The Performance of Japanese Mutual Funds

Jun Cai
City University of Hong Kong

K. C. Chan
Takeshi Yamada
Hong Kong University of Science and Technology

We analyze the performance of Japanese open-type stock mutual funds for the 1981–1992 period. The results show that, regardless of the performance measures and benchmarks employed, most of the Japanese mutual funds underperform the benchmarks by between 3.6% and 10.8% per annum. These funds tend to invest more in large stocks with low book-to-market ratios. But this feature does not explain the underperformance. A potential explanation is the dilution effect caused by inflows of funds. In Japan, a new investor of an open-type fund only pays in the after-tax value of the net asset value. We conduct a bootstrap experiment to assess the magnitude of this dilution effect.

Are Japanese mutual funds a good investment? The overall performance of Japanese open-type stock mutual funds over the last 15 years has not been

The authors acknowledge the seminar participants at the Chinese University, City University of Hong Kong, Hong Kong Statistical Association, Hong Kong University of Science and Technology, Keio University, and the participants at the American Finance Association Annual Meeting in San Francisco, the Emerging Trends in Japanese Financial Markets Conference at Columbia University, the Nippon Finance Association Annual Meeting at Yokohama National University, and the Kinzai Finance Workshop. We particularly thank the anonymous referee, John Ammer, Jeffrey Busse, Wayne Ferson, Will Goetzmann, Bob Korajczyk (the editor), Yasushi Hamao, Katsuhide Hatanaka, Ravi Jagannathan, David Modest, Rudi Schadt, Osamu Shigeta, and Koichi Watanabe for valuable comments, and the Investment Trusts Association for providing us with valuable information. The usual disclaimer applies. Address correspondence to Jun Cai, Department of Economics and Finance, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong.

The Review of Financial Studies Summer 1997 Vol. 10, No. 2, pp. 237–273

impressive compared to that of the market.[1] The average rate of return of 800 open-type mutual funds was 1.74% per annum between January 1981 and December 1992, while that of the market was 9.28% per annum during the same period. Regardless of the performance measures and benchmarks employed, we find strong evidence of underperformance in the Japanese mutual funds.

It has been suggested that the meager performance of Japanese mutual funds may be due to institutional factors such as the contracts between fund managers and their employers as well as the relationships between mutual fund companies and brokerage houses [see, for example, *Economist* (1994)]. Major mutual fund companies are subsidiaries of the brokerage houses from which top management as well as many fund managers are drawn. The fund managers' salaries are paid from the fixed commissions that investors pay to the mutual fund companies. However, their salaries may not be directly linked to their investment performance. They are usually tied closely to the pay scale of the parent company, which may be unrelated to each manager's performance. Good performance of a manager may result to a certain extent in quicker promotions or higher bonuses, but the link is not as explicit as in the United States. Such a compensation scheme may create an agency problem between the fund managers and the investors. According to the *Economist* (1994), the turnover ratio in Japanese mutual funds was more than twice the Tokyo market average during the 1980s. A high turnover ratio produces profits for the parent brokerage houses due to the fixed commissions for stock trading. Finally, major brokerage houses like Nomura, Nikko, Daiwa, and Yamaichi recommend stocks for their clients. These recommendations may influence the selection of the stocks by the subsidiary mutual fund companies. The Japanese Ministry of Finance has been aware of the poor performance of mutual funds and has come up with several ways to bring more competition into the business as well as to disclose more information to investors. First, the ministry has permitted banks and foreign companies to manage mutual funds since 1990. Second, the ministry intends to promote comparisons of funds' performance so that investors can make informed choices. At present, mutual fund managers are not allowed to compare their performance with rivals' in advertisements. Finally, since June 1994, fund managers have to disclose their commissions.

[1] Open-type mutual funds are similar to open-end funds in that new principal can be added to the fund and investors can cancel their investments by withdrawing the principal. On the other hand, no new principal can be added to unit-type mutual funds. In contrast to closed-end funds, unit-type funds are not traded and the investors liquidate their investments by withdrawing the principal.

We provide the first comprehensive study of Japanese mutual funds. Our sample covers the open-type stock mutual funds managed by nine investment management companies for the 1981–1992 period. We employ the traditional Jensen measure [Jensen (1968, 1969)] as well as the positive period weighting measure developed by Grinblatt and Titman (1989b, 1994). Following Ferson and Schadt (1996), we incorporate conditional information directly into the performance measures to control for the biases arising from fund managers responding to public information. Further we investigate what kind of strategy funds have followed in general. To this end we construct mimicking portfolios based on size and book-to-market ratios, and explore if any of the performance found in the previous section can be explained by the weighting on these factors.

In order to obtain valid inferences with various performance measures, the benchmark must be mean-variance efficient from the point of view of the uninformed investor. We employ two different benchmarks. The first one is a value-weighted single-index benchmark that covers stocks listed on both the first section and the second section of the Tokyo Stock Exchange (TSE), government bonds, corporate bonds, and convertible bonds. The second benchmark consists of three factors: (1) the value-weighted market factor as described above; (2) a mimicking factor that is related to the size effect; and (3) another mimicking factor that is related to the book-to-market ratio. We find evidence that the three-factor benchmark is more appropriate than the single-index benchmark. However, our general conclusion is not affected by the choice of benchmark.

We also evaluate the dilution effect on the net asset value of open-type funds. This effect is caused by a particular method according to which the sales price of a mutual fund share is calculated when there is an inflow of funds. For an outflow, the fund pays out net asset value (NAV) to the investors so that the NAV per share is unaffected by the outflow. The investors pay capital gains tax, if any, from the proceeds. For an inflow, new investors do not pay in the amount equal to the NAV per share. Instead, new investors pay in the after-tax value of the NAV, which is the amount that existing investors would receive after tax if they sold their share. Therefore the NAV per share is diluted by the inflow. This implies that the rate of return on the NAV would be negative even if the return on the managed portfolio is zero.

This article is organized as follows. Section 1 gives an introduction to Japanese mutual funds. Section 2 provides a comprehensive performance evaluation using various measures. This section also examines whether performance varies between different periods, whether any management company or companies performed better (or worse) than the others, and whether there is any persistence in performance among the managers. Section 3 analyzes how funds were managed and investigates their performance by using the mimicking portfolios based on size and book-to-market ratios. This section also refers briefly to funds' timing ability. Section 4 provides a simulation analysis of the dilution effect. The last section presents the conclusion.

1. Japanese Mutual Funds

1.1 Overview of the mutual fund industry

Japanese mutual funds are of the contractual type, not of the corporate type which prevails in the United States; thus the funds are called *investment trusts*. A contract is made between an investment trust management company, a trustee (a trust bank), and a beneficiary (an investor). The cash collected from investors by management companies through subscriptions or sales of beneficiary certificates is transferred to the custody of a trustee company. The manager gives investment instructions to the trustee that administers and safe-keeps the assets.[2] The administration fee of the trust bank is passed on to the investors as a debit subtracted from the NAV of the mutual fund (or investment trust). In addition and in most cases, an investor of an open-type mutual fund is required to pay a fee up front as a fixed percentage of the value of the investment. This fee is typically between 2% and 5% of the investment value, and is an investor's out-of-pocket cost that is not deducted from the fund's asset.

At present in Japan, there are 16 domestic, 5 foreign-affiliated, and 5 bank-affiliated investment trust management companies.[3] However, a major portion of the investment trusts sold in Japan has been run by management companies that are subsidiaries of Japanese brokerage houses. Many of these management companies originate from the investment trust division of the brokerage houses, which originally managed their own investments. The management company delegates subscriptions and sales of the investment trusts to brokerage houses; at present, the majority of funds are sold through brokerage houses that are parents of the fund management firms. A small portion of funds managed by foreign- or bank-affiliated companies is

[2] As of May 1994, there were 11 trust companies and 1 commercial bank that were engaged in the trust function.

[3] The Ministry of Finance licensed non-Japanese affiliated companies to operate mutual fund companies after October 1990, and licensed Japanese bank-affiliated companies to do the same after October 1993. As of May 1994 the 16 management companies affiliated with domestic brokerage houses include Nomura, Nikko, Yamaichi, Daiwa, Taiyo, Shin-Wako, Sanyo, Asahi, Japan, Daiichi, Kokusai, Cosmo, Tokyo, Universal, Taiheiyo, and Toyo; the bank-affiliated management companies include SBIM, Sakura, Sanwa, Nochu, and Fuji; and the foreign-affiliated management companies are Warburg, Jardine Fleming, Invesco, Schroder, and Credit Suisse.

sold by brokerage houses that are not affiliated with the management companies or are sold directly by the management firms. The sample we use includes only those funds that are sold by the parent brokerage houses, because most of the other types of funds did not begin operation before 1990.

Depending on the portfolio structure, investment trusts in Japan can be classified into two kinds: stock investment trusts and bond investment trusts. The latter invest only in bonds and money market instruments. The former, however, invest not only in stocks but also in bonds (including convertible bonds and warrants) and the money market. According to the investment policy of the funds, stock investment trusts are broadly classified into three categories: growth type, stable growth type, and stable type. The growth type typically has no upper limit on the proportion that the fund can invest in stocks, whereas the stable growth type does have such limits. The stable type mainly invests in convertible bonds.[4] At the end of 1992, the portfolio weights of stocks, bonds, and other money market instruments in stock investment trusts were 50.2%, 17.6%, and 26.5%, respectively [see Investment Trusts Association (1994)]. The investment trusts in Japan can be grouped into open type and unit type. The former allows additional flow of funds into the trust property after the fund's institution, while the latter does not. We focus on open-type investment trusts because unit-type funds operate for only about 5 years.

Investment trusts in Japan represented about 3.5% of the financial assets of the household sector as of the end of 1992 (Flow of Funds Account, The Bank of Japan). This figure includes both stock and bond investment trusts as well as both open-type and unit-type investment trusts. At the end of the same year, investment trusts had approximately 43 trillion yen in aggregate assets, of which 21 trillion was in stock investment trusts. The following numbers summarize the stockholdings of the funds during 1992. The total market value of stocks held by the funds was 10.1 trillion yen or 12.5 million shares, which amounts to 3.4% and 3.6%, respectively, of total stocks outstanding on all stock exchanges in Japan at the end of the year. The stocks traded by the funds during the year, the sum of buys and sells, amounted to 12.2 trillion yen or 13.9 million shares, which represented 15.1% in value and 16.8% in volume of the aggregate stock trading. Therefore, the turnover ratio of all funds was 110.7% while that of the market was 47.68% during the year.

[4] Typically the upper limit of stock investment is 30% for convertible bond open-type funds.

1.2 Management fees and taxes

There are two sources of costs that are borne by investors (or beneficiaries) of the investment trust. The NAV of a fund is determined after deducting these costs from the asset value. The first cost component is a fixed management fee paid to the management company, the trust bank, and the brokerage house that subscribes and sells the investment trust security. The amount of the fee ranges from 0.55% to 1.5% of the total asset value, and the fee is deducted from the asset on a daily basis. The second component is the securities transfer tax plus the brokerage commission, which is paid to the brokerage house that executes orders from the management company. This part of the management fee varies according to the amount of turnover. The brokerage commission rates vary from 1.150% of transactions valued under 1 million yen to 0.100% of those above 500 million and below 1 billion yen. For transactions over 1 billion yen, the commission rates are negotiable. (The rates were amended on June 4, 1990.) The securities transfer tax on equity is 0.3% of the market price (since April 1992) and is paid by investors when they sell shares.

To provide an estimate of the transaction costs, we need estimates of both turnover rate and average transaction value. From the aggregate data, the annual turnover rate was approximately 110% for 1992. Since we do not have data on the average transaction value, we arbitrarily choose a range of commission rates that is plausible for institutional investors: From 0.375% for transactions valued from 30 million to 50 million yen for the lower range to 0.100% for those from 500 million to 1 billion yen for the higher range. Assuming a turnover rate of 110%, the variable portion of transaction cost ranges from approximately 0.72% to 1.32% per annum. These figures assume a securities transfer tax rate of 0.45%, a rate that had been imposed during most of our observation period.[5] If the fixed management fee is 0.55% (1.5%), the total transaction cost ranges from 1.27% (2.22%) to 1.87% (2.82%).

1.3 Mutual fund data

The mutual fund data are obtained from *Kinyuu Deta Sisutemu* (Financial Data Systems Incorporated) in Tokyo for the period from January 1978–April 1994. The dataset includes 1,151 open-type mutual funds managed by 26 management companies. Every fund that ex-

---

[5] $0.715\% = 1.1 \times \{0.1 + (0.1 + 0.45)\}$, $1.320\% = 1.1 \times (0.375 + (0.375 + 0.45)\}$. The securities transfer tax rate for equity has been changed as follows: 0.3% until March 1978, 0.45% for April 1978–December 1987, 0.55% for January 1988–March 1992, 0.3% from April 1992. Consumption tax (0.3%) is levied on brokerage fees effective April 1989. After this date the corresponding variable costs are $0.722\% = 1.1 \times \{0.1 \times 1.03 + (0.1 \times 1.03 + 0.45)\}$ and $1.345\% = 1.1 \times (0.375 \times 1.03 + (0.375 \times 1.03 + 0.45)\}$, respectively.

isted during the period is included; thus there is no survivorship bias. Among the 26 companies, half of them started operation only after 1990. In particular, we choose nine management companies that operated throughout the observation period. These companies include Nomura, Nikko, Yamaichi, Daiwa, Taiyo, Shin-Wako, Sanyo, Asahi, and Japan. After adjusting the NAV for splits, if any, we calculate the continuously compounded monthly returns with dividend payments for all the funds.[6] For individual fund analysis, we select the funds with more than 97 observations from January 1981–December 1992.[7] We find 64 funds managed by the nine fund management companies. However, the requirement of at least 97 observations may bias the average return of these funds upward due to survivorship. Therefore, unbiased return results are likely to be worse than the results obtained in the paper from these funds. To assess the aggregate performance of Japanese mutual funds, we construct two portfolios, vw800 and ew800, which are the value- and equal-weighted portfolios, respectively, of all the 800 mutual funds run by the nine fund management companies. We also construct both value- and equal-weighted portfolios of the 64 individual funds, vw64 and ew64. Since some of these funds concentrate investment in certain industries, foreign equities, or convertible bonds, we construct additional portfolios of funds that primarily invest in well-diversified Japanese equities. We find 190 diversified equity funds among the universe of 800 funds, and 13 among the 64 funds with a relatively long history.[8]

1.4 Basic performance

Table 1 shows that the average raw returns of the open-type mutual funds during the entire observation period (January 1981–December 1992) were 1.73% and 2.41% per annum for vw800 and ew800, respectively. The well-diversified Japanese equity funds (i.e., the 190 and 13 portfolios) show lower mean returns and higher standard deviations than those of the 800 and 64 portfolios. The subperiod figures show that the well-diversified equity funds did particularly poorly in the bear market during the January 1990–December 1992 period. Comparing the mutual fund returns to various benchmarks, we find that the aver-

[6] Nomura has one fund that undergoes a 1-for-3 split. Yamaichi, Taiyo, and Asahi each have one fund that undergoes a 1-for-2 split. Both the NAV and dividend payment are adjusted when calculating the returns.

[7] The choice of the sample period is constrained by the facts that various accounting data, market capitalization, and stock returns from the PACAP database are only available until the end of 1992, and that the value-weighted indices for bonds are not available before 1981.

[8] The well-diversified Japanese stock funds are selected based on the following criteria: (1) No upper limit on stock investment, (2) an upper limit on foreign investment, and (3) no specialization in particular industries or types of stocks such as low capitalization or growth stocks.

age performance of Japanese mutual funds underperformed various measures, even after adding back a transaction cost of, say, 5%.

The first benchmark in the table is a value-weighted index that includes all stocks listed on the TSE, all government and corporate bonds with a longer than 1-year maturity, and convertible bonds.[9] The index performed at 8.91% during the full observation period. Since Japanese stock-type mutual funds invest not only in stocks but also in bonds and convertible bonds, it is appropriate to compare fund performance with this benchmark. We use this benchmark as the market index in subsequent analyses. The buy-and-hold 30 portfolio includes the 30 largest stocks as of the end of 1980. Its return was the highest (14.85% for the whole observation period) although its standard deviation was also the largest.

Table 2 provides summary statistics for individual funds as well as for the nine management firms. Note that the returns in Table 2 are reported in terms of monthly returns instead of annual returns. For each company, mean return and standard deviation are reported for equally weighted portfolios of all its funds and for its well-diversified Japanese equity funds. Except for three management firms (Nomura, Sanyo, and Asahi), well-diversified equity funds performed worse than the average of all funds. Among the 64 individual funds, performance varies from −0.74% per month (−8.87% per annum) to 0.94% per month (11.29% per annum), and standard deviation from 1.99% per month (6.89% per annum) to 8.82% per month (30.54% per annum). Among the 13 well-diversified equity funds, the mean varies from −0.25% per month (−2.98% per annum) to 0.94% per month (11.29% per annum), and standard deviation from 3.85% per month (13.33% per annum) to 5.93% per month (20.54% per annum). Although the observation periods for the funds are not exactly the same, they overlap during the majority of the period. (Figure 1 shows a plot of mean return against standard deviation of individual funds.)

2. The Performance

2.1 Performance measures

2.1.1 Jensen measure. Suppose $r_{j,t+1}$ is the monthly return of the mutual fund, j, in excess of the 1-month risk-free rate, and $r_{m,t+1}$ is the excess return on the mean-variance efficient market portfolio;

[9] The index is a value-weighted average of the Tokyo Stock Market Index (TOPIX) and Daiwa Bond Index from the Daiwa Institute of Research. The aggregate market values of bonds were also obtained from Daiwa. As of the end of December 1992, stocks, government and corporate bonds, and convertible bonds accounted for 60%, 30%, and 10% of the value of the index portfolio, respectively.

Table 1
An overview of Japanese mutual fund performance

	Jan. 1981–Dec. 1992				Jan. 1981–Dec. 1989				Jan. 1990–Dec. 1992			
	Mean return (%per annum)	Standard deviation	Mean excess return	Sharpe measure	Mean return (%per annum)	Standard deviation	Mean excess return	Sharpe measure	Mean return (%per annum)	Standard deviation	Mean excess return	Sharpe measure
All category												
vw800	1.73	14.67	−3.95	−0.269	8.59	11.39	3.03	0.266	−18.84	20.84	−24.88	−1.194
ew800	2.41	13.15	−3.27	−0.249	8.40	10.33	2.84	0.274	−15.55	18.53	−21.60	−1.166
vw64	1.23	14.39	−4.45	−0.309	7.67	12.08	2.11	0.175	−18.10	18.89	−24.15	−1.278
ew64	2.13	13.51	−3.55	−0.263	7.97	11.42	2.41	0.211	−15.39	17.65	−21.44	−1.223
Well-diversified Japanese equity funds												
vw190	− 0.127	17.73	−5.81	−0.328	8.24	13.20	2.68	0.203	−25.22	26.07	−31.26	−1.199
ew190	1.26	16.87	−4.43	−0.262	9.50	12.77	3.94	0.308	−23.47	24.39	−29.51	−1.210
vw13	− 2.09	17.70	−7.77	−0.439	5.62	14.04	0.06	0.004	−25.20	24.83	−31.25	−1.259
ew13	0.55	16.41	−5.13	−0.313	8.11	13.48	2.54	0.189	−22.10	22.03	−28.15	−1.278
Value-weighted index	8.91	13.77	3.22	0.234	16.19	10.03	10.62	1.059	−12.93	20.32	−18.97	−0.934
Buy-and-hold 30	14.85	21.98	9.17	0.417	26.46	19.07	20.89	1.095	−19.95	26.90	−26.00	−0.966
Bond index	7.78	3.89	2.09	0.538	8.19	3.50	2.63	0.753	6.52	4.93	0.474	0.096
Gensaki rate	5.68	0.38	NA	NA	5.56	0.36	NA	NA	6.04	0.420	NA	NA

The numbers in the table are in annualized monthly returns. The Sharpe measure is a ratio of excess return and the standard deviation. The value- and equal-weighted portfolio of 800 funds, vw800, and ew800, represent all the funds managed by nine investment management companies: Nomura, Nikko, Yamaichi, Daiwa, Taiyo, Shin-Wako, Sanyo, Asahi, and Japan. The value- and equal-weighted portfolios of 64 funds, vw64 and ew64, represent a subsample of the 800 funds that were selected based on the criteria that they have more than 97 observations during the observation period. Well-diversified Japanese equity funds invest all or mostly in Japanese stocks with no specialization in particular industries or types of stocks such as growth or low capitalization stocks. The 190 and 13 funds are subsets of the 800 and 64 funds, respectively. The value-weighted index is a portfolio of stocks from both sections of the TSE, all government and corporate bonds with longer than 1-year maturity, and convertible bonds. The buy-and-hold index is an equally weighted portfolio that consists of the 30 largest stocks on the TSE as of December 1980. The bond index consists of all government and corporate bonds with a longer than 1-year maturity and convertible bonds. The maturity of the Gensaki rate is 1 month.

Table 2
Summary statistics of selected Japanese mutual funds

	Nomura Securities Investment Trust Management	Begin	End	Obs	Mean	Std. Dev	Max	Min
	All funds (155)	8101	9212	144	0.273	3.659	10.64	−14.19
	Well-diversified Japanese equity funds (54)	8101	9212	144	0.283	4.551	13.80	−18.39
1	No. 1 open*	8101	8909	105	0.852	3.848	11.74	−15.13
2	No. 2 open*	8101	8901	97	0.941	3.880	16.95	−11.75
3	New large stock fund	8101	9110	130	0.690	4.295	14.91	−16.54
4	Stock accumulation fund*	8101	9212	144	0.445	5.401	16.32	−18.20
5	Foreign natural resources stock fund	8101	9212	144	0.296	4.246	10.01	−26.79
6	CB open	8401	9212	108	0.451	4.017	13.61	−13.80
7	Rainbow fund—Information electronics fund	8403	9212	106	−0.334	6.461	16.70	−20.02
8	Rainbow fund—Health care fund	8403	9212	106	0.364	4.893	14.77	−12.23
9	Rainbow fund—Cyclical industry fund	8403	9212	106	0.106	5.595	14.53	−16.48
10	Rainbow fund—Mechatronics fund	8403	9212	106	−0.251	5.411	14.11	−16.31
11	Rainbow fund—Public utility stock fund	8403	9212	106	0.326	5.421	15.85	−15.14
12	Rainbow fund—Excellent fund	8403	9212	106	0.185	3.633	11.86	−12.95
	Nikko Securities Investment Trust & Management							
	All funds (118)	8101	9212	144	0.124	4.411	12.10	−16.30
	Well-diversified Japanese equity funds (33)	8101	9212	144	0.017	5.857	15.11	−19.23
13	No. 1 open*	8101	9212	144	−0.109	5.851	14.59	−21.26
14	New large stock fund	8101	9212	144	0.127	4.972	17.91	−15.23
15	Global growth fund	8101	9212	144	0.096	4.521	10.12	−13.92
16	Capital open*	8101	9212	144	−0.248	5.888	13.62	−21.66
17	CB fund	8312	9212	109	0.332	3.487	9.23	−13.64
18	My select—New media portfolio	8404	9212	105	−0.619	7.159	15.52	−27.10
19	My select—Mechatronics portfolio	8404	9212	105	−0.591	6.595	17.11	−21.24
20	My select—Health care portfolio	8404	9212	105	0.177	5.272	17.00	−14.95
21	My select—New service portfolio	8404	9212	105	−0.078	5.002	10.87	−18.12
22	My select—Cyclical industry portfolio	8404	9212	105	−0.301	5.799	15.17	−24.64
	Yamaichi Investment Trust and Management							
	All funds (88)	8101	9212	144	0.139	4.200	11.85	−16.90
	Well-diversified Japanese equity funds (21)	8101	9212	144	0.010	5.242	15.43	−19.70
23	No. 1 open*	8101	9212	144	−0.062	5.301	14.32	−25.62
24	New large stock fund	8101	9212	144	−0.094	5.638	18.70	−24.47
25	Universal fund	8101	9212	144	0.338	8.815	53.74	−52.32
26	New large stock-bond fund	8101	9212	144	0.313	4.826	17.37	−15.61
27	CB open	8401	9212	108	0.188	3.927	10.47	−14.24
28	Select fund—Information electronics portfolio	8404	9212	105	−0.472	6.396	12.52	−26.36
29	Select fund—Life science portfolio	8404	9212	105	0.027	5.303	16.27	−15.28
30	Select fund—New service portfolio	8404	9212	105	−0.113	5.288	14.08	−22.18
31	Select fund—Resources-energy portfolio	8404	9212	105	−0.364	5.522	16.57	−19.63
32	Select fund—Cyclical industry portfolio	8404	9212	105	−0.306	5.388	12.10	−17.38
	Daiwa Investment Trust and Management							
	All funds (200)	8101	9212	144	0.269	3.535	9.10	−14.40
	Well-diversified Japanese equity funds (26)	8101	9212	144	0.037	4.994	14.24	−17.26
33	No. 1 open*	8101	9212	144	−0.112	5.097	13.95	−15.57
34	No. 2 open*	8101	9212	144	−0.090	5.397	12.15	−15.26
35	Large stock fund	8101	9212	144	−0.051	5.280	16.32	−16.16
36	Foreign stock fund	8101	9212	144	0.115	4.638	11.55	−25.64
37	CB open	8411	9212	98	0.762	3.550	12.57	−16.89
38	Super select fund—Electronics portfolio	8401	9212	108	−0.739	6.673	15.68	−21.31
39	Super select fund—Life science portfolio	8401	9212	108	−0.075	5.464	18.79	−17.05
40	Super select fund—Resources-energy portfolio	8401	9212	108	−0.067	5.153	15.13	−19.13
41	Super select fund—Cyclical industry portfolio	8401	9212	108	−0.014	5.549	14.41	−22.31
42	Super select fund—Leading stock portfolio	8401	9212	108	−0.034	4.895	12.83	−17.03

Taiyo Investment Trust Management							
All funds (58)	8101	9212	144	0.152	4.101	13.84	−17.76
Well-diversified Japanese equity funds (12)	8101	9212	144	−0.021	5.190	16.65	−20.32
43 Balance open	8101	9212	144	0.284	2.828	9.67	−10.64
44 Capital open*	8101	9212	144	−0.077	5.237	17.21	−23.28
45 Hi select fund—Electronics portfolio	8412	9212	97	−0.470	6.944	15.58	−25.71
46 Hi select fund—Life science portfolio	8412	9212	97	−0.093	5.928	23.41	−15.00
47 Hi select fund—New industrial materials portfolio	8412	9212	97	−0.172	6.703	21.09	−25.04
48 Hi select fund—New business portfolio	8412	9212	97	0.032	6.070	19.83	−23.17
49 Hi select fund—Cyclical industry/hidden asset	8412	9212	97	0.223	6.487	19.61	−23.21
Shin-Wako Investment Trust Management							
All funds (47)	8101	9212	144	0.190	3.848	11.81	−15.41
Well-diversified Japanese equity funds (13)	8101	9212	144	−0.106	5.055	12.76	−21.18
50 Balance fund	8101	9212	144	0.527	2.032	6.85	−6.73
51 International fund*	8101	9212	144	0.126	4.173	12.18	−21.18
52 CB open	8403	9212	106	0.615	1.989	6.16	−7.12
Sanyo Investment Trust Management							
All funds (39)	8101	9212	144	0.202	4.136	12.13	−15.54
Well-diversified Japanese equity funds (13)	8101	9212	144	0.250	5.032	13.05	−16.55
53 Open*	8101	9212	144	0.080	5.002	11.76	−20.40
Asahi Investment Trust Management							
All funds (59)	8101	9212	144	0.201	3.790	12.27	−14.93
Well-diversified Japanese equity funds (12)	8101	9212	144	0.270	5.140	14.82	−17.59
54 Balance fund	8101	9202	134	0.737	2.243	7.18	−9.16
55 Large stock fund	8101	9010	118	0.645	3.025	10.02	−8.93
56 Pacific fund	8101	9212	144	−0.211	4.340	8.63	−25.90
57 Stock open*	8101	9212	144	0.306	4.677	15.27	−13.67
58 CB open	8312	9212	109	0.540	3.509	14.90	−10.87
59 New select fund—Information portfolio	8403	9212	106	−0.217	6.032	13.18	−22.58
60 New select fund—New industrial materials portfolio	8403	9212	106	−0.060	4.810	13.15	−15.36
61 New select fund—Life science portfolio	8403	9212	106	0.196	4.524	14.86	−13.36
62 New select fund - Hidden asset portfolio	8403	9212	106	0.295	5.464	16.61	−17.87
Japan Investment Trust Management							
All funds (36)	8101	9212	144	0.019	4.532	12.95	−17.77
Well-diversified Japanese equity funds (7)	8101	9212	144	−0.098	6.216	17.40	−19.68
63 Balance fund	8101	9212	144	0.354	2.578	6.75	−9.57
64 Nihon open*	8101	9212	144	−0.091	5.929	17.40	−21.60
Aggregate Mutual Fund Portfolios							
65 vw800 (All category)	8101	9212	144	0.144	4.236	12.54	−15.88
66 ew800	8101	9212	144	0.201	3.795	10.83	−14.78
67 vw64	8101	9212	144	0.102	4.153	10.99	−15.08
68 ew64	8101	9212	144	0.178	3.899	10.22	−14.76
69 vw190 (Well-diversified Japanese equity funds)	8101	9212	144	−0.011	5.118	15.21	−18.93
70 ew190	8101	9212	144	0.105	4.870	14.40	−18.58
71 vw13	8101	9212	144	−0.174	5.109	14.18	−18.89
72 ew13	8101	9212	144	0.046	4.736	13.01	−18.84

The 64 individual funds are selected based on the criteria that they have more than 97 observations during the January 1981–December 1992 period. The portfolios of funds for each management company are equally weighted of all the funds that existed during the observation period. Among all the funds, the well-diversified Japanese equity funds indicated by an asterisk (*) are those that invest all or mostly in Japanese stocks with no specialization in particular industries or types of stocks such as growth or low capitalization stocks. The figures in the parentheses show the number of funds in the portfolio. The indices vw800 and ew800 refer to the value- and equal-weighted portfolios for all 800 mutual funds managed by the nine management companies. Portfolios vw64 and ew64 refer to the value- and equal-weighted portfolios for the 64 funds that had more than 97 observations during the observation period. The well-diversified 190 and 13 funds are subsets of the 800 and 64 funds, respectively. The returns are in percentage rates per month. The names of individual funds are not necessarily the direct translations of the original Japanese names.

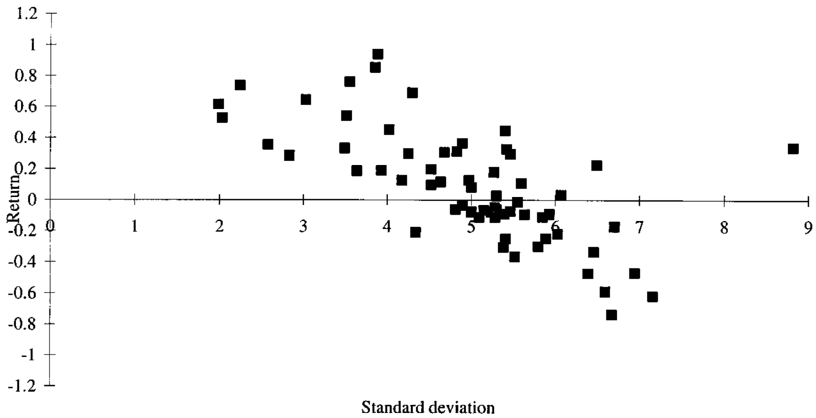

Figure 1
Risk and return of Japanese open-type mutual funds
The figure shows the average return and standard deviation of the 64 individual mutual funds selected in Table 2. All returns and standard deviations are in percentage rates per month.

then the Jensen measure refers to the intercept α_j in the following regression:

$$r_{j,t+1} = \alpha_j + \beta_j r_{m,t+1} + \varepsilon_{j,t+1}. \tag{1}$$

A positive Jensen measure indicates superior performance if a fund manager possesses stock selection ability but no timing ability.

2.1.2 Positive period weighting measure. When a fund manager has timing ability, α_j can be negative even if the manager is successful both in selecting stocks and gauging market timing. Conversely α_j can be positive even if the manager is not successful in both stock selection and timing [see Admati and Ross (1985), Dybvig and Ross (1985), Jensen (1972), and Lehmann and Modest (1987)]. We therefore calculate the positive period weighting (PPW) measure developed by Grinblatt and Titman (1989b, 1994) to address the problem of a negative Jensen measure when a manager has timing information. The PPW measure for fund j is defined as a summation: $\alpha_j = \sum_t w_t r_{j,t}$, where $r_{j,t}$ is the excess return of the fund for period t, and the summation is over the observation period of the data. The weights are chosen to be nonnegative and satisfy the following relation for the excess return of a benchmark, $r_{m,t}$, for the same period: $\sum_t w_t r_{m,t} = 0$. This relation corresponds to the first-order condition for holding the optimal benchmark portfolio where the weights correspond to the marginal utility of an investor. To derive these weights we assume a risk-averse investor with a power utility function who maximizes his expected utility (or the average utility over the sample period), $\sum_t (1/\theta)(1 + r_{f,t} + \gamma r_{m,t})^{\theta}$. The marginal utility at time t is $(1+r_{f,t}+\gamma r_{m,t})^{\theta-1}$, where the gross return represents the wealth level in each period, assuming the initial wealth is 1. The risk-free rate at time t is denoted by $r_{f,t}$, and γ is the optimal weight of the benchmark portfolio obtained by maximizing the expected (or the average) utility. The time series of the marginal utilities are rescaled so that they add up to 1; i.e., $w_t = (1+r_{f,t}+\gamma r_{m,t})^{\theta-1} / \sum_t (1+r_{f,t}+\gamma r_{m,t})^{\theta-1}$. We choose the risk aversion parameter, θ, of -0.68 because the optimal portfolio under this parameter setting requires no holdings of the risk-free asset. We calculate each set of weights for different benchmarks as well as for different observation periods.

2.1.3 Conditional Jensen measure. Ferson and Schadt (1996) recognize the importance of incorporating changing economic conditions in evaluating mutual fund performance. If fund managers shift their portfolios based on public information on economic conditions, traditional (unconditional) performance measures that do not take into account of this effect can be biased. By conditioning on time-varying economic variables, Ferson and Schadt (1996) obtain results that are different from the unconditional analysis. In the conditioned model the beta of a managed portfolio is assumed to be a linear function of public information vector Z_t that captures changing economic conditions:

$$\beta_j(Z_t) = b_{1j} + b_{2j} z_t,$$

where b_{1j} is the unconditional mean of the conditional beta $E[\beta_j(Z_t)]$. The second coefficient, b_{2j}, is a beta response coefficient vector that tracks how the beta varies with the innovation of the conditioning variable vector $z_t = Z_t - E(Z_t)$. By multiplying the market return to $\beta_j(Z_t)$, the following regression is obtained:

$$r_{j,t+1} = a_j + b_{1j} r_{m,t+1} + b_{2j}(z_t r_{m,t+1}) + \varepsilon_{j,t+1}. \qquad (2)$$

Since returns are in terms of excess returns from the risk-free rate, the additional factor in Equation (2) can be interpreted as a self-financing dynamic strategy that purchases z_t units of market portfolio by borrowing on the risk-free market.

2.2 Benchmark and conditioning variables

Since Japanese stock mutual funds invest not only in stocks but also in bonds as well as convertible bonds, we use the value-weighted benchmark that consists of these assets. [See Section 1.4 and footnote 9 for details of the benchmark.] The conditioning variables are dividend yield of the value-weighted index, 1-month Gensaki rate, term spread between the yield on 10-year government bonds and 1-month

Gensaki rate, and finally the January dummy variable. Dividend yield for the market is constructed from the difference between the two market index returns with and without dividends, provided by the PACAP Japanese database. The dividend yield used is computed by summing the monthly dividend for 12 months preceding month t and dividing the sum with the index without dividends for month t. One-month Gensaki rates and yields on 10-year government bonds are provided from Daiwa Institute of Research.

2.3 Performances

Table 3 summarizes the Jensen measures based on both unconditional and conditional benchmarks. The results confirm that Japanese open-type mutual funds significantly underperform the market index. The second and third columns of panel A show unconditional and conditional Jensen alphas for the aggregate portfolios. The portfolio alphas of funds in "All category" are consistently negative and statistically significant, with numbers ranging from −0.501% to −0.587% per month (around −6% to −8% per annum). The well-diversified equity funds perform even worse, since their alphas indicate average returns of −8% to −9.5% per annum from the benchmark. Even allowing for transaction costs as high as 3%, the funds still underperform the index on average. The second panel shows summary results for individual funds. Almost all funds have negative alphas, with a majority being statistically significant. In particular, all 13 well-diversified equity funds have negative alphas and 11 of them are statistically significant at the 5% level, regardless of the performance measure. The PPW measures are similar to the Jensen measures in size for the aggregate portfolios. With regard to the individual funds, the results are also comparable to those of the Jensen measures.

We examine the alphas of foreign-investment funds to see if they had particularly poor performance due to the appreciation of the yen exchange rate during the observation period. The average alpha of the six foreign-investment funds is −0.425 while that of the domestic-only funds is −0.568. Thus in our sample, whether or not to include foreign-investment funds does not seem to affect the general result.[10]

The Jensen measures do not improve with the conditional model. Figure 2 plots the histogram for the unconditional and conditional Jensen measures. Both the unconditional and conditional measures are skewed to the left. The result contrasts with that of Ferson and Schadt (1996) who find that the alphas become more positive when

[10] As of the end of 1993, stock open-type mutual funds had 9.6% of their investment in foreign assets.

Table 3
The basic performance measures, January 1981–December 1992

		Unconditional		Conditional		
	PPW	α	R^2	a	R^2	p-value
Panel A						
All category						
vw800	−0.588*	−0.587*	0.810	−0.588*	0.843	0.000
	(3.795)	(3.833)		(4.127)		
ew800	−0.504*	−0.501*	0.795	−0.488*	0.836	0.000
	(3.494)	(3.474)		(3.754)		
vw64	−0.613*	−0.611*	0.731	−0.638*	0.778	0.000
	(3.391)	(3.408)		(3.897)		
ew64	−0.523*	−0.520*	0.726	−0.522*	0.773	0.000
	(3.048)	(3.014)		(3.287)		
Well-diversified Japanese equity funds						
vw190	−0.797*	−0.795*	0.808	−0.795*	0.830	0.002
	(4.230)	(4.271)		(4.381)		
ew190	−0.670*	−0.668*	0.826	−0.681*	0.852	0.000
	(3.927)	(3.959)		(4.240)		
vw13	−0.940*	−0.937*	0.704	−0.931*	0.750	0.000
	(4.030)	(4.052)		(4.361)		
ew13	−0.704*	−0.701*	0.734	−0.737*	0.783	0.000
	(3.438)	(3.430)		(3.925)		
Panel B: The number of positive and negative measures of 64 individual funds. [The number of 13 well-diversified Japanese equity funds.]						
Positive	3 [0]	3 [0]		4 [0]		
Negative	61 [13]	61 [13]		60 [13]		
Significance at 10%	40 [12]	41 [11]		35 [12]		
Significance at 5%	30 [11]	30 [11]		30 [11]		

Panel A compares positive period weighting measure as well as the unconditional and conditional Jensen measures from the single-index model for the aggregate mutual fund portfolios. The well-diversified Japanese equity funds invest all or mostly in Japanese stocks with no specialization in particular industries or types of stocks such as growth or low capitalization stocks. These 190 and 13 funds are subsets of the 800 and 64 funds, respectively. The R^2 is the adjusted correlation coefficient and the p-values indicate the significance of the information variables. Heteroskedasticity-adjusted t-statistics are in the parentheses. Asterisks (*) indicate significance at the 10% level. Panel B reports the number of the positive, negative, and significantly negative Jensen measures for 64 individual funds and the subset of 13 well-diversified Japanese equity funds under various models. The performances are measured in percentage per month.

the conditional model is used. They show that when the covariance between the conditional beta and the excess return on the market portfolio, $\text{cov}(r_m, b_{2j}z)$, is negative, the unconditional Jensen measure is negatively biased.[11] They find this to be the case for U.S. mutual

[11] Ferson and Schadt (1996) show that when Equation (2) is the true model, Equation (1) is estimated as

$$p\lim(\beta_j) = b_{1j} + b'_{2j}\text{cov}(r_m, zr_m)/\text{var}(r_m),$$
$$p\lim(\alpha_j) = E(r_m)(b_{1j} - p\lim(\beta_j)) + \text{cov}(r_m, b_{2j}z).$$

In a different context, Chan (1988) and Ball and Kothari (1989) suggest that the correlation between the time-varying beta and risk premium gives rise to a biased estimate of the returns earned by the contrarian investment strategy.

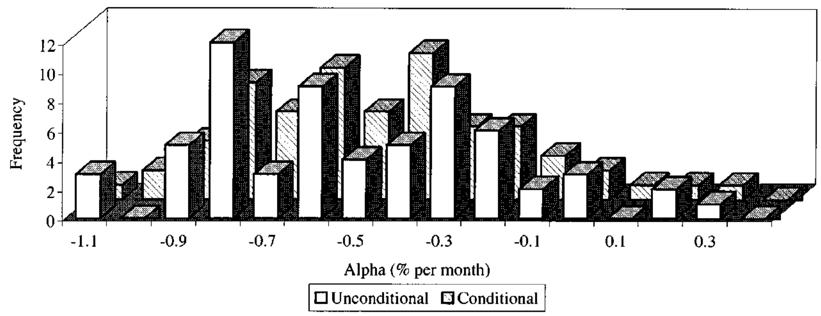

Figure 2
Jensen measures: single-factor models
The figure shows the frequency distributions of the Jensen measures of 64 individual funds for both unconditional and conditional single-factor models. See Table 2 for details of the funds.

funds, which explains their result. We do not, however, find significant negative correlation between the conditional betas and the excess market return, which explains why our conditional alphas do not become more positive than the unconditional ones.

The conditional variables provide additional information for explaining the return dynamics of the mutual funds. For the aggregate portfolios, the third column of Table 3 panel A reports the p-value of the F-test for the significance of the information variables.[12] Panel A also reports the R^2s from the two models. The conditional variables provide additional explanatory power of 3% to 4%.

Finally, we note that the survivorship bias should not be a major concern for the 64 funds that are selected for individual analysis for having a relatively long history. Others have noted that the reliance on surviving funds positively skews the performance measure [see Brown et al. (1992) and Grinblatt and Titman (1989a)]. In our case, however, the 64 funds show worse performance than the overall industry funds (the 800 portfolios) using any measures presented in this section. Therefore, survivorship bias may not to be a major issue.

2.4 Betas

In the first column of Table 4 panel A the beta coefficients from the unconditional model range from 0.835 to 0.958 for the 800 and 64 "All category" portfolios, and from 1.020 to 1.156 for the 190 and 13 "Well-diversified equity" portfolios. The average beta coefficients of the conditional model, b_1, are shown in the second column of the

[12] For individual funds, the null hypothesis that the information variables are irrelevant is rejected at the 5% level for 47 out of the 64 funds.

Table 4
Betas, January 1981–December 1992

	β	b_1	b_{div}	b_{rg}	b_{sp}	b_{jdum}
Panel A						
All category						
vw800	0.958*	1.129*	0.350*	1.026*	1.412	−0.352*
	(20.989)	(19.217)	(2.098)	(2.380)	(1.476)	(1.803)
ew800	0.851*	0.999*	0.275	1.193*	1.631	−0.311*
	(18.448)	(16.642)	(1.420)	(2.539)	(1.368)	(2.060)
vw64	0.893*	1.122*	0.501*	0.929*	1.685	−0.405*
	(16.295)	(16.426)	(2.349)	(1.826)	(1.315)	(1.724)
ew64	0.835*	1.022*	0.371	1.176*	1.841	−0.346*
	(15.782)	(12.839)	(1.542)	(2.166)	(1.335)	(2.014)
Well-diversified Japanese equity funds						
vw190	1.156*	1.323*	0.326*	1.031*	1.721*	−0.316
	(23.866)	(16.696)	(1.725)	(2.432)	(2.027)	(1.531)
ew190	1.113*	1.295*	0.403*	1.156*	1.428	−0.289
	(23.940)	(17.630)	(2.184)	(2.702)	(1.614)	(1.406)
vw13	1.077*	1.314*	0.446*	1.458*	2.541*	−0.480*
	(16.141)	(15.363)	(1.784)	(2.687)	(1.752)	(1.756)
ew13	1.020*	1.281*	0.601*	1.449*	1.945	−0.342
	(17.151)	(14.587)	(2.472)	(2.821)	(1.541)	(1.582)
Panel B	The number of positive and negative measures of 64 individual funds. [The number of 13 well-diversified Japanese equity funds.]					
Positive	64 [13]	63 [13]	47 [13]	53 [12]	54 [11]	1 [0]
Significantly positive	62 [13]	60 [13]	23 [6]	27 [6]	17 [4]	0 [0]
Negative	0 [0]	1 [0]	17 [0]	11 [1]	10 [2]	63 [13]
Significantly negative	0 [0]	0 [0]	1 [0]	3 [0]	0 [0]	25 [4]

Panel A reports the estimates for the conditional and unconditional beta for the aggregate mutual fund portfolios from the single-index model. The coefficient β (subscript j omitted) is an unconditional beta from the following regression:

$$r_{j,t+1} = \alpha_j + \beta_j r_{m,t+1} + \varepsilon_{j,t+1},$$

where $r_{j,t+1}$ is the excess return for the jth fund and $r_{m,t+1}$ is the excess return on the market portfolio. The coefficient b_1 is the average conditional beta and b_2 is the vector of beta responsive coefficients from the following model:

$$r_{j,t+1} = a_j + b_{1j} r_{m,t+1} + b'_{2j}(z_t r_{m,t+1}) + \varepsilon_{j,t+1}.$$

The vector of information variables, z, includes dividend yield, 1-month Gensaki rate, long-short spread, and the January dummy variable. Therefore $b_2 = (b_{\text{div}}, b_{\text{rg}}, b_{\text{sp}}, b_{\text{jdum}})'$. Heteroskedasticity-adjusted t-statistics are in the parenthesis. Asterisks (*) indicate significance at the 10% level. Panel B reports the number of positive, significantly positive, negative, and significantly negative coefficients for the 64 and its subset of 13 individual funds. The significance level is 10%.

table. Conditional betas are larger than the unconditional ones. This implies that the unconditional betas may be biased and that managers could be adjusting their portfolios to changing economic conditions. Particularly, the well-diversified equity funds tend to have betas larger than unity and are larger than the average of all funds. However, the mutual fund industry as a whole, represented by the 800 portfolios, has a risk position that is close to that of the market.

Before we look at the sensitivities of the betas to individual conditional variables, we consider whether the same set of information variables can forecast the market returns. We regress the excess returns of the market portfolio 1 month ahead on the information variables of the current month. All information variables are expressed as innovations from the long-term mean. The regression result shows that the dividend yield (div_t) is positively related, and the 1-month Gensaki rate (rg_t) and term spread (sp_t) are negatively related to the excess return on the market portfolio:

$$\underset{}{r_{m,t+1}} = \underset{(2.18)}{4.02} + \underset{(2.95)}{4.57 div_t} - \underset{(-2.74)}{12.92 rg_t} - \underset{(-2.38)}{16.19 sp_t} + \varepsilon_{m,t+1}, \quad R^2 = 0.06.$$

This implies that these conditioning variables have predictive power for the market returns one period ahead. The negative relation between the spread and market index return from the TSE is also found in Campbell and Hamao (1992). If managers use this information in adjusting their portfolios, the portfolio betas should respond positively to a change in the dividend yield and negatively to a change in the Gensaki rate and the term spread.

The last four columns show the sensitivities of betas to these conditioning variables and the January dummy. The results show that fund managers respond positively to the dividend yield. However, with regard to the interest rate and the term spread, the beta responses are positive, which is opposite to the prediction that managers use this information to forecast the market returns. For individual funds, we observe that the sign for the dividend yield is positive for most of the funds (positive for all well-diversified equity funds), of which about half of them are statistically significant. The signs for the short-term interest rate and the term spread are again positive for most of the funds, of which about one-half and one-third are significant, respectively. The results from both the aggregate and individual funds suggest that Japanese mutual fund managers responded correctly to dividend yield information but incorrectly to interest rate information. Finally, the signs of the coefficients of January dummies are all negative but not all of the coefficients are statistically significant. Particularly, the coefficients for well-diversified equity funds tend to be less significant.

2.5 Subperiod and company analysis

Our observation period, which is from January 1981–December 1992, covers a long bull market until the end of 1989 and the subsequent bear market. We estimate the performance measures for the two subperiods to determine if they differ between the two market environments. The results in Table 5 show that the performance was not any better in either subperiod.

Next we check whether the aggregate performance is affected by a few poorly performing companies. Table 6 shows both conditional

Table 5
Basic performance measures: subperiod analysis

	Jan. 1981–Dec. 1989						Jan. 1990–Dec. 1992					
		Unconditional		Conditional				Unconditional		Conditional		
	PPW	α	R^2	a	R^2	p-value	PPW	α	R^2	a	R^2	p-value
All category												
vw800	−0.576*	−0.533*	0.611	−0.435*	0.705	0.000	−0.483*	−0.470*	0.977	−0.599*	0.982	0.097
	(2.768)	(2.415)		(2.355)			(3.007)	(3.186)		(4.283)		
ew800	−0.515*	−0.466*	0.595	−0.358*	0.715	0.000	−0.399*	−0.382*	0.968	−0.516*	0.974	0.169
	(2.679)	(2.119)		(2.223)			(2.374)	(2.380)		(3.543)		
vw64	−0.649*	−0.598*	0.528	−0.474*	0.650	0.000	−0.593*	−0.578*	0.952	−0.789*	0.965	0.043
	(2.675)	(2.298)		(2.265)			(2.819)	(3.034)		(4.344)		
ew64	−0.593*	−0.540*	0.542	−0.427*	0.664	0.000	−0.483*	−0.462*	0.930	−0.680*	0.945	0.114
	(2.619)	(2.096)		(2.156)			(2.034)	(2.174)		(3.340)		
Well-diversified Japanese equity funds												
vw190	−0.723*	−0.673*	0.591	−0.553*	0.658	0.001	−0.620*	−0.604*	0.974	−0.710*	0.983	0.010
	(2.924)	(2.570)		(2.358)			(2.902)	(2.893)		(3.840)		
ew190	−0.613*	−0.565*	0.629	−0.491*	0.701	0.000	−0.599*	−0.581*	0.980	−0.694*	0.984	0.118
	(2.688)	(2.331)		(2.344)			(3.452)	(3.441)		(4.295)		
vw13	−0.880*	−0.811*	0.436	−0.631*	0.563	0.000	−0.734*	−0.714*	0.957	−0.912*	0.972	0.013
	(2.853)	(2.403)		(2.350)			(2.822)	(2.849)		(4.024)		
ew13	−0.710*	−0.649*	0.524	−0.567*	0.634	0.000	−0.699*	−0.680*	0.945	−1.000*	0.959	0.047
	(2.610)	(2.199)		(2.322)			(2.664)	(2.967)		(4.411)		

The positive period weighting measure (PPW) as well as the unconditional and conditional Jensen measures are calculated from the single-index model for the aggregate mutual fund portfolios. Well-diversified Japanese equity funds invest all or mostly in Japanese stocks with no specialization in particular industries or types of stocks such as growth or low capitalization stocks. These 190 and 13 funds are subsets of the 800 and 64 funds, respectively. The value-weighted portfolio of stocks from both sections of the TSE, all government and corporate bonds with a more than 1-year maturity, and convertible bonds are used as the benchmark. The R^2 is the adjusted correlation coefficient and the p-values indicate the significance of the information variables. Heteroskedasticity-adjusted t-statistics are in the parenthesis. Asterisks (*) indicate significance at the 10% level. The performances are measured in percentage per month.

Table 6
Company analysis and persistence

Company	Unconditional Jan. 1981–Dec. 1992	Unconditional Jan. 1981–Dec. 1989	Unconditional Jan. 1990–Dec. 1992	Conditional Jan. 1981–Dec. 1992	Conditional Jan. 1981–Dec. 1989	Conditional Jan. 1990–Dec. 1992
A	−0.483	−0.305	−0.609	−0.493	−0.304	−0.683
	(4.088)[1]	(1.931)[2]	(3.819)[6]	(4.425)[1]	(2.122)[2]	(4.575)[4]
B	−0.756	−0.658	−0.515	−0.751	−0.489	−0.609
	(2.372)[5]	(1.397)[3]	(2.962)[3]	(2.386)[5]	(1.130)[4]	(3.439)[2]
C	−0.766	−0.696	−0.565	−0.751	−0.544	−0.773
	(3.356)[6]	(2.044)[6]	(3.042)[5]	(3.269)[5]	(1.807)[6]	(4.134)[7]
D	−0.736	−0.660	−0.617	−0.768	−0.589	−0.743
	(3.892)[4]	(2.553)[4]	(3.089)[7]	(4.217)[7]	(2.411)[7]	(4.161)[6]
E	−0.800	−0.694	−0.401	−0.728	−0.531	−0.539
	(3.794)[7]	(2.241)[5]	(2.342)[1]	(3.517)[4]	(1.934)[5]	(3.003)[1]
F	−0.858	−0.811	−0.553	−0.809	−0.663	−0.649
	(3.490)[8]	(2.112)[8]	(2.903)[4]	(3.255)[8]	(1.906)[8]	(4.290)[3]
G	−0.512	−0.283	−0.840	−0.564	−0.136	−0.961
	(2.325)[2]	(0.885)[1]	(3.473)[8]	(2.705)[2]	(0.536)[1]	(4.246)[9]
H	−0.716	−0.707	−0.404	−0.608	−0.429	−0.695
	(3.623)[3]	(2.484)[7]	(2.067)[2]	(3.455)[3]	(1.867)[3]	(3.368)[5]
I	−0.909	−1.048	−0.657	−1.073	−1.153	−0.823
	(2.974)[9]	(2.424)[9]	(2.111)[9]	(3.575)[9]	(2.749)[9]	(3.394)[8]
ew190	−0.668	−0.565	−0.581	−0.681	−0.491	−0.694
	(3.959)	(2.331)	(3.441)	(4.240)	(2.344)	(4.295)

The unconditional and conditional Jensen measures are calculated from the single-index model for the equal-weighted portfolio of well-diversified Japanese equity funds for each management company. The figures in the parentheses ( ) are *t*-statistics adjusted for heteroskedasticity, and the brackets [ ] are rankings across companies. Portfolio ew190 is the equal-weighted portfolio of well-diversified equity funds across all management companies. The performances are measured in percentage per month.

and unconditional alphas for the nine management companies for the entire observation period as well as for the two subperiods. The table covers only the well-diversified equity funds, since the composition of other types of funds may differ among companies. Also we employ equal-weighted portfolios, instead of the value-weighted ones, to avoid bias that may arise if large funds perform differently from others. The results show that even the best performing company (company A in the table) seems to underperform the index significantly by 5.8% to 5.9% per annum for the entire period.

Furthermore, we examine if there is persistence in the performance of the nine management companies. Table 6 includes the ranking of the companies from 1 to 9. We split the observation period according to the previous analysis and estimate the Jensen measures for both unconditional and conditional models. We calculate the Spearman rank correlation between the two periods. The rank correlation of company alphas for the unconditional model is −0.10, and that for the conditional model is 0.00. We conclude that there is little persistence in performance among the companies.

3. An Investigation of Managers' Strategies

3.1 Passive strategies

For comparison with the sample of mutual funds, we construct a number of portfolios based on passive strategies that use known accounting information and no private information about the stocks. The purpose of this exercise is to validate our approach; since passive portfolios are formed without private information, a valid evaluation model should reveal no evidence of stock selection ability if applied to these portfolios.

Fama and French (1992) show that two empirically determined variables — size and book-to-market ratio — effectively explain the cross-section of average returns on the U.S. stocks for the 1963–1990 period, among other variables like market beta, E/P, and leverage. Chan, Hamao, and Lakonishok (1991) examine cross-sectional regressions for the Japanese stock market and reach similar conclusions. Also in a time-series context, Fama and French (1993) demonstrate that the market factor and the mimicking factors related to size and book-to-market ratio effects successfully capture the common variations in the stock market. Motivated by these results, we construct 36 value-weighted passive portfolios from all stocks listed on the TSE. These include 25 portfolios formed by a two-way sort on size and book-to-market ratios (BE/ME), 6 portfolios formed on the earnings price ratio (E/P), and the 5 portfolios formed on the ratio between book asset and market equity (BA/ME). The first of the six E/P portfolios consists of stocks with negative earnings. The rest of the stocks are broken into five groups, from lowest to highest E/P ratios. Since these 36 portfolios do not use private information, they should generate zero intercepts when regressed on benchmarks and therefore can provide a basis for comparison with the mutual fund performance.

We rebalance the portfolios once a year based on the most currently available information. For most of the Japanese companies, March is the last month of their fiscal year. The annual reports published by the Ministry of Finance become available a few months later. Thus we construct the portfolios in July when new information for most of the companies first becomes available to the public. When calculating the BE/ME, BA/ME, and E/P ratios in July, we use the market values at the end of June and the accounting values from the previous fiscal year that ends anytime between April of the previous year and March of the current year.

We regress the excess returns of the 36 passive portfolios on the excess returns of the market portfolio. The first panel of Table 7 reports the intercepts from the unconditional model. Most of the significant and positive intercepts are from the portfolios of smaller size and higher BE/ME ratios, and a significantly negative alpha is observed for the portfolio with the largest size and the lowest BE/ME ratio. This evidence implies the inefficiency of the value-weighted market portfolio; that is, one can buy small stocks with high BE/ME ratios to beat the performance of the value-weighted portfolio. The second panel of Table 7 summarizes the results for the conditional model which are similar to those from the unconditional regression.[13]

3.2 Three-factor model

Based on the findings above, we investigate if underperformance of Japanese open-type mutual funds stems from investing in large and low BE/ME ratio stocks. To this end we construct factors that represent the two factors described above. First, we construct passive portfolios based on size and BE/ME ratios as explained in the previous section. For size-based groups, we use the median to split the stocks into the big and small groups (B and S). For the BE/ME ratios, we group the stocks based on breakpoints for the bottom 30% (low), the middle 40% (medium), and the top 30% (high) ratios. Therefore, we have six portfolios; that is, small- and large-firm portfolios each classified into low, medium, and high BE/ME ratios. We use the notation SL, SM, and SH for small-firm portfolios with three different levels of BE/ME ratios, and BL, BM, and BH for the three large-firm portfolios. After forming the portfolios, we calculate monthly value-weighted returns by using the same weights from July of the current year to June of the following year. Next we calculate the returns of two self-financing portfolios; one related to size and the other to the BE/ME ratio. The return of the mimicking portfolio that is related to size, SMB, is the difference between the average return of the three small-stock portfolios (SL, SM, SH) and the average return of the three large-stock portfolios (BL, BM, BH). The return of the mimicking portfolio should be free of the influence of the BE/ME ratio effect and should characterize the return difference between large and small stocks. Similarly, the return of the mimicking portfolio that is related to the BE/ME ratio, HML, is the difference between the average return of the two high BE/ME ratio portfolios (SH and BH) and that of the two low BE/ME ratio portfolios (SL and BL). The return of the HML portfolio should be free of the influence of size and should capture the difference in returns of the high and low BE/ME ratio stocks. The correlation between the two factors, SMB and HML, is small (−0.04).

In the next step we regress the excess returns of the various passive portfolios that we constructed in Section 3.1 on the three factors. Most

[13] We reject the null hypothesis that conditional information is irrelevant for 30 portfolios.

Table 7
Passive strategy portfolios

Panel A: Unconditional					
	BE/ME 1	BE/ME 2	BE/ME 3	BE/ME 4	BE/ME 5
Size 1	0.673	0.860*	1.168*	0.823*	1.106*
	(1.342)	(1.734)	(2.552)	(1.907)	(2.536)
Size 2	0.143	0.619	0.843*	0.795*	0.797*
	(0.330)	(1.479)	(2.170)	(1.970)	(2.019)
Size 3	0.044	0.246	0.320	0.413	0.734*
	(0.113)	(0.662)	(0.885)	(1.171)	(1.880)
Size 4	−0.527	0.041	0.346	0.417	0.718*
	(−1.408)	(0.135)	(1.079)	(1.367)	(2.276)
Size 5	−0.708*	−0.105	0.131	0.522*	0.565*
	(−2.577)	(−0.458)	(0.602)	(1.803)	(1.785)
E/P<0	E/P 1	E/P 2	E/P 3	E/P 4	E/P 5
0.745*	−0.477*	−0.170	0.055	0.287	0.491*
(1.908)	(−2.065)	(−0.684)	(0.262)	(1.390)	(2.000)
	BA/ME 1	BA/ME 2	BA/ME 3	BA/ME 4	BA/ME 5
	−0.319	0.072	0.253	0.250	0.537*
	(−0.969)	(0.313)	(1.232)	(1.167)	(1.966)
Panel B: Conditional					
	BE/ME 1	BE/ME 2	BE/ME 3	BE/ME 4	BE/ME 5
Size 1	0.869*	1.046*	1.361*	0.980*	1.196*
	(1.729)	(2.069)	(2.928)	(2.196)	(2.735)
Size 2	0.282	0.779*	0.929*	0.957*	0.957*
	(0.647)	(1.844)	(2.336)	(2.372)	(2.479)
Size 3	0.118	0.408	0.467	0.588*	0.922*
	(0.299)	(1.102)	(1.316)	(1.660)	(2.431)
Size 4	−0.424	0.180	0.514*	0.542*	0.827*
	(−1.123)	(0.583)	(1.656)	(1.831)	(2.648)
Size 5	−0.725*	−0.065	0.016	0.397	0.600*
	(−2.749)	(−0.283)	(0.075)	(1.512)	(1.935)
E/P<0	E/P 1	E/P 2	E/P 3	E/P 4	E/P 5
0.931*	−0.450*	−0.111	−0.001	0.253	0.403*
(2.380)	(−2.010)	(−0.465)	(−0.003)	(1.389)	(1.733)
	BA/ME 1	BA/ME 2	BA/ME 3	BA/ME 4	BA/ME 5
	−0.351	0.070	0.273	0.204	0.524*
	(−1.101)	(0.318)	(1.339)	(0.948)	(1.876)

The numbers are intercepts (Jensen measures) of the regressions of 36 passive portfolio excess returns on the value-weighted market index that includes stocks, bonds with longer than 1-year maturity, and convertible bonds. The numbers in parentheses are heteroskedasticity-adjusted *t*-statistics. Among the 36 portfolios, 25 are sorted by size and book-to-market ratio (BE/ME), 6 by earning price ratio (E/P), and 5 by book asset/market equity ratio (BA/ME), formed from all stocks in both the first and second sections of the TSE. The excess returns are net of the 1-month Gensaki rates. Size 1 (5) has the smallest (largest) market capitalization, BE/ME 1 (5) has the lowest (highest) BE/ME ratio. E/P 1 (5) has the lowest (highest) E/P ratio and BA/ME 1 (5) has the lowest (highest) leverage. Asterisks (*) indicate significance at 10%.

of these passive portfolios do not generate abnormal performance with respect to the three-factor benchmark (not reported). This result implies that the three factors can mimic an efficient benchmark. Similar results have been found by Fama and French (1993) for the U.S. stock market. The explanatory power of the three factors against the passive

25 size and BE/ME ratio sorted portfolio returns are 0.811 on average. The adjusted R^2s are relatively low compared to those results found by Fama and French (1993). The reason is that our market index, or the first factor, includes bonds. When we use the stock index (TOPIX) for the first factor, the average R^2 increases to 0.912, which is comparable to the Fama and French (1993) results. Therefore the size and BE/ME ratio factors are reasonable factors for explaining the equity portion of the mutual fund returns.

Our primary interest is to find whether the underperformance is due to the inefficiency of the single-factor benchmark; that is, whether using a more efficient benchmark mitigates the possible bias in the estimate of the Jensen measure. The unconditional three-factor model refers to the following equation:

$$r_{j,t+1} = \alpha_j + \beta_j r_{m,t+1} + \beta_j^{\mathrm{SMB}}\mathrm{SMB}_{t+1} + \beta_j^{\mathrm{HML}}\mathrm{HML}_{t+1} + \varepsilon_{j,t+1},$$

where β, β^{SMB}, and β^{HML} are unconditional betas for the market factor, the size factor, and the BE/ME ratio, respectively. Alternately, the conditional three-factor model refers to the following equation:

$$\begin{aligned} r_{j,t+1} \;=\; & a_j + (b_{1j} + b_{2j}' z_t) r_{m,t+1} + (b_{1j}^{\mathrm{SMB}} + b_{2j}^{\mathrm{SBM}\prime} z_t)\mathrm{SMB}_{t+1} \\ & + (b_{1j}^{\mathrm{HML}} + b_{2j}^{\mathrm{HML}\prime} z_t)\mathrm{HML}_{t+1} + \varepsilon_{j,t+1}, \end{aligned}$$

where b_1, b_1^{SMB}, and b_1^{HML} are average conditional betas, and b_2, b_2^{SMB}, and b_2^{HML} are vectors of beta-responsive coefficients with respect to the factors. The vector of information variables, z_t, includes dividend yield, 1-month Gensaki rate, the term spread, and the January dummy. The Jensen measures are intercepts of the equations. In Table 8 the estimated numbers under columns α and a still indicate underperformance, and their magnitudes are close to the estimates from the single-factor models. Panel B of Table 8 and Figure 3 show the Jensen measures of the individual funds. Although the results are similar between the two models, the conditional model shows slightly more significant negative alphas than the unconditional model.[14] In sum, the inclusion of size and book-to-market factors do not affect the underperformance of the funds.

Although the underperformance is not explained, the coefficients on the factors provide interesting information about how managers formed their portfolios. The mimicking factor SMB measures the difference in returns between small and large stock portfolios. A positive (negative) coefficient on the SMB factor indicates that the underlying

[14] We also calculated the PPW measure from the three-factor model. The results are similar to those obtained from the single-factor model.

Table 8
Three-factor models, January 1981–December 1992

	Unconditional					Conditional				
	α	β	β^{SMB}	β^{HML}	R^2	a	b_1	b_1^{SMB}	b_1^{HML}	R^2
Panel A										
All categories										
vw800	−0.478*	0.927*	−0.080*	−0.089		−0.563*	1.045*	−0.158*	−0.211*	
	(2.286)	(18.291)	(2.537)	(1.186)	0.819	(4.423)	(16.515)	(4.382)	(3.552)	0.897
ew800	−0.461*	0.838*	−0.042	−0.026		−0.525*	0.920*	−0.138*	−0.140*	
	(2.826)	(16.498)	(1.309)	(0.379)	0.798	(4.551)	(14.063)	(4.078)	(2.750)	0.897
vw64	−0.516*	0.862*	−0.118*	−0.048		−0.649*	1.034*	−0.198*	−0.197*	
	(2.581)	(14.545)	(3.025)	(0.546)	0.745	(4.494)	(14.723)	(4.744)	(2.904)	0.858
ew64	−0476*	0.819*	−0.078*	−0.009		−0.571*	0.909*	−0.196*	−0.160*	
	(2.474)	(14.343)	(2.021)	(0.107)	0.732	(4.046)	(11.022)	(4.502)	(2.655)	0.858
Well-diversified Japanese equity funds										
vw190	−0.603*	1.108*	−0.046	−0.214*		−0.711*	1.237*	−0.122*	−0.359*	
	(3.096)	(20.228)	(1.201)	(2.442)	0.825	(4.288)	(14.119)	(2.471)	(4.452)	0.887
ew190	−0.534*	1.078*	−0.056	−0.134*		−0.639*	1.191*	−0.143*	−0.274*	
	(2.988)	(20.999)	(1.540)	(1.844)	0.835	(4.352)	(14.629)	(3.277)	(4.252)	0.898
vw13	−0.772*	1.032*	−0.093*	-0.151		−0.915*	1.251*	−0.162*	−0.336*	
	(3.009)	(13.688)	(1.907)	(1.300)	0.717	(4.498)	(12.781)	(2.724)	(3.412)	0.834
ew13	−0.583*	0.985*	−0.102*	−0.087		−0.729*	1.158*	−0.201*	−0.271*	
	(2.685)	(15.193)	(2.389)	(0.973)	0.745	(4.262)	(12.131)	(3.852)	(3.421)	0.851

Table 8
continued

	Unconditional				Conditional			
	α	β	β^{SMB}	β^{HML}	a	b_1	b_1^{SMB}	b_1^{HML}
Panel B:	The number of positive and negative coefficients from 64 individual funds. [The number from 13 well-diversified Japanese equity funds.]							
Positive	4 [0]	64 [13]	25 [1]	32 [4]	1 [0]	62 [13]	9 [1]	12 [0]
Significantly positive	0 [0]	62 [13]	10 [0]	7 [0]	0 [0]	61 [13]	0 [0]	4 [0]
Negative	60 [13]	0 [0]	39 [12]	32 [9]	63 [13]	2 [0]	55 [12]	52 [13]
Significantly negative	32 [8]	0 [0]	22 [9]	3 [3]	45 [11]	0 [0]	38 [9]	30 [9]

Panel A reports the estimates for the conditional and unconditional beta for the aggregate mutual fund portfolios from the three-factor model. The coefficients β, β^{SMB}, and β^{HML} (subscript j is omitted) are unconditional betas from the following regression:

$$r_{j,t+1} = \alpha_j + \beta_j r_{m,t+1} + \beta_j^{\mathrm{SMB}}\mathrm{SMB}_{t+1} + \beta_j^{\mathrm{HML}}\mathrm{HML}_{t+1} + \varepsilon_{j,t+1},$$

where $r_{j,t+1}$ is the excess return for the jth mutual fund, $r_{m,t+1}$ is the excess return of the value-weighted market portfolio, SMB_t and HML_t are the mimicking factors related to the size and book-to-market ratios, respectively. The coefficients b_1, b_1^{SMB}, and b_1^{HML} are average conditional betas with respect to the three factors, and b_2, b_2^{SMB}, and b_2^{HML} are the vectors of beta responsive coefficients from the following conditional model:

$$r_{j,t+1} = a_j + (b_{1j} + b_{2j}' z_t) r_{m,t+1} + (b_{1j}^{\mathrm{SMB}} + b_{2j}^{\mathrm{SMB}\prime} z_t)\mathrm{SMB}_{t+1} + (b_{1j}^{\mathrm{HML}} + b_{2j}^{\mathrm{HML}\prime} z_t)\mathrm{HML}_{t+1} + \varepsilon_{j,t+1}.$$

The vector of information variables, z, includes dividend yield, 1-month Gensaki rate, the long-short spread, and the January dummy. Heteroskedasticity-adjusted t-statistics are in the parentheses. Asterisks (*) indicate significance at the 10% level. Panel B reports the number of positive and negative coefficients from the 64 and its subset of 13 individual funds. The significance level is 10%.

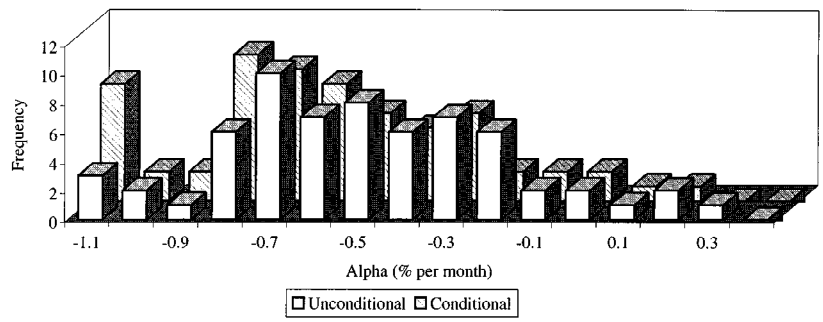

Figure 3
Jensen measures: three-factor models
The figure shows the frequency distributions of Jensen measures of 64 individual funds for both unconditional and conditional three-factor models. See Table 2 for details of the funds.

fund is tilted toward smaller (larger) stocks relative to the market index. From panel A of Table 8, the SMB slopes for the eight mutual fund portfolios are all negative and the *t*-statistics exceed 2, except for the ew800, vw190, and ew190 portfolios using the unconditional model. For the conditional model, the coefficients are all significant. For the individual funds we find that about one-third of the estimates are significantly negative among the 64 funds, and most of them are both negative and significant for the 13 well-diversified equity funds.

The mimicking factor HML measures the difference in returns between portfolio of stocks with high and low BE/ME ratios. Again, a negative coefficient on the HML factor indicates that the underlying fund is tilted toward low BE/ME ratio stocks relative to the market index. The slopes of the HML factor are all negative for the aggregate portfolios. Although the coefficients are not significant for the 800 portfolios with the unconditional model, they are all significant with the conditional model. For the 64 individual funds, only half of them have negative slopes for the unconditional model, and most of them are not statistically significant. However, for the conditional model, most of them are negative and more than half of them are significant. In particular, for the 13 well-diversified equity funds, all of them have negative signs and most of them are statistically significant.

We can conclude that for most Japanese mutual funds, the average conditional betas for both SML and HML factors are negative. In other words, Japanese mutual fund managers lean towards stocks with large market capitalization and low BE/ME ratios, or large and glamour stocks. However, our results show such strategies are not the main source of underperformance.[15] In a recent article Lakonishok, Shleifer and Vishny (1994) showed that those investment strategies that buy out-of-favor or value stocks (for example, stocks with high BE/ME ratios) have outperformed glamour strategies over the 1968-1989 period in the United States. They conjecture that the results can be best explained by the preference of both institutional and individual investors for glamour stocks and by their avoidance of value stocks. Particularly institutions might prefer glamour stocks because they appear to be prudent to investors. The results for Japanese mutual funds are consistent with this conjecture. In addition, managers of open-type mutual funds may tend to hold glamour stocks because they are likely to be more liquid and the funds are exposed to repurchase from the investors.[16]

3.3 Timing and selectivity

Timing refers to a manager's ability to tilt his portfolio to a greater portion of the market portfolio when market return is higher and vice versa. Treynor and Mazuy (1966) capture such a nonlinear relation by a squared term of the return on the market portfolio. Ferson and Schadt (1996) extend the analysis to a conditional setting. Our results (not reported) show negative timing coefficients that are statistically significant for both unconditional and conditional single-index models. As a result, Jensen's alphas shift in a positive direction, for example, by 0.175% per month (2.1% per annum) for the vw800 portfolio and 0.207% (2.5% per annum) for the ew800 portfolio, relative to the alphas of the model without the timing coefficient. Therefore it seems that part of negative alphas is explained by negative timing.

To assess the validity of the model, we apply the model to the 36 passive portfolios. We find that most of the timing coefficients are negative; particularly portfolios with large-size and low BE/ME ratio stocks tend to have significant coefficients while the others do not. The alphas of these passive portfolios become uniformly higher, say by 0.2% to 0.3% per month, compared to the models without the timing coefficient. Therefore we cannot conclude that the mutual funds' significant timing coefficients and less negative alphas are due

[15] In order to form the passive portfolios, accounting information was obtained from the PACAP Japanese tape, which has a forward-looking bias; that is, the delisted firms are excluded from the data whenever the tape is newly compiled. See Chan, Hamao, and Lakonishok (1991) for similar comments on Japanese data. The observation period for this study is 12 years from January 1981–December 1992, and 53 companies were delisted during the period among 1,412 companies in 1981 and 1,651 in 1992. The majority of these companies were delisted either due to mergers and/or financial distress. Since the number of delisted companies seems to be relatively small, the bias may not be significant for our study.

[16] From personal conversation with those in the management companies.

to negative timing. Instead, this result may be simply due to the fact that funds hold large and low BE/ME ratio stocks. Similar results hold for the conditional model as well.[17] As pointed out by Admati, et al. (1986), it is difficult to separate timing from selective activities. Further, it is possible to construct portfolios that show artificial timing ability when no true timing exists. In practice, investing in options or option-like securities will generate spurious timing. [See Glosten and Jagannathan (1994) and Jagannathan and Korajczyk (1986) for a detailed discussion.]

4. The Dilution Effect of Fund Inflows

To explain the dilution effect, we show how capital gains tax is determined for open-type mutual funds.[18] When an investor *sells* an existing share of funds, the after-tax price (P) is net asset value (NAV) minus capital gains tax; $P = NAV - Tax$. (Note that the mutual fund returns that we used are calculated from NAV.) In the case of open-type mutual funds, the government defines a fund's capital gain as the difference between the current NAV and the *historical trade-weighted average* of the after-tax price (P) since the start of the fund; that is, the capital gain is $\max[NAV - \bar{P}, 0]$ where $\bar{P}$ is the average price since the fund's inception.[19] The government is able to collect taxes without keeping track of the individual transactions of investors as long as the capital gain is defined in this manner. Thus the capital gain of an open-type mutual fund is calculated for each fund at each point in time, not for each investor's transactions.

The NAV per share may be diluted when a new investor *buys* shares of an existing fund. Dilution occurs when the price that an investor pays for a share is less than the existing NAV per share. This is the case for open-type funds because a new investor is only required to pay the *after-tax* NAV (i.e., P), not the NAV. Only when there is no capital gain is the after-tax price equal to the NAV per share. Thus when there is any capital gain in the fund, inflow causes dilution. In

[17] We also considered the timing ability using the Merton and Henriksson (1981) model, which models the manager's timing behavior as creating an option-like payoff. Tests involving the passive portfolios show spurious timing ability with this model, thus we did not carry out the analysis of this model on the mutual fund sample.

[18] The authors thank the following for having drawn our attention to this fact and clarifying our questions: Katsuhide Hatanaka with LTCB Investment Advisory Co., Mamoru Mochizuki, Osamu Shigeta, Hiroshi Tunoi, Koichi Watanabe, all with Daiwa Investment Trust, and Toshinori Takayama with MTB Investment Technology. During the revision of our article we came across Ueda (1994) which also points out the dilution effect.

[19] Capital loss is not recognized in this rule.

the case of an outflow, the fund pays out NAV to an investor so that the NAV per share remains the same after the transaction.

The dilution effect can be formulated as follows: Let n be the number of existing mutual fund shares, a be the number of newly issued shares, and d be the number of repurchased shares by the fund. The value of NAV after the transactions is denoted by a prime, and the after-tax value by P as defined above. When an investor withdraws money from the fund, the fund pays out the NAV and the investor pays the capital gains tax, if any, from the proceeds; while a new investor pays in only P. Therefore we have $NAV' = (nNAV + aP - dNAV)/(n + a - d) = NAV - \alpha Tax$ where $\alpha = a/(n + a - d)$. If the return on the managed portfolio is r during the period, then we have $NAV' = NAV(1 + r) - \alpha Tax$ where the last term shows the dilution effect. The capital gains tax is calculated using the following formula: $Tax = (0.2)\max[NAV(1 + r) - \bar{P}, 0]$, where the tax rate is 20%.[20] A single period expected return of the NAV, $\mathbf{E}(NAV')/NAV - 1$, is

$$\mathbf{E}(r) - (0.2)\mathbf{E}(\alpha \max[(1 + r) - \bar{P}/NAV, 0]),$$

where $\mathbf{E}$ is the expectation operator and the second term is the dilution effect. Given the expected performance of the managed portfolio, $\mathbf{E}(r)$, the dilution effect is expected to be larger if (1) the rate of future inflow of funds (α) is larger and (2) current $\bar{P}/NAV$ is lower. The dilution effect penetrates into subsequent periods since the current transaction price, P, is incorporated in the average transaction price, $\bar{P}$, in the following period. The ratio between this new average transaction price and the NAV in the next period is used to determine the capital gain in the next transaction. Due to this multiperiod effect, the dilution effect is larger if (3) there have been more transactions since the fund started. Thus older funds have more dilution effect, other things being equal. This is true because the movement of $\bar{P}$ becomes more smooth and less responsive to the current movement of the NAV. Therefore there is higher probability that future NAV is larger than future $\bar{P}$, thus a higher probability of dilution.

Since information on α and $\bar{P}$ for individual funds is not available, we conduct a bootstrap experiment using the actual distribution of the single-factor benchmark index. Although the fund inflow rate is

[20] The tax is levied separately at the source. Tax-exempt investors include, for example, individual investors over 65 years old. If a corporation holds a stock mutual fund, the 20% tax levied on both dividends and capital gains is deductible from corporate tax in proportion to the holding period of the fund. Also 40% of both dividends and capital gains is not considered as corporate earnings and thus not subject to corporate tax. Nonresident investors, in principle, are taxed at the same rate as Japanese investors. However, if a country has a tax treaty with the Japanese government, the tax rate is determined by the treaty. The rate applied for many countries, including the United States, in such cases is 15%.

a stochastic variable, we treat it as a nonstochastic parameter in the simulation. We provide results for different inflow rates. We assume that a fund manager invests in an index portfolio that is equal to the single-factor benchmark that we used in the previous sections. Thus the portfolio returns are drawn from the distribution of the benchmark returns from January 1981–December 1992. The experiment is repeated 1,000 times for each set of parameters. Table 9 panel A shows the mean and standard deviation of the dilution effect from 1,000 replications for various cases. The numbers are in terms of percentages per month. From the same set of experiments, panel B reports the probability that the dilution effect explains the underperformance of −0.6% per month, which is a ballpark figure of the underperformance of the aggregate mutual fund portfolios. We have no information about the initial difference between NAV and $\bar{P}$ at the starting point of the simulation (i.e., January 1981). Therefore we present three cases: where NAV is higher than $\bar{P}$ by 10%, is at the same level as $\bar{P}$, and is lower than $\bar{P}$ by 10%. We know that the average aggregate inflow rate during the observation period is around 0.1 (10%) per month [Investment Trusts Association (1994)].[21] However, the aggregate inflow includes new mutual funds that started during the observation period. It is the inflow to an existing fund that is relevant to the dilution effect. Thus the inflow that causes dilution should be smaller than that implied by the aggregate inflow rate. Therefore we also provide results that assume smaller inflow rates. The age of the fund at the beginning of the simulation is set equal to 10 years. For example, among the 64 funds, 28 funds existed in January 1981, and the average age was 13.3 years. The *effective* age of the index of both 64 and 800 funds should be much younger because many of the funds started operation after 1983. Panel A shows that, with the inflow rate of 0.1, the average dilution effect is between 0.336% and 0.424% per month. Panel B shows that, at this inflow rate, the dilution effect explains the underperformance with probability zero. But it can explain half of the underperformance (−3%) with probability of more than 50%. At a smaller but perhaps more reasonable inflow rate of 0.05 per month, the average dilution effect drops to between 0.211% and 0.271% per month, and the probability that it can explain even half the underperformance drops to less than 30%.

However, we must be very careful in interpreting these figures because they are based on hypothetical simulations whose assumptions

[21] From personal interviews with some management firms, we find that the inflow rate of 0.1 is not an unreasonable number for particular months, but it may be too large for the average of the whole period.

Table 9
Dilution effect on the net asset value: a bootstrap experiment

Fund inflow rate	$\alpha = 0.01$	0.05	0.10
Panel A	(% per month)		
$(NAV_0/\bar{P}_0 - 1)$			
10%	−0.067	−0.271	−0.424
	(0.012)	(0.050)	(0.073)
0%	−0.059	−0.242	−0.382
	(0.012)	(0.050)	(0.074)
−10%	−0.051	−0.211	−0.336
	(0.013)	(0.050)	(0.073)
Panel B			
	Prob{ dilution effect < −0.6% per month} [Prob{ dilution effect < −0.3% per month}]		
10%	0.00	0.00	0.01
	[0.00]	[0.28]	[0.97]
0%	0.00	0.00	0.00
	[0.00]	[0.11]	[0.84]
−10%	0.00	0.00	0.00
	[0.00]	[0.05]	[0.69]

The first column, $NAV_0/\bar{P}_0$, is the premium (or discount) of the current NAV over the past average of after-tax prices of the mutual fund share. This is the initial premium (or discount) set at the beginning of the simulated series of 144 months. The fund inflow rate (α) is the ratio of inflow per month to the total assets outstanding. The initial age of the fund is set equal to 10 years (or 120 months). One plus the rate of return of NAV is calculated using the following formula for month t:

$$NAV_t/NAV_{t-1} = (1 + r_t) - \alpha(0.2)\max[(1 + r_t)NAV_{t-1} - \bar{P}_{t-1}, 0]/NAV_{t-1}$$

where r_t is the rate of return of the managed portfolio, and $\bar{P}_t = \{\bar{P}_{t-1} \times (120 + t - 1) + P_t\}/(120 + t)$ where $P_t = NAV_t - (0.2)\max[(1 + r_t)NAV_{t-1} - \bar{P}_{t-1}, 0]$ for $t = 1 \ldots 144$. For each bootstrap experiment, r_t is drawn without replacement from the return distribution of the value-weighted portfolio that comprises of stocks, bonds, and convertible bonds from January 1981–December 1992. The simulated time series average of the dilution effect, $-\alpha(0.2)\max[(1 + r_t)NAV_{t-1} - \bar{P}_{t-1}, 0]/NAV_{t-1}$, is calculated for each experiment. The numbers in panel A are means and standard deviations (in the parentheses) of the dilution effect from 1,000 experiments for various sets of parameters. Panel B reports the p-values of the dilution effect at −0.6% per month (−7.44% per annum) and −0.3% per month (−3.66% per annum) from simulated distributions. For each case, the null hypothesis that the distribution is normal cannot be rejected at the 5% significance level using Jarque–Bera statistics for the test of normality.

may differ from the situations of individual funds.[22] One piece of information suggests that the dilution effect may be less than these simulations suggest. We compare the returns on the two portfolios, ew64 and ew800, noting that the average dilution effect could be less for the latter after the mid-1980s, because the latter includes many new funds that started after that period, and those funds should be less diluted than the older ones. We compare the subperiod return of both ew64 and ew800 funds; where the returns are 8.70% per annum

[22] If more funds flow into funds that have higher performance, the dilution effect would be emphasized.

and 8.41% per annum for 1981–1986, and are −3.50% per annum and −3.76% per annum for 1987–1992, respectively. We do not find the ew64 return to be less than the ew800 return.

There is a fund selection strategy that allows investors of open-type funds to take advantage of this institutional setting. Recall that an investor only pays the after-tax (or traded) price, $P = NAV - Tax$, on buying a share, and receives P on selling. Therefore the rate of return for an investor is calculated from P (not NAV). An anecdotal example is that an investor can select a fund whose NAV is deep below $\bar{P}$, since the probability of future NAV being less than $\bar{P}$ is higher in this case than otherwise. An investor can benefit from two sources if NAV is less than $\bar{P}$ in the future.[23] First, the NAV directly reflects the performance of managers since there is no dilution effect. Second, an investor need not pay capital gains tax on selling the share. On the other hand, if an investor buys a share in a fund whose NAV is above $\bar{P}$, he/she benefits by paying less than the existing NAV since an investor pays the after-tax price, $P = NAV - Tax$ with $Tax > 0$, today. Using the same experiments as above, we calculate the difference in returns (on P) between a strategy of buying a fund whose NAV is below $\bar{P}$ by 10% and that of buying a fund whose NAV is above $\bar{P}$ by 10%. The result shows that buying funds whose NAV is below $\bar{P}$ yields on average 0.91% per annum more than buying funds whose NAV is above $\bar{P}$.[24] In sum, the advantages of both avoiding dilution and not paying capital gains tax in the future outweigh the advantage of paying less than NAV for diluted funds today.

Next we compare the after-tax return of an investor holding an index mutual fund with that of an investor holding an index portfolio. We use the result from one of the simulations in which the inflow rate (α) is equal to 0.05 and $NAV_0/\bar{P}_0 = 1$. We find that the simulated after-tax return for the investor (i.e., the rate of return of the traded price, P) is 5.10% per annum on average when the performance of the underlying index is 8.90% per annum, thus 3.80% per annum below the index return.[25] On the other hand, an investor who directly invests

[23] The traded price (P) is published daily in newspapers, while the NAV is not. An investor can ask, which few investors do, the mutual fund company to find about the value.

[24] This number is the difference in the rate of return of P between the two bootstrap experiments that we conducted in Table 9; the two cases where $NAV_0/\bar{P}_0 - 1$ is ±10%, assuming a fund inflow rate of 0.1 per month and a holding period of 10 years. Table 9 reports the rate of returns of NAV, not those of P. A detailed simulation result for P is available upon request from the authors.

[25] The NAV return is 5.82% per annum in this simulation; thus the dilution effect is 3.08 (= 8.90 − 5.82)% per annum Thus the average capital gains tax rate, the percentage difference between the average rate of return on traded price (P) and NAV, is around 12% (= 1 − 5.10/5.82). Note that this number is less than the imposed capital gains tax rate of 20%. Since the fund's NAV can be less than $\bar{P}$ during the simulation period, and no capital gains tax is levied on such occasions, the average tax rate for the observation period is less than 20%.

in an index portfolio must pay capital gains tax. Thus the after-tax return depends on the rate of capital gains tax levied on the investor. Before April 1989 capital gains tax was levied on investors who made intensive trading of more than 30 transactions involving more than a total of 120 thousand shares per year.[26] Then the income tax rate of the investor was applied to the capital gains. Using the after-tax return on the mutual fund (5.10% per annum) and the index return (8.90% per annum), we calculate a break-even capital gains tax, which is 42.7% ($= 100 \times \{1 - 5.10/8.90\}$). If an investor's capital gains tax is lower than this rate, the after-tax return from directly investing in the index portfolio is higher than that from investing in an index mutual fund. As a matter of fact, no capital gains tax was levied before April 1989 on normal levels of equity trading, and the capital gains tax rate has been only 26% since April 1989. The break-even tax rate is so high that it may not be difficult for many investors to find an investment strategy, say a buy-and-hold one, that yields higher after-tax returns than that of a mutual fund.

5. Conclusions and Implications

In this article we investigate the performance of Japanese open-type equity mutual funds. We find that over the January 1981–December 1992 period, the value-weighted and equal-weighted portfolios of the 800 mutual funds run by the nine management companies underperform the single-index benchmark by approximately 7.0% and 6.0%, respectively. The subset of funds that invest mainly in domestic equity performed even worse. The poor performance was pervasive among the different companies examined, and was found in bull as well as bear markets.

Our results are robust to the methodology used as well as the benchmark portfolios used. We consider the possibility that managers tilted their portfolios toward large and glamour firms relative to the single-market index, thus using a single-index benchmark may result in spurious underperformance measures. Although we find fund managers tilt toward stocks that have larger market capitalization and low BE/ME ratios, or large and glamour stocks, the funds still underperform by the same magnitude as before, relative to portfolios that passively follow the strategy of buying large and glamour stocks.

[26] Capital gains tax was also imposed on trading involving more than 120 thousand shares per year of a single company. Otherwise no tax was levied on capital gains on equities. After April 1989 an investor can choose between a 26% tax (20% national tax, 6% local inhabitants' tax) on capital gains and a 20% tax imposed on 5% of the equity sales price [see Ishi (1994), pp. 143–144].

We finally are left with explanations related to institutional features of the mutual fund industry: the excessive turnover, transaction expenses, or the dilution effect from fund inflows that is caused by the difference between the NAV and the share prices based on after-tax value. That the compensation of the fund manager is usually not directly linked to the funds' performance and that, on the aggregate, the funds have higher turnover than the market lend some credibility to this. Based on bootstrap experiments, we find that the dilution effect, under a set of assumptions that yield the maximum effect, explains 3% per annum of the underperformance with a probability of 50%. However, a comparison between the performance of funds that existed from the beginning of our sample period and those that started later shows that there is not significant difference between their performance, which suggests that the dilution effect may not be serious. Without direct data on turnover, fund composition, and fund inflow, the dilution explanation is at best a conjecture.[27] Besides the dilution effect, fixed management fee accounts for about 1% per annum, and the brokerage commission and securities transfer tax is estimated at around 0.7% to 1.3% per annum, with 110% turnover rate. Therefore, approximately 5% per annum of the underperformance may be attributed to these factors including the dilution effect. Since the underperformance is about 9.5% per annum for the well-diversified domestic equity funds, approximately 4.5% per annum of the underperformance remains unexplained. The results reported in this article have raised some serious questions concerning the performance of Japanese mutual funds that need to be addressed in future research.

References

Admati, A. R., and S. A. Ross, 1985, "Measuring Investment Performances in a Rational Expectation Model," *Journal of Business*, 55, 1–26.

Admati, A. R., S. Bhattacharya, S. A. Ross, and P. Pfleiderer, 1986, "On Timing and Selectivity," *Journal of Finance*, 41, 715–731.

Ball, R., and S. P. Kothari, 1989, "Nonstationary Expected Returns: Implications for Tests of Market Efficiency and Serial Correlation in Returns," *Journal of Financial Economics*, 25, 51–74.

Brown, S. J., W. N. Goetzmann, R. G. Ibbotson, and S. A. Ross, 1992, "Survivorship Bias in Performance Studies," *Review of Financial Studies*, 5, 553–580.

Campbell, J. Y., and Y. Hamao, 1992, "Predictable Stock Returns in the United States and Japan: A Study of Long-term Capital Market Integration," *Journal of Finance*, 47, 43–69.

[27] Elton et al. (1993) find that funds with higher fees and turnover underperform those with lower fees and turnover for the United States.

Chan, K. C., 1988, "On the Contrarian Investment Strategy," *Journal of Business*, 61, 147–164.

Chan, L. K. C., Y. Hamao, and J. Lakonishok, 1991, "Fundamentals and Stock Returns in Japan," *Journal of Finance*, 46, 1739-1764.

Dybvig, P. H., and S. A. Ross, 1985, "Differential Information and Performance Measure Using a Security Market Line," *Journal of Finance*, 40, 383–399.

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

Fama, E. F., and K. R. French, 1992, "The Cross-Section of Expected Stock Returns," *Journal of Finance*, 47, 427–465.

Fama, E. F., and K. R. French, 1993, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, 33, 3–56.

Ferson, W. E., and R. W. Schadt, 1996, "Measuring Fund Strategy and Performance in Changing Economic Conditions," *Journal of Finance*, 51, 425–461.

Glosten, L., and R. Jagannathan, 1994, "A Contingent Claims Approach to Performance Evaluation," *Journal of Empirical Finance*, 1, 133–166.

Grinblatt, M., and S. Titman, 1989a, "Mutual Fund Performance: An Analysis of Quarterly Portfolio Holdings," *Journal of Business*, 62, 393–416.

Grinblatt, M., and S. Titman, 1989b, "Portfolio Performance Evaluation: Old Issues and New Insights," *Review of Financial Studies*, 2, 393–421.

Grinblatt, M., and S. Titman, 1994, "A Study of Monthly Mutual Fund Returns and Performance Evaluation Techniques," *Journal of Financial and Quantitative Analysis*, 29, 419–444.

Investment Trusts Association, 1994, *Investment Trusts in Japan*, Investment Trusts Association, Tokyo.

Ishi, H., 1994, *The Japanese Tax System* (2d ed.), Oxford University Press, Oxford.

Jagannathan, R., and R. A. Korajczyk, 1986, "Assessing the Market Timing Performance of Managed Portfolios," *Journal of Business*, 59, 217–236.

Economist. "Japanese Investment Trusts: Punting in the Dark," *Economist*, 22 January 1994, 78–79.

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

Jensen, M. C., 1969, "Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolios," *Journal of Business*, 42, 167–247.

Jensen, M. C., 1972, "Optimal Utilization of Market Forecasts and the Evaluation of Investment Portfolio Performance," in G. P. Szego and K. Shell (eds.), *Mathematical Methods in Investment and Finance*, North Holland, Amsterdam.

Lakonishok, J., A. Shleifer, and R. W. Vishny, 1994, "Contrarian Investment, Extrapolation, and Risk," *Journal of Finance*, 49, 1541–1578.

Lehmann, B. N., and D. M. Modest, 1987, "Mutual Fund Performance Evaluation: A Comparison of Benchmarks and Benchmark Comparisons," *Journal of Finance*, 42, 233–265.

Merton, R. C., and R. D. Henriksson, 1981, "On Market Timing and Investment Performance II: Statistical Procedures for Evaluating Forecasting Skills," *Journal of Finance*, 54, 513–534.

Treynor, J., and K. Mazuy, 1966, "Can Mutual Funds Outguess the Market?" *Harvard Business Review*, 44, 131–136.

Ueda, A., 1994, *Toushi-shintaku Naniga Mondaika (What is the Problem with Investment Trusts?)*, Toyo-keizai Shinposha, Tokyo (in Japanese).