Asset (Active) Management

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Banking and Financial Intermediation

Quick Brush-up in Class

Requirements

- CAPM
- Multifactor Asset Pricing Models (e.g. Fama and French 1993)
- Bayesian Probability

Quick Brush-up: Bayesian Learning

Bayes Rule

$$P(X|Y) = \frac{P(Y|X)P(X)}{P(Y)} \tag{1}$$

Consider an unknown parameter θ from a population (e.g. the expected value). The beliefs (probability distribution= about this parameter can be computed using Bayes Rule as new data arrives.

$$P(\theta|\text{Data}) \propto P(\text{Data}|\theta)P(\theta)$$

Or in Bayesian Probability terminology

$$\text{Posterior} \propto \text{Likelihood} \times \text{Prior} \tag{2}$$

Given some prior beliefs, Bayes rule updates the entire probability distribution by using the likelihood of the data observed based on θ. This process of updating probability distribution is what Economists call Rational learning or Bayesian learning.

Normal Conjugates

When the posterior comes from the same family of distributions, we say that we have a conjugate prior. The mathematics of Bayesian updating over continuous distribution are not simple, but we can use the main results to obtain some intuition. Assume we are interested in the expected value of the distribution. If $\mu \sim \mathcal{N}(\mu_0, \sigma_0)$ and $x|\mu \sim \mathcal{N}(\mu, \sigma^2)$

$$\mu|x \sim \mathcal{N}\Big(\frac{\sigma_0^2}{\sigma^2 + \sigma_0^2}x + \frac{\sigma^2}{\sigma^2 + \sigma_0^2}\mu_0, \big(\frac{1}{\sigma_0^2} + \frac{1}{\sigma^2}\big)^{-1}\Big)$$

Introduction

What is Asset Management?

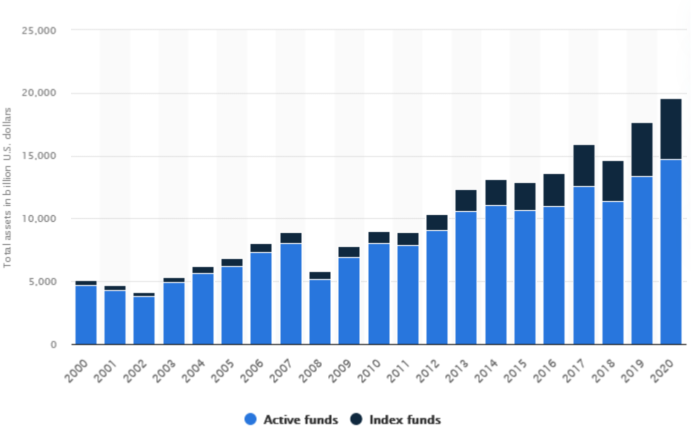
- Is the practice of maximizing investor preferences, normally related to the risk-return trade-off by acquiring, maintaining, and trading investments.
- In most cases this activity is delegated to asset management professionals, who might work independently or for an investment bank or other financial institution (such as funds).

Quick Recap - Passive vs Active Investment

According to the Capital Asset Pricing Model

- With mean variance preferences, rational expectations (subjective and objective probabilities coincide), and no short restrictions, investors' relative demand for risky securities is the same regardless of their risk aversion.
- The so called two fund separation theorem states that any investor maximizes utility by building a portfolio composed of the market portfolio and the risk free asset.
- In this world there is no room for active investment (stock picking).
- Assets are only priced based on their contribution to systematic risk (no α)

Why is active management so large?



Why is active management so large?

- Some funds can generate alpha
- The true ability to generate alpha is unknown to investors, and therefore funds are not optimally allocated.
- Model miss-specification (Investors’ asset pricing model vs ”true” asset pricing model)
- Diseconomies of scale

Fund Manager Incentives

Chevalier and Ellison 1997 - Risk Taking by Mutual Funds as a Response to Incentives - Journal of Political Economy

- Potential Agency Conflicts between mutual fund investors and mutual fund companies.
- Investors would prefer to maximize risk adjusted returns, while fund companies prefer to maximize inflow of investments.
- Investors chase performance
- Estimate an econometric model of the form $\text{Flows}_{t+1} = f(\text{Performance}_t)$

The Flow Performance Relationship

- When consumers are faced with the decision of choosing a mutual fund, they must form beliefs about the suitability of each fund to their objectives and about the ability of each fund to generate excess returns.

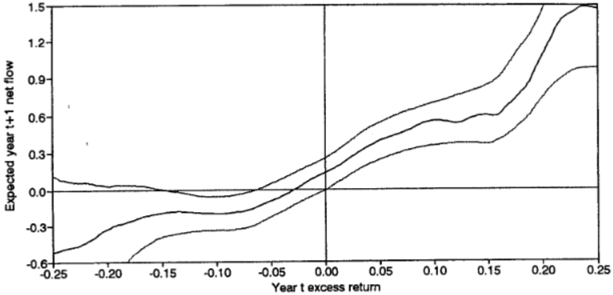


FIG. 1.—Flow-performance relationship $\hat{f}$ for young funds (age 2) with 90 percent confidence bands.

The Flow Performance Relationship

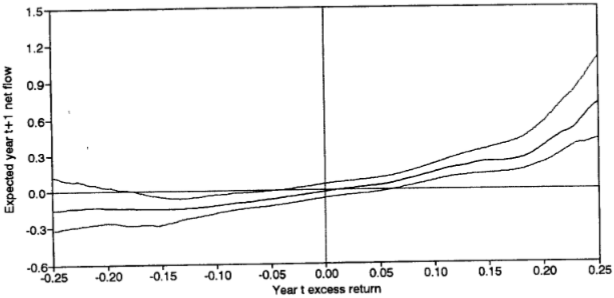


FIG. 2.—Flow-performance relationship $\hat{f}$ for old funds (age > 10) with 90 percent confidence bands.

Results

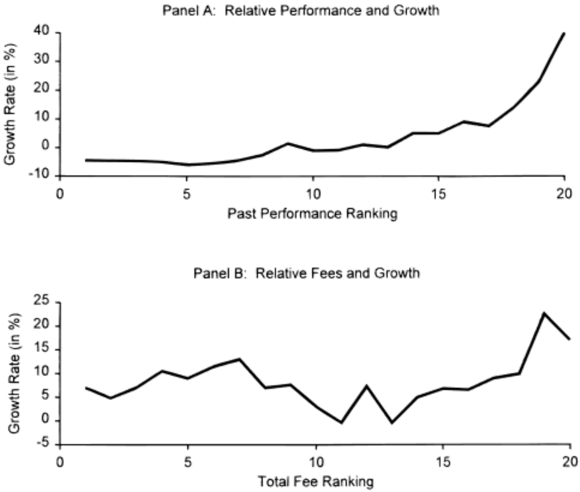
- The convexity of the flow-performance relationship generates incentives for mutual fund companies to increase the riskiness of their portfolios.
- Funds alter their portfolios between September and December based on incentives to take more risk.

What can explain the convexity?

Sirri and Tufano 1998 - Costly Search and Mutual Fund Flows - Journal of Finance

- Consumers base their fund purchase decisions on prior performance information, but do so asymmetrically, investing disproportionately more in funds that performed very well the prior period.
- Search costs seem to be an important determinant of fund flows. High performance appears to be most salient for funds that exert higher marketing effort, as measured by higher fees.
- Flows are directly related to the size of the fund's complex as well as the current media attention received by the fund, which lower consumers' search costs.

Flow-performance relation



Main Results

- We find that consumers of equity funds disproportionately f lock to high performing funds while failing to f lee lower performing funds at the same rate.
- Flows are fee-sensitive, but consumersâ response to fees is also asymmetric in that they respond differ- ently to high and low fees, as well as to fee increases and decreases
- Mutual fund flows are affected by factors related to the search costs that consumers must bear. We find that high-fee funds, which presumably spend much more on marketing than their rivals, enjoy a much stronger performance -flow relationship than do their rivals.

Are mutual funds good?

Carhart 1997 - On persistence in mutual fund performance - Journal of Finance

- Persistence in Mutual Fund performance does not reflect superior stock picking skill.
- Rather, common factors in stock returns and persistent differences in mutual fund expenses and transaction costs explain almost all of the predictability in mutual fund returns.
- Only the strong, persistent underperformance by the worst-return mutual funds remains anomalous.

How to measure fund's ability?

Jensen's alpha

$$\mathbb{E}[r_{it} - r_f] = \alpha_i + \beta_i \mathbb{E}[r_{mt} - r_f] \tag{3}$$

What if the CAPM does not explain the cross-section of stock returns? A 4 factor model with factors related to size, value, and momentum does

$$\mathbb{E}[r_{it} - r_f] = \alpha_i + b_i \mathbb{E}[r_{mt} - r_f] + s_i \mathbb{E}[SMB_t] + h_i \mathbb{E}[HML_t] + m_i \mathbb{E}[MOM_t] \tag{4}$$

Only bad performance is persistent

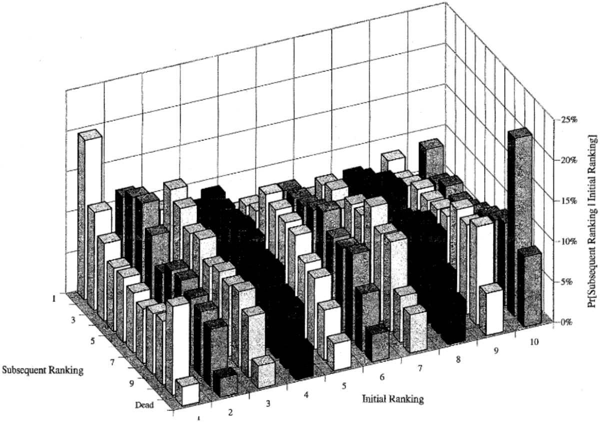


Figure 1. Contingency table of initial and subsequent one-year performance rankings. In each calendar year from 1962 to 1992, funds are ranked into decile portfolios based on one-year gross return. These initial decile rankings are paired with the fund's subsequent one-year gross return ranking. Funds that do not survive the complete subsequent year are placed in a separate category for dead funds. The bars in cell (j, i) represent the conditional probability of achieving a subsequent ranking of decile j (or dying) given an initial ranking of decile i. I estimate gross returns by adding back expense ratios to reported returns.

Portfolios based on past performance

Portfolio	Excess Return	Standard Deviation	4-Factor Model Ordinary Least Squares (OLS) Estimates					
			Alpha	Alpha-t	RMRF	SMB	HML	PR1YR
1 (high)	0.62%	5.07%	0.02%	(0.41)	0.93	0.48	−0.14	0.14
2	0.47%	4.60%	−0.06%	(−1.37)	0.90	0.32	−0.10	0.10
3	0.49%	4.49%	−0.03%	(−0.81)	0.90	0.25	−0.06	0.09
4	0.43%	4.43%	−0.05%	(−1.46)	0.91	0.20	−0.04	0.06
5	0.39%	4.45%	−0.13%	(−3.34)	0.90	0.25	−0.03	0.09
6	0.40%	4.40%	−0.11%	(−2.76)	0.90	0.20	−0.03	0.08
7	0.38%	4.46%	−0.17%	(−3.97)	0.90	0.26	−0.01	0.10
8	0.40%	4.54%	−0.16%	(−3.29)	0.90	0.29	−0.03	0.11
9	0.37%	4.68%	−0.19%	(−3.19)	0.89	0.38	−0.06	0.10
10 (low)	0.19%	5.10%	−0.43%	(−5.89)	0.93	0.49	−0.06	0.11
1-10 spread	0.43%	1.33%	0.45%	(5.95)	0.00	−0.01	−0.08	0.03
9-10 spread	0.18%	1.07%	0.24%	(3.12)	−0.04	−0.11	0.00	−0.01

Can we rationalize these findings?

Berk and Green 2004 - Mutual Fund Flows and Performance in Rational Markets - Journal of Political Economy.
Empirical Facts

- Mutual fund managers on average cannot outperform passive benchmarks
- Relative performance of mutual fund managers is mostly unpredictable from past relative performance
- Investors chase mutual fund performance

Traditional view: mutual fund managers have no skill and superior performance is the result of luck (Negative story), asymmetric information or moral hazard based explanations. This paper: empirical facts can be generated under rational and competitive market settings (Positive story)

Methodology and Assumptions

- Convex cost function (Diseconomies of scale)
- Rational investor learning
- Competitive Economy
- Differential in managers' ability to generate high return
- Can we justify lack of persistence + investors chasing past performance?

The Model (Simplified version)

Managers earn a gross return (can be understood as the return on top of a benchmark or Jensen's alpha)

$$R_t = \alpha + \epsilon_t \tag{5}$$

Sometimes managers do better (or worse) than they should $\epsilon_t \sim \mathcal{N}(0, \sigma^2)$. Investors manage an amount q_t of assets under management and have costs $C(q) \geq 0$, $C'(q) > 0$, $C''(q) > 0$ and $\lim_{q\to\infty} C(q) = \infty$.

What do investors get?

$$TP_{t+1} = qR_{t+1} - C(q_t) - q_t f \tag{6}$$

or as a return

$$r_{t+1} = R_{t+1} - \frac{C(q_t)}{q_t} - f \tag{7}$$

at each point in time, funds flow to each fund so that the expected return going forward is zero

$$\mathbb{E}[r_{t+1}] = 0 \tag{8}$$

assume a quadratic cost $C(q) = aq^2$ which implies

$$r_{t+1} = R_{t+1} - aq_t - f \tag{9}$$

Where do investors invest their money?

Investors have a prior about $\alpha \sim \mathcal{N}(\phi_0, \eta^2)$, such that

$$\phi_t = \mathbb{E}(R_{t+1}|R_1, ..., R_t) \tag{10}$$

Define as $\gamma = 1/\eta^2$ and $\omega = 1/\sigma^2$ the precision of the prior and the signal. This implies

$$\mathbb{E}[r_{t+1}] = \mathbb{E}[R_{t+1}] - aq_t - f \rightarrow \phi_t = aq_t + f \tag{11}$$

Bayesian updating implies

$$\phi_t = f(\phi_{t-1}, r_t, t) = \phi_{t-1} + \frac{\omega}{\gamma + t\omega} r_t \tag{12}$$

$$q_t = g(q_{t-1}, r_t, t) = q_{t-1} + \frac{1}{a} \frac{\omega}{\gamma + t\omega} r_t \tag{13}$$

Conclusions of Berk and Green

- The fact that performance is not persistent can be explained by diseconomies of scale.
- The fact that investors chase performance, can be explained by assuming rational Bayesian learning and unkown managerial ability.