Introduction

- ▶ Active investment managers:
  - ▶ deviate from a passive benchmark
  - ▶ seek to outperform the benchmark
  - ▶ charge fees higher than passive (index) funds
- ▶ Active management's share of invested assets is roughly
  - ▶ 80% of U.S. equity mutual funds
  - ▶ 60% of U.S. pension funds, endowments, trusts
- ▶ Active fees range widely, depending on types of managers and investors
- ▶ Rough magnitudes of annual fee rates:
  - ▶ 0.40% for institutional investors in traditional products
  - ▶ 1% for mutual funds
  - ▶ 2% plus incentive fee (e.g., 20% of profit) for hedge funds
- ▶ Mutual funds: longest and cleanest data for analyzing performance.

Negative Net Performance

Mutual Fund Performance Results (Annualized)

A. Articles Using Mutual Fund Returns (Post Expenses)

		Average Performance
1.	Jensen (1968)	-1.1
2.	Lehman & Modest (1987)	Negative
3.	Elton, Gruber, Das & Hlavka (1993)	-1.59
4.	Gruber (1996)	-.65
5.	Elton, Gruber, Blake (1996c)	-.91
6.	Ferson and Schadt (1996)	+.24
7.	Carhart (1997)	-1.98
8.	Pastor, Stambaugh (2002)	-.86 to -1.25
9.	Elton, Gruber & Blake (2003)	-.91
10.	Fama & French (2010)	-.83
11.	Elton, Gruber & Blake (2011a)	Negative

B. Using Holdings Data (Pre-Expenses)

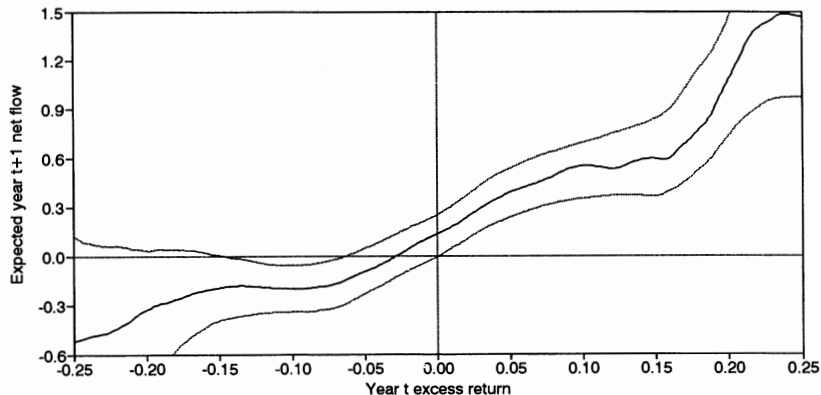|		
1.	Grinblatt & Titman (1989a)	(slight positive)
2.	Grinblatt & Titman (1993)	2.00%
3.	Daniel, Grinblatt, Titman & Wermers (1997)	.77
4.	Wermers (2002)	.71

source, Elton and Gruber, "Mutual Funds," 2011.

1.	Daniel, Grinblatt, Titman & Wermers (1997)	Timing ability

Performance and Future Flows - Young Funds

Fig. 1.—Flow-performance relationship $\hat{f}$ for young funds (age 2) with 90 percent confidence bands.

Performance and Future Flows - Older Funds
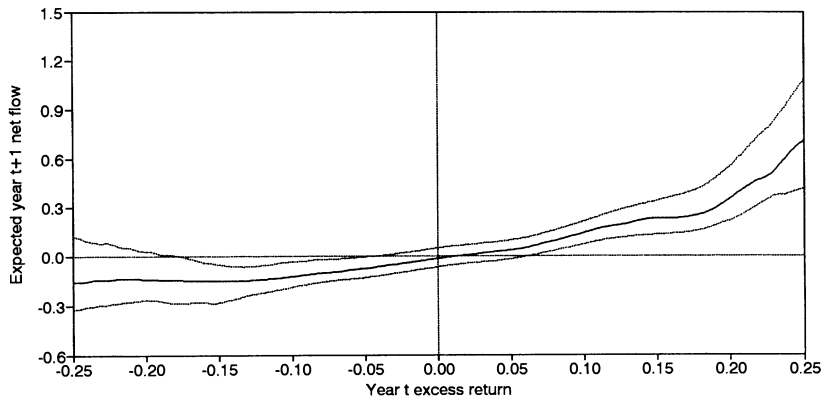
FIG. 2.—Flow-performance relationship $\hat{f}$ for old funds (age > 10) with 90 percent confidence bands.

Does performance persist?

- ▶ Is a fund with good (poor) past performance likely to have good (poor) future performance?
- ▶ Evidence of persistence in net returns is mixed at best.
- ▶ Any persistence seems limited to the short-run.
  - ▶ Funds with superior returns over a multi-year period do not exhibit superior multi-year future returns.
- ▶ Persistence is stronger at the bottom:
  - ▶ Funds with poor past returns are more likely to exhibit poor future performance.
  - ▶ Often these are funds with high turnover and fees.
- ▶ Persistence in good performance appears to be explained largely by
  - ▶ flows into good performers produces buying pressure, and thus temporarily good returns on those funds' stocks.
  - ▶ the momentum effect in stocks: recent winning stocks outperform recent losers

Questions/Puzzles

- ▶ Why should active management remain popular despite its track record?
- ▶ Why should money flow into funds with good past performance, given performance doesn't persist?
- ▶ Should we expect active management to outperform benchmarks?
- ▶ Does being large make it harder to outperform? In other words, are there decreasing returns to scale
  - ▶ for any given actively managed fund?
  - ▶ for the active fund industry?
- ▶ What are the implications of decreasing returns to scale?
- ▶ Is there evidence of skill?
  - ▶ Gross versus net returns
  - ▶ Do funds make more when they trade more?
- ▶ How should skill be measured?

Fund-Level Decreasing Returns to Scale

▶ Benchmark-adjusted net return on fund i in period $t+1$:

$$r_{i,t+1} = a_i - c(s_{i,t}) - f_i + \epsilon_{i,t+1}$$

  ▶ a_i: expected before-fee return if the fund were tiny
  ▶ $s_{i,t}$: size of fund i at end of period t
  ▶ $c(s_{i,t})$: a proportional cost, increasing in fund size $[\frac{dc}{ds} > 0]$
  ▶ f_i: proportional fee charged by manager of fund i

▶ Decreasing returns to scale $\Leftrightarrow \frac{dc}{ds} > 0$: Becoming larger makes it harder to outperform, because bigger trades cost more (greater market impact).

▶ Investors
  ▶ know $c(s_{i,t})$ but are uncertain about a_i
  ▶ assess a_i given the fund's available return history, $\Phi_{i,t}$

▶ At time t, investors assess fund i's alpha to be:

$$\begin{aligned} \alpha_{i,t} &= \mathsf{E}(r_{i,t+1}|\Phi_{i,t}) \\ &= \mathsf{E}(a_i|\Phi_{i,t}) - c(s_{i,t}) - f_i \end{aligned}$$

Equilibrium Implications (Berk and Green)

- ► Assume
    - ► there are many funds
    - ► the $\epsilon_{i,t+1}$'s are uncorrelated across funds
- ► Investors will invest/withdraw money such that

$$\alpha_{i,t} = \mathsf{E}(r_{i,t+1}|\Phi_{i,t}) = 0,$$

- ► Otherwise investors would perceive an arbitrage opportunity:
    - ► imagine numerous funds with $\alpha_{i,t} > 0$
    - ► form a well diversified portfolio of all those funds.
    - ► the $\epsilon_{i,t+1}$'s diversify away, so
    - ► the portfolio has positive alpha with zero non-benchmark risk.
    - ► hedging out (shorting) the benchmarks produces a riskless arbitrage profit.

Equilibrium Implications - continued

- At the end of period $t + 1$, investors assess $E(a_i|\Phi_{i,t+1})$
- The revision versus $E(a_i|\Phi_{i,t})$ is
  - upward if $r_{i,t+1} > 0$
  - downward if $r_{i,t+1} < 0$
  - smaller in magnitude, the longer is the return history $\Phi_{i,t+1}$
- Money flows to/from each fund to make

$$\alpha_{i,t} = E(r_{i,t+1}|\Phi_{i,t}) = 0,$$

- Because $\alpha_{i,t} = E(a_i|\Phi_{i,t}) - c(s_{i,t}) - f_i$ and $\frac{dc}{ds} > 0$,
  - funds with $r_{i,t+1} > 0$ get bigger ($s_{i,t+1} > s_{i,t}$)
  - funds with $r_{i,t+1} < 0$ get smaller ($s_{i,t+1} < s_{i,t}$)
- A fund with $E(a_i|\Phi_{i,t}) - f_i \leq 0$ dies.

Equilibrium Implications - continued

▶ Money rationally flows toward (away) from good (poor) past returns
  ▶ especially for younger funds: greater learning about a_i
▶ Superior returns do not persist.
▶ Skill does not produce positive alpha.
▶ More skill $\Rightarrow$ larger fund and/or higher fee.
▶ Potential measures of a fund's skill
  ▶ $\hat{a}_i$: estimated alpha if size were tiny
  ▶ average $s_{i,t} \times (r_{i,t+1} + f_i)$: before-fee benchmark-adjusted profit

Decreasing Returns to Scale for The AM Industry

▶ Suppose the active-management (AM) industry's α depends on the industry's size

$$\alpha = a - b(S/W)$$

where S is AM industry size and W is the size of the equity market.

  ▶ α becomes more elusive as more money chases it

▶ Given a negative track record

  ▶ we'd expect the AM industry to shrink
  ▶ but not as much as it would if investors thought $b = 0$

▶ Degree of decreasing returns (b) is uncertain

  ▶ How much better would the AM industry's track record be, had less been invested?

▶ Active management's 80% share of equity mutual funds

  ▶ is consistent with rational investing and slow learning about b
  ▶ would be puzzling if instead it were known that $b = 0$

Scale and Skill: Empirical Evidence

Scale:

- ▶ Strong evidence of decreasing returns to scale at **industry** level
    - ▶ Greater impact on high-turnover and high-volatility funds
- ▶ Mixed evidence of decreasing returns to scale at **fund** level
    - ▶ After removing econometric biases

Skill

- ▶ Estimated as expected benchmark-adjusted return if the fund's size and industry size were both tiny:
- ▶ Funds born more recently exhibit more skill:
    - ▶ Younger funds outperform older funds
- ▶ A fund's performance tends to decrease over its lifetime

Narrative

- New funds tend to be more skilled than existing funds
  - Education? Technology?

- Given their better skill, new funds tend to outperform ...
  - ... their benchmarks
  - ... older funds

- As these funds grow older, their performance suffers
  - Because industry keeps growing ($\Rightarrow$ more skilled competition)

Fund Sample

Data: CRSP and Morningstar, 1979–2011

- ▶ Check accuracy across databases (return, size, expense ratio)
- ▶ Build on Berk and Binsbergen (2012)
- ▶ Only domestic active equity funds with size $\geq$ \$15 million
- ▶ Benchmark-adjusted returns use Morningstar benchmarks

Final sample: $\sim$350,000 monthly observations of 3,126 funds

Distribution of fund skill over time

Panel A: Constant skill within funds
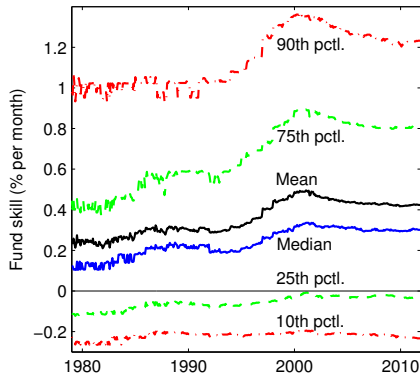
Panel B: Age–varying skill within funds
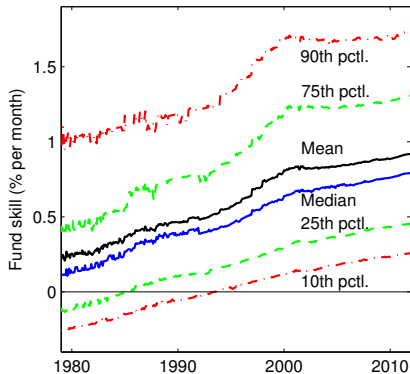
Average active fund performance over time
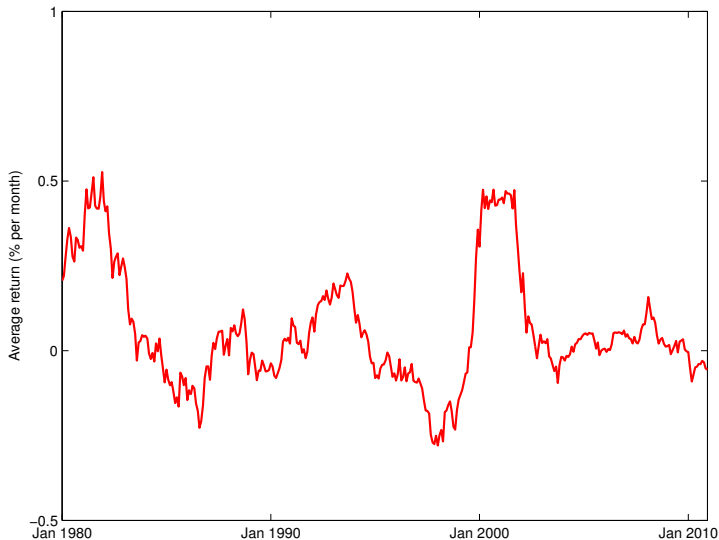
AM industry size over time
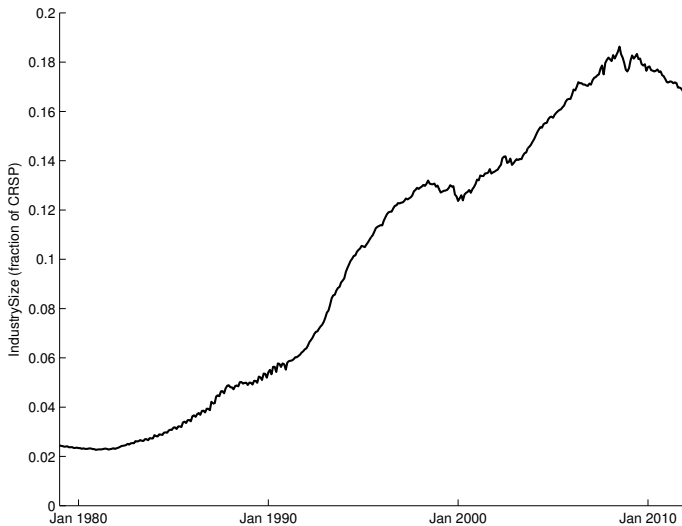
Estimated fund performance if the AM industry had not grown
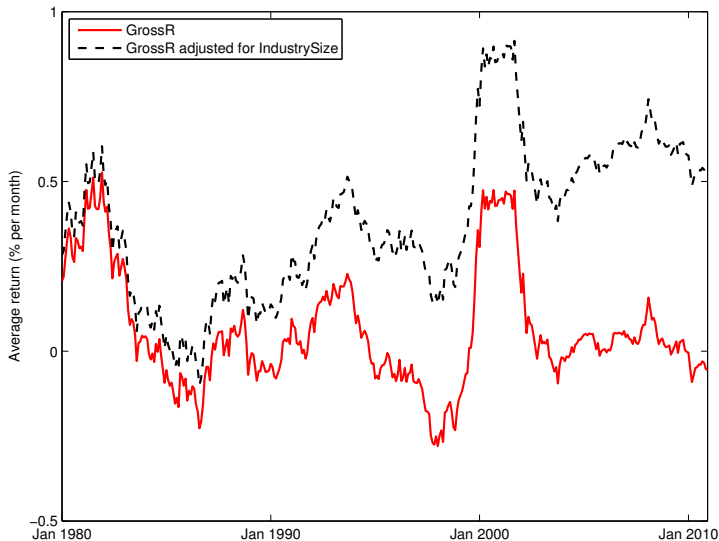
Fund age vs. performance

Prediction:

Fund's skill constant

Industry-level DRTS $\left.\right\}$ Performance ↓ over fund's life

Industry size ↑

Age-based investment strategies

	Average return for age range (yrs)			
Return	[0, 3]	(3, 6]	(6, 10]	>10
Before fees	0.084	0.056	0.020	0.012
	(2.33)	(1.45)	(0.55)	(0.30)
After fees	-0.005	-0.052	-0.084	-0.083
	(-0.15)	(-1.38)	(-2.29)	(-2.07)

	Average differences		
Return	[0,3] - (>10)	(3,6] - (>10)	(6,10] - (>10)
Before fees	0.072	0.043	0.008
	(2.85)	(2.48)	(0.52)
After fees	0.077	0.031	-0.001
	(3.10)	(1.79)	(-0.08)

t-statistics in parentheses below average returns

Do Funds Make More When They Trade More?

- **Idea:**
  - A fund trades more when it perceives better opportunities
  - If the fund is skilled, perceived opportunities produce profits

  $\Rightarrow$ A skilled fund should earn more after trading more

- When a fund trades more than usual, does it subsequently perform better?
  - Do funds know when it's a good time to trade?

Main Result

- Active mutual funds perform better after trading more
- Positive turnover-performance relation: $b > 0$ in

$$R_{i,t} = a_i + b \, \textit{FundTurn}_{i,t-1} + \epsilon_{i,t}$$

  - $R_{i,t}$: Fund i's benchmark-adjusted gross return in month t
  - $\textit{FundTurn}_{i,t-1}$: Fund i's turnover for most recent 12-month period before month t ($= \min(\text{buys},\text{sells})/\text{TNA}$)
  - Fund-specific intercept $a_i \Rightarrow b$ reflects relation over time for any given fund i
- For the typical fund, $b = 0.0012$ (t-statistic: 7.08)
- Turnover $\uparrow$ 1.0 std. dev. $\Rightarrow$ performance $\uparrow$ 0.66 % per year
- Cross-sectional turnover-performance relation is weaker
  - High-turnover funds don't perform much better than low-turnover funds

Turnover-Performance Relation: Different Across Funds?

- ▶ Should be stronger for funds trading less liquid stocks
  - ▶ For a given amount of turnover, the trading costs are higher
  - ▶ Higher current trading costs must be justified by higher expected subsequent return
  - ▶ A given amount of turnover is followed by higher subsequent return on average
  - ▶ Which funds? More likely small-cap funds and small funds

- ▶ Should be stronger for funds with greater skill
  - ▶ More of their turnover exploits true profit opportunities
  - ▶ Which funds? More likely high-fee (high-expense) funds

Turnover-Performance Slope (b) Across Fund Categories

	Stock-Size Category		
Small Cap	Mid Cap	Large Cap	Small–Large
0.00302	0.00114	0.00100	0.00202
(7.60)	(3.38)	(4.17)	(4.49)

	Fund-Size Category		
Small	Medium	Large	Small–Large
0.00195	0.00089	0.00037	0.00158
(7.86)	(4.12)	(1.24)	(4.51)

	Expense-Ratio Category		
High	Medium	Low	High–Low
0.00161	0.00099	0.00077	0.00084
(6.02)	(5.02)	(3.60)	(3.09)

	Value vs. Growth Category		
Growth	Blend	Value	Growth–Value
0.00155	0.00111	0.00184	-0.00029
(5.61)	(4.85)	(4.35)	(-0.54)

Turnover and Performance by Fund Category

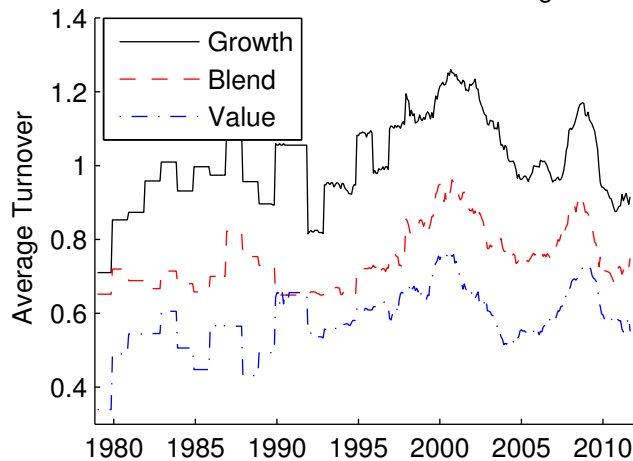| Funds included	Number of funds	Fund turnover (fraction/year)			Average benchmark-adjusted return (%/month)	
		Average	Volatility	Autocorr.	Gross	Net
Full Sample						
All	2721	0.850	0.450	0.507	0.0389	-0.0585
Stock-Size Categories						
Small-Cap	572	0.914	0.418	0.479	0.1913	0.0896
Mid-Cap	597	0.974	0.485	0.511	-0.0068	-0.1074
Large-Cap	1291	0.758	0.425	0.507	0.0161	-0.0783
Small − Large		0.156	-0.007	-0.028	0.1752	0.1679
(t-statistic)		(4.62)	(-0.34)	(-0.92)	(3.81)	(3.75)
Fund-Size Categories						
Small	1258	0.908	0.478	0.422	0.0519	-0.0489
Medium	802	0.897	0.464	0.496	0.0533	-0.0525
Large	659	0.759	0.410	0.603	0.0146	-0.0761
Small − Large		0.149	0.068	-0.181	0.0373	0.0272
(t-statistic)		(5.39)	(3.95)	(-5.35)	(2.48)	(1.81)

Turnover and Performance by Fund Category (cont.)

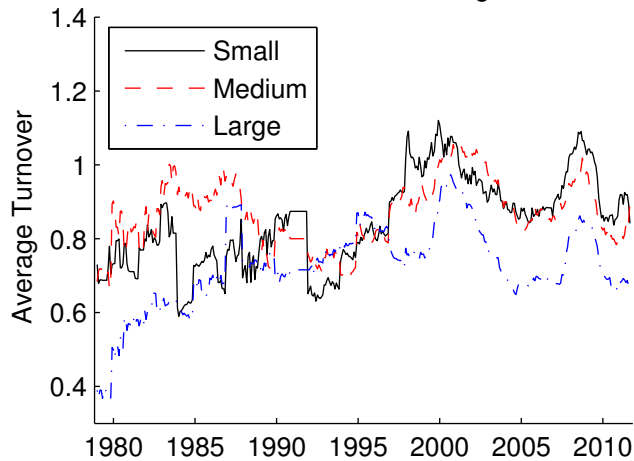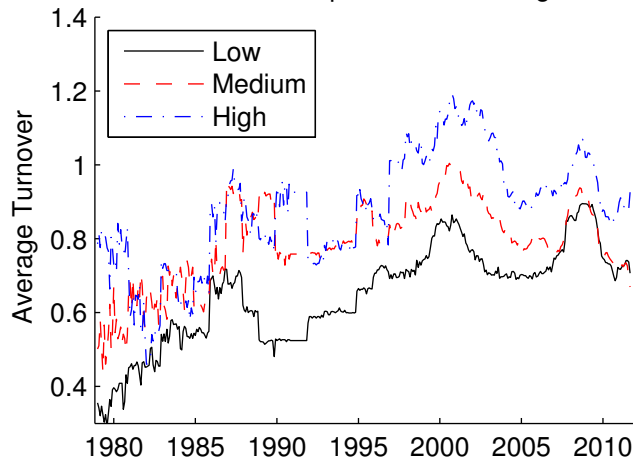| Funds included	Number of funds	Fund turnover (fraction/year)			Average benchmark-adjusted return (%/month)	
		Average	Volatility	Autocorr.	Gross	Net
Fund-Expense-Ratio Categories						
High	1019	0.978	0.511	0.485	0.0812	-0.0619
Medium	848	0.837	0.422	0.519	0.0287	-0.0705
Low	854	0.730	0.377	0.492	0.0074	-0.0611
High − Low		0.248	0.134	-0.006	0.0738	-0.0009
(*t*-statistic)		(7.75)	(6.86)	(-0.20)	(4.58)	(-0.05)
Value-Growth Categories						
Growth	1016	1.056	0.499	0.504	0.1097	0.0136
Blend	803	0.772	0.434	0.534	0.0019	-0.0939
Value	639	0.611	0.335	0.424	0.0154	-0.0834
Growth − Value		0.445	0.164	0.081	0.0943	0.0971
(*t*-statistic)		(15.41)	(9.04)	(2.37)	(2.20)	(2.28)

Panel A: Stock Size Categories — Average Turnover, with Small Cap, Mid Cap, and Large Cap series.
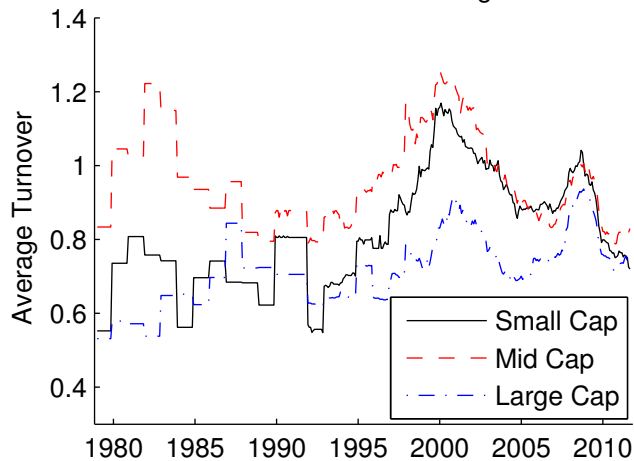
Panel B: Stock Value−Growth Categories — Average Turnover, with Growth, Blend, and Value series.

Panel C: Fund Size Categories — Average Turnover, with Small, Medium, and Large series.

Panel D: Fund Expense Ratio Categories — Average Turnover, with Low, Medium, and High series.

# Correlations of Average Turnover Across Fund Categories

Stock Size	S	M	L	Value-Growth	G	B	V
Small	1.00			Growth	1.00		
Mid	0.59	1.00		Blend	0.76	1.00	
Large	0.67	0.18	1.00	Value	0.80	0.62	1.00

Fund Size	S	M	L	Expense Ratio	L	M	H
Small	1.00			Low	1.00		
Medium	0.54	1.00		Medium	0.76	1.00	
Large	0.52	0.44	1.00	High	0.74	0.74	1.00

Mispricing and Funds' Common Variation in Turnover

- ▶ Turnover varies over time in manner that is correlated across funds
- ▶ Do funds trade more when mispricing is more likely?
  - ▶ mispricing → profit opportunities
- ▶ Three proxies for greater mispricing in the stock market:
  - ▶ High investor sentiment
  - ▶ High volatility
  - ▶ Low liquidity
- ▶ Common component of fund trading: cross-sectional average of turnover
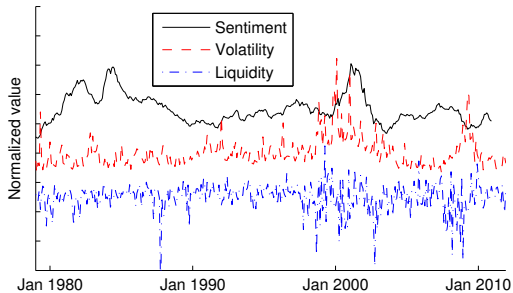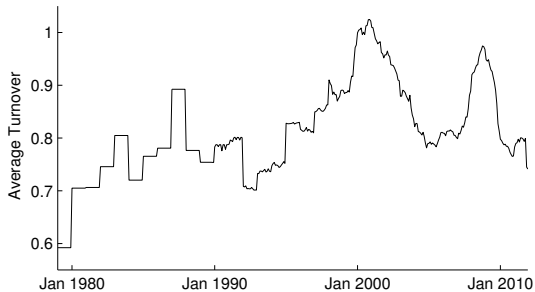
What Explains Turnover?

Independent	Dependent variable: (Individual Fund Turnover)$_t$				Dependent variable: (Average Fund Turnover)$_t$			
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sentiment$_t$	0.0359			0.0232	0.0531			0.0487
	(3.27)			(2.87)	(3.17)			(4.65)
Volatility$_t$		0.747		0.540		0.938		0.809
		(7.69)		(5.56)		(7.23)		(7.98)
Liquidity$_t$			-0.192	-0.0869			-0.212	-0.138
			(-4.53)	(-3.88)			(-4.14)	(-4.58)
Business Cycle$_t$				-0.0122				-0.00334
				(-1.84)				(-0.66)
Market Return$_t$				-0.0365				0.0171
				(-1.34)				(0.34)
Time Trend$_t$	0.0000	-0.0001	-0.0001	-0.0001	0.0006	0.0004	0.0005	0.0005
	(0.06)	(-0.53)	(-0.83)	(-0.47)	(5.21)	(3.88)	(3.44)	(5.20)
R^2	0.002	0.008	0.001	0.010	0.524	0.541	0.377	0.677
$R^2 - R^2$(trend only)	0.002	0.008	0.001	0.010	0.171	0.188	0.024	0.324
Observations	263,895	272,413	272,413	263,895	372	382	382	372

Turnover of Similar Funds Helps Predict Performance

- ▶ In a period with high turnover of funds similar to fund i
  - ▶ Greater mispricing of stocks in fund i's likely trading universe
  - ▶ More profit from any given opportunity identified by fund i
  - ⇒ high turnover by similar funds predicts high fund i performance
- ▶ *AvgTurnSim*: average turnover of other funds in the same categories as fund i for
  - ▶ stock size
  - ▶ fund size
  - ▶ expense ratio
- ▶ Regression evidence:

$$R_{i,t} = a_i + b \, FundTurn_{i,t-1} + c \, AvgTurnSim_{i,t-1} + \epsilon_{i,t}$$

	Estimate	t-statistic
b	0.00135	7.30
c	0.00184	2.76

Sample Exam Questions

1. If investors in a given mutual fund do not expect its net returns to provide positive alpha, why is it reasonable that the fund could still be large?

2. Suppose benchmark-adjusted returns on mutual funds exhibit no persistence. That is, the fact that a fund performed better than its benchmark in the past does not make it more likely that it will do so in the future. Is it reasonable that investors nevertheless chase returns, by moving money into funds that have performed well and out of those that have under-performed?

Answers

1. The fund's large size can simply reflect a high level of skill by a manager who also faces decreasing returns to scale. With decreasing returns to scale, if the fund were to shrink while keeping its fee rate fixed, its alpha would increase, thereby offering investors positive alpha. Investors would then be attracted by that positive alpha and invest more in the fund, driving its alpha down. This positive flow into the fund would occur up to the point at which the fund's alpha is driven to zero.

2. Yes. Good performance causes investors to update their assessment of the manager's skill. They thus raise their assessment of the fund's true alpha given its previous size. If their previous assessment of that alpha was zero, their new assessment is positive. The positive alpha attracts more money, but the increase in fund size then lowers the alpha if the manager faces decreasing returns to scale. This positive flow occurs up to the point at which the fund's alpha is driven down to zero, and thus the likelihood of future out-performance is no greater than any other fund. Similarly, money moves out of an under-performing fund, driving its newly assessed alpha up to zero, so the likelihood of future under-performance is again no greater than any other fund.