

Measuring skill in the mutual fund industry

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Introduction

Main work

- ➊ Using the value that a mutual fund extracts from capital markets as the measure of skill.
- ➋ The average mutual fund has used this skill to generate about \$3.2 million per year.
- ➌ Investors recognize this skill and reward it by investing more capital with better funds.
- ➍ a strong positive correlation exists between current compensation and future performance.

Introduction

Motivation

- ① Considering that mutual fund managers are among the highest paid members of society, do they earn economic rents without possessing a competitive advantage?
- ② Reexamine whether or not mutual fund managers are skilled.
- ③ Prior work has focused attention exclusively on funds that hold only US stocks.
- ④ In addition to evaluating managers using a risk model, This paper evaluates managers by comparing their performance with an alternative investment opportunity set.

Introduction

Peter Lynch

- In his first five years managing Fidelity's Magellan fund, Peter Lynch had a 2% monthly gross alpha on average assets of about \$40 million.
- In his last five years, his gross alpha was 20 basis points (bp) per month on assets that ultimately grew to more than \$10 billion
- In fact, the value he added went from less than \$1 million/month to more than \$20 million/month.

Figure: PETER LYNCH



Background

- Active mutual fund managers lack skill, and mutual fund performance is largely unpredictable (Carhart, 1997; Zheng, 1999; Bollen and Busse, 2001; Kosowski et al., 2006)^{1,2,3,4}.
- Active mutual fund managers are skillful. Their stock holding outperform the market, and they add value to portfolio managed through active investment strategy. (Grinblatt and Titman, 1989, 1993; Cremers and Petajisto, 2009; Fama and French, 2010)^{5,6,7,8}
- Where the skill comes from: geography, industry, social network connection, Stock picking and Market Timing et al. (Daniel et al, 1997; Coval and Moskowitz, 2001; Kacperczyk, Sialm, and Zheng, 2005; . Kacperczyk, Nieuwerburgh, and Veldkamp, 2014)^{9,10,11,12}

Why alpha measures do not measure skill

Net Alpha

- $R_{i,t}^n = R_{i,t}^B + \epsilon_{i,t}$
- $\alpha_i^n = \frac{1}{T} \sum_{t=1}^{T_i} (R_{i,t}^n - R_{i,t}^B) = \frac{1}{T} \sum_{t=1}^{T_i} \epsilon_{i,t}$
- A positive net alpha implies that capital markets are not competitive and that the supply of capital is insufficient to compete away the abnormal return. A negative net alpha implies that investors are committing too much capital to active management. (Berk and Green, 2004)¹³

Why alpha measures do not measure skill

Gross Alpha

- $R_{i,t}^g = R_{i,t}^n + f_{i,t-1} = R_{i,t}^B + \epsilon_{i,t} + f_{i,t-1}$
- $\alpha_i^g = \frac{1}{T} \sum_{t=1}^{T_i} (R_{i,t}^g - R_{i,t}^B) = \frac{1}{T} \sum_{t=1}^{T_i} (\epsilon_{i,t} + f_{i,t-1})$
- Just as the internal rate of return cannot be used to measure the value of an investment opportunity (it is the net present value that does), the gross alpha cannot be used to measure the value of a fund.

Why alpha measures do not measure skill

Value added

- $V_{i,t} = q_{i,t-1}(R_{i,t}^g - R_{i,t}^B) = q_{i,t-1}f_{i,t-1} + q_{i,t-1}\epsilon_{i,t}$
- $S_i = \sum_{t=1}^{T_i} \frac{V_{i,t}}{T_i}$
- This estimate of value added consists of two parts –the part the fund takes as compensation (the dollar value of all fees charged), which is necessarily positive, plus any value the fund provides (or extracts from) investors, which can be either positive or negative.

Why alpha measures do not measure skill

Proposition

- 1 The net alpha never proxies for, or measures, managerial skill.
- 2 The only condition under which gross alpha measures managerial skill is if all managers set their fees to ensure that the AUM of all funds is exactly \$1.
- 3 Value added, the product of AUM and gross alpha, always measures skill.

Why alpha measures do not measure skill

Proof :The net alpha never proxies for, or measures, managerial skill.

- As Berk and Green (2004)¹³ argue, if investors are rational and financial markets competitive (that is, investors compete with each other for positive present value opportunities), non-zero net alpha investment opportunities must be competed away. Thus the net alpha is zero for all managers, so it cannot measure skill, proving the first part of the proposition.

Why alpha measures do not measure skill

Proof :The only condition under which gross alpha measures managerial skill is if all managers set their fees to ensure that the AUM of all funds is exactly \$1.

- $\alpha_i^* = a_i - b_i q$
- where a_i can be interpreted as the alpha on the first cent the manager actively invests, b_i is a parameter that captures the decreasing returns to scale the manager faces, both of which can vary by fund, and q is the amount of money the manager puts into active management.

Why alpha measures do not measure skill

Proof :The only condition under which gross alpha measures managerial skill is if all managers set their fees to ensure that the AUM of all funds is exactly \$1.

- managerial skill, V_i , is the solution to the optimization problem:
$$V_i = \max_q (a_i - b_i q)$$
- $FOC : q^* = \frac{a_i}{2b_i}$
- the skill of the manager is $V_i = q_i^* (a_i - b_i q_i^*) = \frac{a_i^2}{4b_i}$
- $\alpha_i^* = a_i - b_i \frac{a_i}{2b_i} = \frac{a_i}{2}$
- The gross alpha of the fund as a whole is $\alpha_i^g = \frac{q_i^*}{q_i} \alpha_i^*$
- $\alpha_i^g = \frac{a_i^2}{4q_i b_i}$

Why alpha measures do not measure skill

Proof: Value added, the product of AUM and gross alpha, always measures skill.

- $q_i \alpha_i^g = q_i \frac{a_i^2}{4q_i b_i} = \frac{a_i^2}{4b_i}$
- What the proposition highlights is the importance of scale in measuring managerial skill. The only time the gross alpha is informative about managerial skill is when all managers manage funds of the same size, making scale unimportant.

Empirical analysis

Choice of benchmarks and estimation

Vanguard index fund

- Eleven Vanguard index funds. They are widely regarded as the least costly method to hold a well-diversified portfolio.

Four-factor model

- Carhart(1997)¹

Empirical analysis

Data

Data sources

- Center for Research in Security Prices (CRSP) survivorship bias-free database mutual funds.
- Morningstar.
- Drop all index funds, bond funds, and money market funds and any fund observations before the fund's (inflation adjusted) AUM reached \$5 million, also drop funds with less than two years of data. In the end, we are left with 6,054 funds.

Time period

January 1962 to March 2011.

Empirical analysis

Results

Figure: Table 3

	Vanguard benchmark	FFC risk measure
Cross-sectional weighted mean	0.27	0.25
Standard error of the weighted mean	0.05	0.06
t-statistic	5.74	3.94
Cross-sectional mean	0.14	0.10
Standard error of the mean	0.03	0.03
t-statistic	4.57	3.43
1st percentile	-3.60	-3.93
5th percentile	-1.15	-1.43
10th percentile	-0.59	-0.77
50th percentile	-0.02	-0.03
90th percentile	0.75	0.70
95th percentile	1.80	1.98
99th percentile	7.82	6.76
Percent with less than zero	57.01%	59.70%
Total number of funds	5974	6054

- The average fund added an economically significant \$270,000 per month, or \$3.2 million annually (in Y2000 dollars).

Empirical analysis

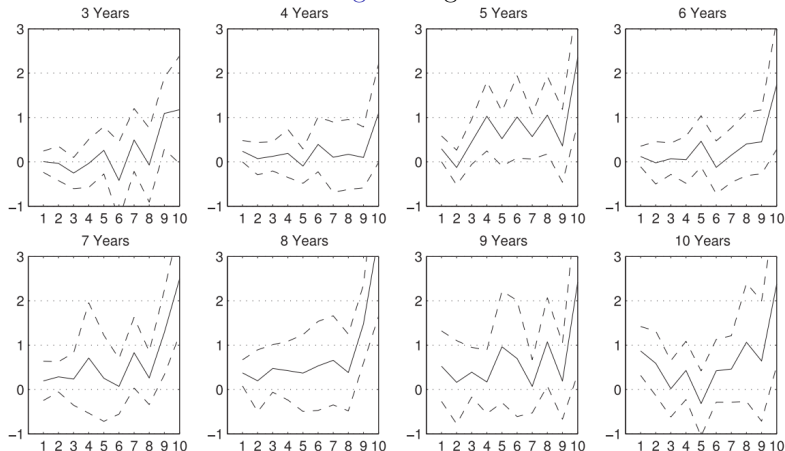
Results

- $\hat{skr}_i^\tau = \frac{\hat{S}_i^\tau}{\sigma(\hat{S}_i^\tau)}$
- At each time τ , use all the information until that time to sort funds into ten deciles based on the skill ratio.
- Then calculate the monthly value added $\{V_{i,t}, \dots, V_{i,t+h}\}$ over different measurement horizons, h , varying between 36 to 120 months using only the information in the measurement horizon. At the end of the process, in each decile,
- We have a time series of monthly estimates for average value added. We then compute, for each decile, the above order statistics as well as the mean and standard error of the time series.

Empirical analysis

Results

Figure: Fig.3



Empirical analysis

Results

- From Fig. 3 it appears that evidence of persistence exists as far out as ten years.
- The point estimate of the average value added of tenth decile managers is positive at every horizon and is always the best performing decile.
- The value added estimates are economically large. Although clearly noisy, the average tenth decile manager adds around \$2 million/month.

Empirical analysis

Results

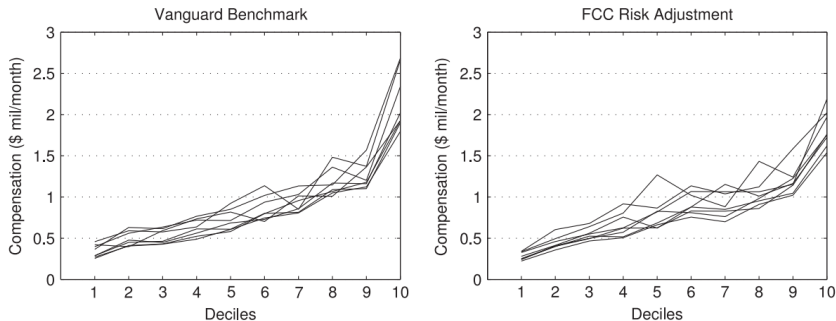
Figure: Table 4

Horizon	Value added		Top outperforms bottom		Top in top half		Fraction of total
Years	\$ Mil	p-value (%)	Freq. (%)	p-value (%)	Freq. (%)	p-value (%)	AUM (%)
Panel A: Vanguard benchmark							
3	1.19	2.51	56.32	4.75	56.32	4.75	24.82
4	1.10	2.49	57.14	2.07	59.45	0.32	25.56
5	2.32	0.11	55.81	3.54	56.98	1.46	24.34
6	1.72	0.95	57.09	1.09	57.46	0.79	25.30
7	2.47	0.00	61.57	0.01	64.55	0.00	22.57
8	3.44	0.01	58.23	0.67	58.65	0.46	25.65
9	2.42	1.00	54.21	9.15	55.31	4.50	24.94
10	2.38	0.52	54.69	5.55	57.93	0.31	24.95
Panel B: FFC risk adjustment							
3	1.30	1.33	56.13	0.47	57.63	0.06	17.93
4	1.13	3.01	58.14	0.02	57.72	0.05	19.50
5	1.03	2.68	59.60	0.00	58.79	0.01	17.88
6	1.27	2.22	58.85	0.01	56.50	0.28	19.38
7	0.98	3.37	59.71	0.00	56.12	0.44	17.91
8	2.13	0.42	59.12	0.01	57.14	0.13	19.01
9	1.35	1.12	56.51	0.18	55.15	1.09	16.10
10	1.62	4.67	58.91	0.01	56.74	0.22	21.83

Empirical analysis

Results

Figure: Fig. 4



- Once managers reveal their skill by adding value, investors reward them with higher subsequent compensation (total dollar fees).

Empirical analysis

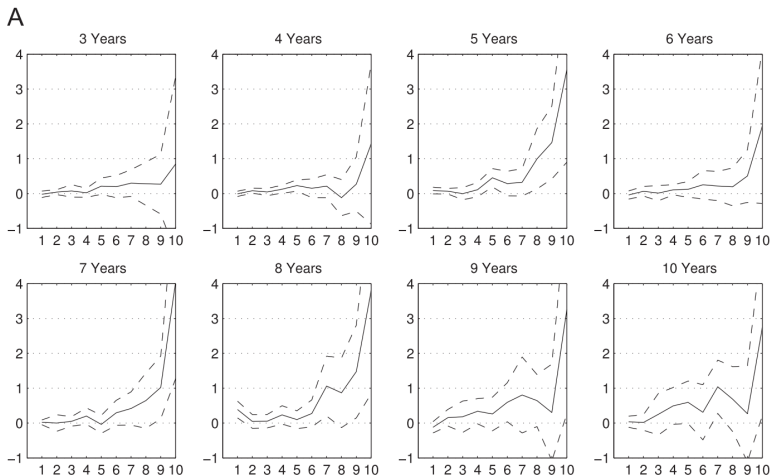
Results

- If investors reward better funds with higher compensation, then they must be able to identify better managers ex ante. Thus, compensation should predict performance

Empirical analysis

Results

Figure: Fig.5



Empirical analysis

Separating out diversification services

Figure: Table 5

Horizon	Vanguard benchmark Skill ratio	Compensation	FFC risk adjustment Skill ratio	Compensation
3	18.55	9.17	2.76	72.15
4	3.51	1.87	12.20	4.89
5	18.61	0.02	8.40	48.81
6	4.57	9.23	0.58	3.24
7	15.92	5.85	0.53	17.52
8	4.16	3.79	4.88	25.58
9	28.61	14.71	5.97	3.90
10	53.02	0.25	16.38	4.82

- Table 5 reports the p-value of observing the reported numbers under the null hypothesis that there is no skill (so the probability is 1/2). The table confirms what the figures imply. While skill ratio can identify extreme performers, it does not differentiate other funds very well.

Conclusions

- 1 This paper uses value added to measure the skill in mutual funds, and find that the average manager is skilled, adding \$3.2 million per year.
- 2 Furthermore, investors appear to be able to identify and correctly reward this skill. Not only do better funds collect higher aggregate fees, but current aggregate fees also predict future value added.

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