Discussion of:
What do fund flows reveal about asset pricing models and investor sophistication?

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Outline

1. Quick literature review:
   - Basic framework: Berk and Green (2004)
   - "...asset pricing models..." (Berk and van Binsbergen, 2016)
   - "investor sophistication" (Barber, Huang, and Odean, 2016)
2. Outline framework for thinking about these models.
3. Jegadeesh & Mangipudi (JM) — econometric issues:

Fama and French (2010)

- Average mututal fund performance, gross and net of fees:

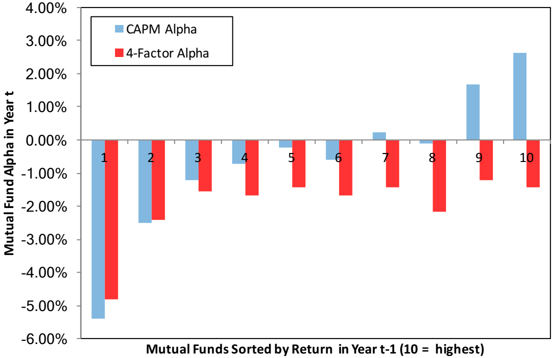
The period is January 1984 through September 2006. On average there are 1,308 funds and their average AUM is $648.0 million.

	$12 * a$						
	Net	Gross	b	s	h	m	R^2
EW Returns							
Coef	−1.11	0.18	1.01				0.96
t(*Coef*)	−1.80	0.31	1.12				
Coef	−0.93	0.36	0.98	0.18	−0.00		0.98
t(*Coef*)	−2.13	0.85	−1.78	16.09	−0.24		
Coef	−0.92	0.39	0.98	0.18	−0.00	−0.00	0.98
t(*Coef*)	−2.05	0.90	−1.78	16.01	−0.25	−0.14	
VW Returns							
Coef	−1.13	−0.18	0.99				0.99
t(*Coef*)	−3.03	−0.49	−2.10				
Coef	−0.81	0.13	0.96	0.07	−0.03		0.99
t(*Coef*)	−2.50	0.40	−5.42	7.96	−3.22		
Coef	−1.00	−0.05	0.97	0.07	−0.03	0.02	0.99
t(*Coef*)	−3.02	−0.15	−5.03	7.78	−3.03	2.60	

- Their results, for the full set of actively managed mututal funds, is broadly consistent with Jensen (1968).
- Note that the FF also use the Vanguard S&P 500 net returns as an alternative benchmark, and get the same result.

Carhart (1997)

- Net of fee returns:



- Fund return over year $t-1$ forecasts α^{CAPM} over year t.
- Explained by persistence in holdings and individual firm momentum, not skill.

Convex Flow-Performance Relationship

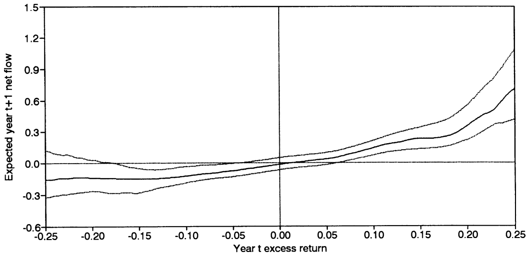


FIG. 2.—Flow-performance relationship $\hat{f}$ for old funds (age > 10) with 90 percent confidence bands.

- Chevalier and Ellison (1997) and Sirri and Tufano (1998) demonstrate a positively sloped, convex relation between past returns and fund flows.

Berk and Green (2004)

Berk and Green (2004):

"Mutual fund flows and performance in rational markets"

- Manager "skill" exists, but is limited.
  - $\Rightarrow$ pre-expense "gross" $\alpha > 0$, but falls with fund AUM
- Large number of rational, competitive fund investors.
  - $\Rightarrow$ post-expense "net" $\alpha = 0$.
    - i.e., manager's capture all rents.
- Investors estimate manager skill, at least partly, from historical returns/alphas.
  - Assuming fixed expense ratio, high fund past returns $\Rightarrow$
    - inflows.
    - future gross-alpha $\times$ AUM higher.
    - future net-alphas zero.

Berk and van Binsbergen (2016)

Berk and van Binsbergen (2016):

"Assessing asset pricing models using revealed preference"

- Examine flow response to mutual fund past performance.
- Find that realized $\hat{\alpha}^{\text{CAPM}}$ best forecasts future fund flows.
- Specifically:
  1. Flows aren't related to funds' market-adjusted returns.
  2. Flows are related to realized alpha related to size, value, momentum factors exposure, and to residual returns.
  3. Flows are better explained by the residual returns from the CAPM than the residuals from a Campbell and Cochrane (1999), Bansal and Yaron (2004), or multifactor (FF/FFC) model.

Berk and van Binsbergen (2016)

- BvB's conclusion is that these results are consistent with the CAPM being the "correct" risk model.
- *Intuition:* Any past return orthogonal to the market provides information about manager skill.
  - That it, if in a given month a fund earned an extra 5% as a result of loading on industry, or any other factor, it would be equally informative about skill as if it earned a high firm specific return.
- High past returns that come from high market realizations are not informative about skill.

Barber, Huang, and Odean (2016)

Barber, Huang, and Odean (2016):

"Which factors matter to investors? Evidence from mutual fund flows"

- Run a time-series regression of excess monthly fund returns on a set of "factors" over the preceding 60 months:

$$r_{p,t} = \alpha_p + \beta_p r_{m,t} + s_p \mathrm{SMB}_t + h_p \mathrm{HML}_t + m_p \mathrm{UMD}_t + \sum_{k=1}^{3} i_p^k \mathrm{IND}_t^k + e_{p,t}$$

  where $\mathrm{IND}_t^{\{1,2,3\}}$ are the first three Pástor and Stambaugh (2002a,b) mutual-fund/industry principal components.
- Like Berk and van Binsbergen (2016), BHO find that flows respond to every component of the funds' return *except* the market-component.

Barber, Huang, and Odean (2016)

- However, BHO's interpretation is very different.
- BHO argue that high returns resulting on loading on any factor should *not* result in inflows in a fully rational world:
- Intuitively, a high return because you load on the tech industry is likely not indicative of skill.
- BvB would respond (I think) that the inflows wouldn't happen if they weren't indicative of skill (because investors are rational).
  - If you could show that the inflows resulted in future negative net alphas, this would be inconsistent with the BvB model.

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- This paper says both BvB and BHO are wrong.
- *Setup:* Suppose

$$r_{p,t} = \alpha_p + \sum_{k=1}^{J} \beta_{p,k} F_{k,t} + \epsilon_{p,t}$$

where:

1. $r_{p,t}$ is the gross excess return of fund p.
2. $\alpha_p > 0$, falls with increasing fund AUM
3. $F_{k,t}$ is the excess return on an investable portfolio:
4. It is a J factor world, but $K \leq J$ factors are priced:

$$\begin{aligned} \mathbb{E}[F_{k,t}] &= \lambda_k > 0 & k &= 1, \ldots, K \\ \mathbb{E}[F_{k,t}] &= 0 & k &= K+1, \ldots, J \end{aligned}$$

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$$r_{p,t} = \alpha_p + \sum_{k=1}^{J} \beta_{p,k} F_{k,t} + \epsilon_{p,t}$$

- Consider an investor in a BG (1999) like setting.
    - In equilibrium, the net-of-fee alpha must be zero, so if investors revise upward their estimate of a fund's gross α, this will result in inflows into the fund.
    - What will cause them to do this?
- *What happens to a rational Bayesian's estimate of α_p on viewing $r_{p,t}$?*

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$$r_{p,t} = \alpha_p + \sum_{k=1}^{J} \beta_{p,k} F_{k,t} + \epsilon_{p,t}$$

- What is wrong with the BvB argument that you should ignore all but the K priced factors?
  - Controlling for these can improve the precision of the estimator $\hat{\alpha}_p$
- What is wrong with the BHO argument that you should control for the exposure to —em all factors, priced or unpriced?
  - If β estimation error ($\sigma^2_{\hat{\beta}-\beta}$) is high enough, and σ^2_{β} is sufficiently small, excluding certain factors can improve R^2_{adj} and increase precision of $\hat{\alpha}$.

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$$r_{p,t} = \alpha_p + \sum_{k=1}^{J} \beta_{p,k} F_{k,t} + \epsilon_{p,t}$$

- Consider an investor in a BG (1999) like setting.
  - In equilibrium, the net-of-fee alpha must be zero, so if investors revise upward their estimate of a fund's gross α, this will result in inflows into the fund.
  - What will cause them to do this?
- Key question: *how should an investor optimally update her estimate of α_p on seeing a realization of $r_{p,t}$?*

Simulation

- Simulated fund returns for 1990-2017 are generated according to:

$$r_{p,t} = \alpha_p^{\text{true}} + \mathbb{E}^{\text{model}}[r_p] + \beta_p \tilde{r}_{m,t} + s_p \widetilde{\text{SMB}}_t + h_p \widetilde{\text{HML}}_t + m_p \widetilde{\text{UMD}}_t + \sum_{k=1}^{3} i_p^k \widetilde{\text{IND}}_t^k + \epsilon_{p,t}$$

where:

1. all RHS factors are demeaned.
2. $\epsilon_{p,t} \sim i.i.d.\ \mathcal{N}(0, \sigma^2)$ with $\sigma = 1.8\%$ (monthly)
3. α_p^{true} constant over life of fund; $\alpha_p^{\text{true}} \sim \mathcal{N}(0, \sigma^2)$ with $\sigma = 0.2\%$.
4. fund βs constant over life of fund; β dist'n matches sample distribution.
5. Fund entry and exit matches actual fund entry and exit.

Simulation — Flows

$$r_{p,t} = \alpha_p^{\text{true}} + \mathbb{E}^{\text{model}}[r_p] + \beta_p \tilde{r}_{m,t} + s_p \widetilde{\text{SMB}}_t + h_p \widetilde{\text{HML}}_t$$
$$+ m_p \widetilde{\text{UMD}}_t + \sum_{k=1}^{3} i_p^k \widetilde{\text{IND}}_t^k + \epsilon_{p,t}$$

- The month-t flow into fund p is:

$$\text{flow}_{p,t} = a + b \times \alpha_p^{\text{true}} + \psi_{p,t}$$

- This flow modeling decision seems to go against the spirit of the exercise.
- Why not:
  1. α_p^{true} drawn from distribution at fund entry.
  2. Each month, Bayesian investor updates estimate of $\hat{\alpha}_{p,t}$ – the mean of the posterior dist'n of α_p^{true}
  3. $\text{flow}_{p,t} \propto (\hat{\alpha}_t - \hat{\alpha}_{t-1})$

Simulation — Other Issues

$$r_{p,t} = \alpha_p^{\text{true}} + \mathbb{E}^{\text{model}}[r_p] + \beta_p \tilde{r}_{m,t} + s_p \widetilde{\text{SMB}}_t + h_p \widetilde{\text{HML}}_t + m_p \widetilde{\text{UMD}}_t + \sum_{k=1}^{3} i_p^k \widetilde{\text{IND}}_t^k + \epsilon_{p,t}$$

Other Issues:

- I'm not sure the α should remain constant.
  - Even if the manager skill is constant, if the fund grows that α should shrink.
- The only kind of "skill" allowed here is security selection.
  - This isn't that unreasonable; evidence suggests that most fund manager skill is this type.
- However, perhaps factor timing (and or market timing) should also count as skill.
- I don't think this will change the key findings of the simulation.

Simulation Results

Table 7, Panel B:

Panel B: CAPM						
	Horizon					
Model:	3 months	6 months	1 year	2 years	3 years	4 years
Raw Return	50.22	50.50	50.95	50.92	51.18	52.47
Return-R_f	50.23	50.49	50.93	51.15	51.19	51.96
Return-Market	50.45	50.88	51.60	52.88	53.95	54.78
CAPM	50.45	50.89	51.65	53.01	54.11	55.06
FF3	50.54	51.05	51.96	53.51	54.64	55.83
FFC4	50.55	51.07	51.99	53.61	54.80	55.90
FFC4+3 IND	50.59	51.12	52.10	53.78	55.01	56.17
Order of coefficients:						
1st Best	FFC4+3 IND	FFC4+3 IND	FFC4+3 IND	FFC4+3 IND	FFC4+3 IND	FFC4+3 IND
2nd Best	FFC4	FFC4	FFC4	FFC4	FFC4	FFC4
3rd Best	FF3	FF3	FF3	FF3	FF3	FF3
Coefficient Difference Test						
(FFC4+3 IND) – CAPM	0.142	0.221	0.445	0.766*	0.902	1.112*
	(0.153)	(0.179)	(0.304)	(0.436)	(0.585)	(0.627)

- Ordering of coefficients is unchanged with constant ER or FF3 model.

Forecasting αs

Table 8, Panel C:

Panel C: Dependent Variable is 12-month future alpha				
	Future alpha based on:			
	Mkt Adj.	Benchmark Adj.	CAPM	FF3
Past alphas based on:				
Mkt Adj.	0.920*	0.491	0.863	0.988***
	(0.531)	(0.314)	(0.542)	(0.305)
Benchmark Adj.	0.522	0.663	0.474	0.681**
	(0.474)	(0.432)	(0.421)	(0.304)
CAPM	0.765*	0.333	0.983*	0.590***
	(0.458)	(0.257)	(0.503)	(0.226)
FF3	0.499	0.452	0.664	0.708**
	(0.574)	(0.387)	(0.535)	(0.344)
FFC4	0.815**	0.687***	1.109***	0.966***
	(0.353)	(0.264)	(0.359)	(0.236)
FFC4+3 IND	0.760**	0.641**	0.963**	0.939***
	(0.364)	(0.265)	(0.376)	(0.253)
Max-Min	0.422	0.354*	0.635**	0.398***
Max-CAPM	0.156	0.354*	0.126	0.398***
Max-Market Adj.	0	0.196	0.246	0
Max Coefficient	Mkt Adj.	FFC4	FFC4	Mkt Adj.
2nd Biggest	FFC4	Benchmark Adj.	CAPM	FFC4
3rd Biggest	CAPM	FFC4+3 IND	FFC4+3 IND	FFC4+3 IND

- Note that these are *post-expense* alphas.
- Should FFC model also be a column?

Forecasting αs

Table 9, Panel C:

Panel C: Top-Bottom Decile

	1-month holding period				6-month holding period				12-month holding period			
	Model to compute forward alpha				Model to compute forward alpha				Model to compute forward alpha			
	Market Adj.	B/M Adj.	CAPM	FF3	Market Adj.	B/M Adj.	CAPM	FF3	Market Adj.	B/M Adj.	CAPM	FF3
Sorted On Alpha from:												
Market Adj. Ret.	0.542**	0.350**	0.540**	0.606***	1.883	1.225*	1.691	2.408**	2.282	1.025	1.533	3.738
	(0.245)	(0.158)	(0.245)	(0.221)	(1.144)	(0.720)	(1.259)	(1.094)	(2.195)	(1.313)	(3.104)	(2.271)
Benchmark Adj. Ret.	0.472**	0.481**	0.490**	0.547***	1.667	2.010**	1.570	2.151**	1.715	2.696	1.401	3.005*
	(0.201)	(0.206)	(0.198)	(0.182)	(1.019)	(0.991)	(1.044)	(0.933)	(1.703)	(1.693)	(2.350)	(1.715)
CAPM	0.509**	0.437***	0.521**	0.582***	1.709*	1.467**	1.417	1.967**	1.670	1.535	0.722	2.088
	(0.226)	(0.153)	(0.226)	(0.204)	(0.932)	(0.630)	(1.103)	(0.899)	(1.827)	(1.054)	(2.900)	(1.651)
FF3	0.187	0.299**	0.156	0.287*	0.546	1.110	0.095	1.032	0.476	1.331	-0.907	1.721
	(0.180)	(0.151)	(0.182)	(0.156)	(0.926)	(0.685)	(1.087)	(0.752)	(1.924)	(1.313)	(2.618)	(1.280)
FFC4	0.348***	0.379***	0.370***	0.436***	1.448**	1.638***	1.517***	1.926***	1.736*	2.104**	1.846*	2.934***
	(0.130)	(0.119)	(0.128)	(0.124)	(0.571)	(0.530)	(0.569)	(0.610)	(0.978)	(0.816)	(1.107)	(0.998)
FFC4+3 IND	0.231*	0.349***	0.242*	0.310**	0.899	1.357**	0.995*	1.323**	0.782	1.593*	1.061	1.890
	(0.127)	(0.121)	(0.126)	(0.121)	(0.597)	(0.549)	(0.583)	(0.627)	(1.089)	(0.864)	(1.185)	(1.230)

- Note that these are *post-expense* alphas.

Forecasting alphaJM

- JM show that past alphas forecast future alphas.
  - However, these are alphas from the CRSP MF database
  - That means that these are net-of-fee alphas
    - Consistent with Carhart (1997), JM find that past alphas forecast future alphas w.r.t. the market.
- Recall that, in a BG(1999) setting,

$$\mathbb{E}[\alpha_{p,t}^{\text{net}} | \mathcal{F}_{t-1}] = 0$$

for all funds p at all times t.

Other Comments

- There is an interesting new paper, Roussanov, Ruan and Wei (2018), "Marketing Mutual Funds," that shows that mutual fund marketing expenses lead to inflows.
  - These expenses are effectively charged to investors.
- Moskowitz and Matvos (2018?) have some interesting new work looking at the decomposition of net flows.
  - Gross inflows and outflows generally dwarf net flows.

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