w/o risk adjustment
Holding Period, 2	Length	1 year
	Risk/style adj	With and w/o risk adjustment
Persistence?		Yes: at about 1% level. (But 2 out of 12 yrs show sig reversal)
Joe Investor		'Winner' is relative to median mutual fund. Persistent losers contribute. Not a strategy simulation.

With absolute benchmarks:

the reliability of the persistence is reduced, and

most of the persistence is due to repeat losers.

Twist # 3 - probabilities and the real world

To know whether the result of a test is significant, we need the probability that it could be entirely due to chance.

A probability is based on a statistical model.

Standard tests give probabilities based on very simple models.

The world is usually not simple.

Valuable results may therefore require a realistic analysis of the null hypothesis to generate accurate probabilities.

Brown and Goetzman do this: they simulate the impact of real-world effects - fund attrition, correlations between funds, and heteroscedasticity - on the null hypothesis probabilities.

Brown and Goetzman, cont'd

Investable, rank portfolios

Test		Octile portfolios
Selection Period, 1	Length	1 year
	Risk/style adj	No
Holding Period, 2	Length	1 year
	Risk/style adj	Risk: Jensen's alpha
Persistence?		Best rank portfolio has α=4.6, but t=1.5 Best-worst shows significant alpha.
Joe Investor		The study includes load-funds, but ignores t-costs. Statistical significance only for best - worst.

'Preceding year performance appears to be an *excellent* predictor of negative alphas.'

'Evidence that historical information can be used to earn returns in excess of ... the S&P .. is weaker and depends on the time period'

Kahn and Rudd (1995)

Does Historical Performance Predict Future Performance?

KR perform regression and contingency table analysis on each of 3 measures of performance

total return;

selection, or style-adjusted, return; and

information ratio (selection return to selection risk).

Test		Regression of Period 2 perf on Period 1 perf		
Performance measures		Total return	Selection return	Selection I.R.
Selection Period, 1	Length	3 years		
	Risk/style adj	No	Style-adjusted	Style-adjusted
Holding Period, 2	Length	3 years		
	Risk/style adj	No	Style-adjusted	Style-adjusted
Persistence?		No	No	Yes
Joe Investor		Not much persistence. Influenced by losers, fees, and survivor bias.		

Kahn and Rudd, cont'd

Test		Contingency tables of Period 1 and Period 2 perf		
Performance measures		Total return	Selection return	Selection I.R.
Selection Period, 1	Length	3 years		
	Risk/style adj	No	Style-adjusted	Style-adjusted
Holding Period, 2	Length	3 years		
	Risk/style adj	No	Style-adjusted	Style-adjusted
Persistence?		Reverse persistence!	No	No
Joe Investor		Zzz		

KR's are our most negative results so far.

One difference is style-adjustment.

Twist # 4 - style adjustment

Is it necessary?

Identifying skill requires style adjustment.

Identifying funds that will make money does not: Joe Investor doesn't care why his managers make money.

Is it stable?

Will managers retain for 6 years style exposures determined by a style analysis over the prior 3 years?

For bottom-up, 'accidental' styles, probably not.

For mandated styles, perhaps they will.

Style-adjustment's usefulness here depends on the investor's objectives and the funds' mandates.

Elton, Gruber and Blake (1996)

The Persistence of Risk-Adjusted Mutual Fund Performance

EGB form rank portfolios based on past *risk-adjusted* return.

Test		Rank correlations
Selection Period, 1	Length	1,2,3 years
	Risk/style adj	Yes
Holding Period, 2	Length	1, 3 years
	Risk/style adj	Yes
Persistence?		Yes, 1% sig
Joe Investor		Losers contribute Not a simulation Returns are extensively adjusted

EGB's 'risk-adjustment' is comprehensive: r(fund) = alpha +

b1.R(SP500) + b2.R(Small - large) + b3.R(Growth - value) + b4.R(Bonds) +ε

This subtracts the impact of skillful, bottom-up tilts!

Results similar to HPZ but adjusting returns extends predictability to 3 yrs.

Elton, Gruber and Blake, cont'd

EGB compute statistical significance of alpha differences across deciles.

Top deciles returns beat average returns with significance at 1% level.

Only if selection based on risk adjusted returns!

Joe Investor says this is still not market relative.

Exploiting MPT

EGB find that using MPT to weight the funds in top decile gives large improvement (bet 50 and 90 bps per year).

Top-decile alphas from 70 to 150 bps per year.

Joe wants to know about the transaction costs.

Elton, Gruber and Blake, cont'd

Active *versus* passive (at last!)

Compute average sensitivities to the four indexes in their risk model.

From index funds, construct passive portfolio with these target betas.

Active portfolio by maximizes 3-year selection alpha, subject to betas.

No short sales; only funds in top two deciles.

Outperformance: 22 bps per year (51 after passive funds' fees).

Joe wants to know:

Is that likely to repeat / statistically significant?

Would it survive transaction costs?

Sharpe (1996)

The Performance of Subsets of the LS100 Funds, 1985-1994

Test		Quartile Portfolios
Selection Period, 1	Length	1, 2, 3 years
	Risk/style adj	Style adj ret
Holding Period, 2	Length	1 year
	Risk/style adj	Style adj ret
Persistence?		Yes, quartiles correctly ranked. "During the periods analyzed, strategies based on ...prior selection returns..outperformed their styles." ~ 70 to 80 bps per year
Joe Investor		Relative to the market? Significance? Transaction costs?

"The evidence is far from conclusive, statistically or economically."

Sharpe also raises the phantom of ...

Twist # 5 - data mining

Sharpe says (of his own study): 'In no small measure, this is an exercise in data mining.'

'If enough procedures are tested, once can invariably find some that would have "worked" in at least some periods.'

'... we summarize the results for all the methods that were tested. However, even this can provide a deceptive view, since the methods were chosen, to at least an extent, because they were similar to procedures that others had proposed, base on analyses of data from some of the years that we utilize.'

'As with any empirical study of this type, the reader is advised to proceed at his or her own peril.'

Conclusions

Sharpe says 'far from conclusive' but our gracious host requests conclusions!

Statistical persistence?

You bet.

Underperformers

Do *not* suppose that past underperformers are now 'due' to outperform!

Underperformance is persistent.

A strategy for outperformers?

Pick the best no-load funds, on a risk-adjusted basis, weight them using MPT, and go for it!

Probability of outperforming the index is at least 50-50.

A test to resolve all this

Simulation, including transaction costs, and defunct funds.

Compute realistic null hypothesis probabilities.

Risk-adjust only in period 1 (beta is dead).

Style adjust only in period 1 and only for mandated styles.