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# Performance and Persistence in Money Market Fund Returns

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*We study the factors affecting the cross section of net returns of money market mutual funds from 1990 through 1994, and the persistence of relative returns across years. We find that the expense ratio is the most important factor in explaining differences in net returns. Government-only funds produce slightly lower returns than other-taxable funds, and economies of scale are evident only for the smaller funds. Money funds' relative returns show strong persistence. Most funds maintain stable expense ratios, so low-cost funds produce consistently high relative returns.*

## I. INTRODUCTION

Asset allocation models make recommendations about how an individual or family should allocate financial assets among stocks, bonds, and cash. Many individuals invest through mutual funds. Hence, it is important to evaluate fund performance. Numerous studies examine stock mutual funds, beginning with Jensen's (1968) seminal paper on the performance of the industry. In more recent years, Hendricks, Patel, and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Malkiel (1995), and Carhart (1997) investigate the persistence of stock funds' relative returns. A few studies, such as Clements (1991), Cornell and Green (1991), and Blake, Elton, and Gruber (1993) look at returns on bond funds. To the best of our knowledge, our paper is the first academic study to examine the factors affecting the cross section of net returns on money market mutual funds and the persistence of their relative returns across years.

Two factors explain 87 percent of the variance of five-year net returns across larger-than-$300 million money funds: the expense ratio and portfolio type. Portfolio type distinguishes funds that can only invest in U.S. government securities (hereafter, GO funds) from other-taxable (OT) money funds. Not surprisingly, GO funds produce slightly lower net returns. The expense ratio, however, is the dominant factor explaining

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differences in net returns. We conclude that economies of scale exist until fund size reaches $300 million. For funds larger than $300 million, we conclude that all GO funds are essentially commodities and all OT money funds are essentially commodities. That is, (1) they produce similar gross returns, (2) differences in net returns are driven almost exclusively by differences in expenses, and (3) expenses are a dead-weight loss to investors.

In addition, we demonstrate that money funds' relative returns show *strong* persistence. Most funds maintain stable expense ratios. A few funds have unstable expenses because management decides to temporarily absorb some or all expenses. Funds with consistently low expense ratios produce consistently high relative returns. We conclude that individual investors can confidently predict relative returns on money funds. In fact, for 1990 through 1993 every GO fund and every OT fund that produced a net return in the top five in one year produced a net return in the top quintile in the next year.

## II. LITERATURE REVIEW

Money market funds made their debut in the early 1970s. Industry growth in the early years was most pronounced when market interest rates rose above the Regulation *Q* limits on bank deposit interest rates. The development of the industry is examined by Cook and Duffield (1979a, b).

One of the first research questions explored by academics was determining whether money fund managers exhibit the ability to predict interest rates. Predictions can be inferred from changes in the average maturity of fund assets, since it would be profitable to shorten fund maturity prior to interest rate increases and to lengthen maturity prior to interest rate decreases. Ferri and Oberhelman (1981) present evidence that money fund managers were successful in making the appropriate maturity adjustments over the period 1975–1980. Kane and Marks (1987) demonstrate that significant gains would be obtainable from accurate forecasts. However, only a few funds in their study showed statistically significant forecast ability over the period 1978–1981, and the realized gains were small.

Other aspects of money market funds are considered by three studies from the early 1980s. Rosen and Katz (1983) look at the role of money funds in households' asset allocation decisions. Hubbard (1983) finds that fund deposits are not a substitute for money in traditional money demand models. Lyon (1984) looks at the possibility of arbitrage profits due to money funds' use of amortized cost valuation.

Recent studies have returned to the question of evaluating managers' predictive ability. Total money fund assets did not exceed $100 billion until 1982. So, tests using later data may show results that differ from studies based on earlier years when the industry was much smaller. Domian (1992) concludes that fund managers showed no aggregate predictive ability over the period 1982–1990, and in addition, maturity seemed to be adjusted solely in response to past interest rate changes. DeGennaro and Domian (1996) develop models of fund managers' maturity decisions, and note that transaction costs preclude managers from acting aggressively on their beliefs.

## III. THE MONEY FUND INDUSTRY AND THE DATA

### A) The Industry

Money market mutual funds can be classified into three portfolio types and four fund types. The portfolio types are: (1) government-only (GO) funds, which invest only in Treasury securities, agency securities, and repurchase agreements collateralized by Treasury bills, (2) other-taxable (OT) funds, which invest in commercial paper, floating rate notes, U.S. government obligations and other assets, and (3) municipal money funds. In this study, we examine the returns on GO and OT money funds. We do not study returns on municipal money funds because differences in their returns should reflect differences in tax codes across states.

GO and OT funds can be further separated into four fund types. General Purpose funds (GP) and stockbroker-affiliated general purpose funds (SB) are open to any investor. Special purpose funds (SP) are only open to individuals who have a particular affiliation, such as customers of a certain bank. GP, SB, and SP funds are also called retail funds. Institutions-only funds (IN) are designed for institutional investors—bank trust departments, pensions, corporations, and the like.

GO funds are distinct from other taxable funds due to differences in tax status and, perhaps, perceived credit risk. The interest that funds pass through from Treasury bills and other direct U.S. government obligations is tax exempt at the state and local levels. Interest income is not state-exempt on government agency debt or repurchase agreements collateralized with Treasury bills. The portion of GO income that is state-exempt varies from 100 percent to 0 percent, and averages about 38 percent. By comparison, the average OT fund holds 1 percent of assets in Treasury bills. Despite recent budget impasses, investors probably consider Treasury and agency securities to be less risky than first-tier commercial paper.

Except for the GO versus OT distinction, money funds have little ability to distinguish their portfolios from those of their competitors. In particular, regulations today largely preclude distinctions based on maturity, default risk, and the use of derivatives. Since June 1991, the Securities and Exchange Commission has restricted the average maturity to 90 days or less. IBC/Donoghue does not provide annual data on average maturity. So, we cannot rule out the possibility that average maturity influences average net returns among money funds. However, the fact that regulations restrict average maturity to a narrow range suggests that its influence on average return is, at most, minor.

Since June 1991, the SEC has also restricted second-tier (i.e., less-than-highest grade) commercial paper at OT funds to 5 percent of the portfolio. In November 1995, only four funds held any second-tier paper (*IBC/Donoghue's Money Fund Report*, 1995) and only two, both relatively small, held more than 1 percent. Moreover, in the few defaults to date the parent companies of the money funds absorbed the loss to avoid "breaking the buck"—that is, allowing net asset value to fall below $1.00 per share. The 1995 edition of the *IBC/Donoghue's Money Fund Report* says, "No investor has ever lost money in a modern money fund."

We did not find data on the use of derivatives by money funds between 1990 and 1994. On at least three occasions between 1991 and 1993, the SEC expressed in writing its concerns about investments by some money funds in derivative securities, including inverse floaters and capped floating and variable rate instruments. In private conversations, a

money manager told us he did not think such use was widespread. Moreover, the Orange County bankruptcy, which produced derivatives-related losses primarily at municipal money funds, was due to fraud. It was not due to money managers' deliberate exposure to derivatives. Finally, as with other defaults, most losses were absorbed by the fund's parent company or adviser. Consequently, we do not suspect fund managers' deliberate decisions to use derivatives would explain much of the cross section of fund returns.

Since money funds have limited ability to compete based on differences in their portfolios, they primarily compete based on differences in expenses. Some funds, especially new ones, temporarily absorb all or a portion of expenses. They hope to establish a strong record of relative returns and thus attract investors before raising expenses. Another method of reducing expenses is to impose a large minimal initial investment. It costs far less to service one $1 million account than five hundred $2,000 accounts. Thus, the Vanguard Federal Portfolio fund has a 0.32 percent expense ratio and a $3,000 initial minimum investment, while Vanguard's U.S. Treasury Money Market Portfolio charges 0.15 percent but requires a $50,000 minimum initial investment. Money funds can also compete by deciding whether or not they want to offer checking services. Almost all retail funds offer limited checking. For example, they may allow unlimited check writing for checks of at least $500. Of course, the cost of checking is reflected in the funds' expenses.

Institutions-only funds also require large initial investments and have low expense ratios. The 1990 through 1995 issues of *IBC/Donoghue's Money Fund Directory* state, "[INs] are considered by many to be the most active and aggressive money funds, often outperforming General Purpose funds." We will examine whether INs outperform retail funds after adjusting for expenses or whether their net return advantage is due solely to their low expense ratios.

### B) Data

Data for this study come from 1990 through 1995 issues of *IBC/Donoghue's Money Fund Directory*. The primary sample consists of all GO and all other-taxable money funds with complete records of net returns and expense ratios for 1990 through 1994 and end-of-year net assets beginning 1989.

The definitions of the variables used in the analysis are:

$NR_{it}$ = net return for fund $i$ for year $t$;
$EXP_{it}$ = the expense ratio for fund $i$ for year $t$;
$GUR_{it}$ = $NR_{it} + EXP_{it}$, grossed-up return for fund $i$ for year $t$;
$GO_i$ = a dummy variable denoting a government-only fund, GO = 1 for a GO fund and 0 otherwise;
$IN_i$ = a dummy variable denoting an institutions-only fund, IN = 1 for an IN fund and 0 otherwise;
$GP_i$ = a dummy variable denoting a general purpose fund, GP = 1 for a GP fund and 0 otherwise;
$SP_i$ = a dummy variable denoting a special purpose fund, SP = 1 for a SP fund and 0 otherwise;
$SB_i$ = a dummy variable denoting a stock-broker fund, SB = 1 for a SB fund and 0 otherwise;

**TABLE 1**
Average Returns and Expenses of Money Funds in 1994

| *Sample* | *Avg. Net Return %* | *Avg. Expenses %* | *Grossed-Up Return (GUR) %* | *σGUR* | *Total Assets (in $100m)* | *Obs* |
|---|---|---|---|---|---|---|
| **All Money Funds** | | | | | | |
| All | 3.70 | 0.65 | 4.35 | 0.13 | 3,436 | 321 |
| GO | 3.67 | 0.61 | 4.28 | 0.11 | 1,065 | 131 |
| OT | 3.73 | 0.68 | 4.40 | 0.11 | 2,372 | 190 |
| GO, GP | 3.54 | 0.73 | 4.27 | 0.12 | 354 | 73 |
| GO, SB | 3.56 | 0.68 | 4.23 | 0.08 | 90 | 9 |
| GO, SP | 3.70 | 0.58 | 4.28 | 0.13 | 47 | 9 |
| GO, IN | 3.93 | 0.37 | 4.30 | 0.10 | 574 | 40 |
| OT, GP | 3.64 | 0.75 | 4.39 | 0.12 | 1,138 | 122 |
| OT, SB | 3.68 | 0.72 | 4.40 | 0.07 | 591 | 17 |
| OT, SP | 3.73 | 0.71 | 4.43 | 0.12 | 173 | 17 |
| OT, IN | 4.06 | 0.37 | 4.43 | 0.10 | 469 | 34 |
| **Larger Money Funds (>$300 Million)** | | | | | | |
| All | 3.78 | 0.58 | 4.36 | 0.12 | 3,271 | 197 |
| GO | 3.75 | 0.53 | 4.28 | 0.11 | 991 | 79 |
| OT | 3.80 | 0.61 | 4.41 | 0.09 | 2,280 | 118 |
| GO, GP | 3.61 | 0.66 | 4.27 | 0.11 | 301 | 35 |
| GO, SB | 3.56 | 0.68 | 4.23 | 0.09 | 90 | 8 |
| GO, SP | 3.80 | 0.53 | 4.32 | 0.12 | 40 | 6 |
| GO, IN | 3.97 | 0.35 | 4.31 | 0.10 | 559 | 30 |
| OT, GP | 3.70 | 0.71 | 4.41 | 0.10 | 1,060 | 60 |
| OT, SB | 3.69 | 0.71 | 4.40 | 0.07 | 591 | 16 |
| OT, SP | 3.83 | 0.59 | 4.42 | 0.11 | 165 | 13 |
| OT, IN | 4.06 | 0.37 | 4.43 | 0.09 | 464 | 29 |

*Notes:* The averages are equal-weighted across money funds.
The portfolio types are government-only (GO) funds, which invest only in U.S. government securities, and other taxable (OT) funds, which invest in commercial paper, bank CDs, government obligations and other assets. The fund types are general purpose (GP), stockbroker affiliated (SB), special purpose (SP), and institutions-only (IN) funds. The last three columns denote the standard deviation of grossed-up return, total assets (in $100 million), and the number of funds or observations.

$CK_i$ = a dummy variable indicating that checking privileges exist on the fund, CK = 1 if checking privileges exist and 0 otherwise; and

$SIZE_{it}$ = the natural log of net assets (in millions) for fund $i$ at the start of year $t$.

Table 1 presents the 1994 average net returns, average expense ratios, average grossed-up returns and standard deviation of grossed-up returns for samples of all funds and funds exceeding $300 million in net assets. The same patterns of returns and expenses occur in other years. As expected, other-taxable funds produce larger grossed-up returns than GO funds. For example, in the larger-than-$300 million sample, OT funds produced a 13 basis point higher grossed-up return than GO funds, which can be separated into an 8 basis point higher expense ratio and a 5 basis point higher net return.

It is not clear from Table 1 whether institutions-only funds produce higher gross returns than General Purpose GP funds as suggested in several issues of *IBC/Donoghue's Money Fund Directory*. IN funds produce larger net returns but this advantage may be due entirely to their lower expense ratios. For example, in the all-funds sample, GO/IN funds (i.e., institutions-only funds that hold only government obligations) enjoy

a 39 basis point net return advantage compared to GO/GP funds (3.93% vs. 3.54%), but 36 basis points are due to lower expenses and 3 basis points to higher grossed-up returns. In other such comparisons, IN funds enjoy a 2 to 4 basis point grossed-up return advantage compared to GP funds. We cannot state with certainty whether the advantage is small but real or due to chance alone. We return to this issue in the regression analysis.

Finally, the sample may suffer from a survivorship bias. Poorly performing stock funds typically merge into more successful funds, thereby burying the bad stock fund's record. Therefore, the record of the average surviving stock fund is an upward biased measure of the average fund's performance. The evidence from this study suggests that managers have little ability to raise or lower the money fund's gross return. So, survivorship bias is not likely to be a major problem.

## IV. METHODOLOGY AND RESULTS

### A) The Determinants of Net Returns: Economies of Scale

We begin the analysis by examining the role of net asset size in fund returns. Table 2 presents regressions of net returns on EXPENSE, SIZE, and GO for 1990–1994 and each year. Again, SIZE denotes the natural log of beginning net assets in millions.

**TABLE 2**
Determinants of Net Returns

| | *EXPENSE*[b] | *S.E.* | *SIZE* | *S.E.* | *GO* | *S.E.* | $R^2$ |
|---|---|---|---|---|---|---|---|
| **All Money Funds** | | | | | | | |
| 1990–1994 | −1.001 | 0.028 | 0.020[a] | 0.004 | −0.131[a] | 0.012 | 0.87 |
| 1990 | −0.985 | 0.026 | 0.014[a] | 0.005 | −0.196[a] | 0.012 | 0.87 |
| 1991 | −0.943 | 0.051 | 0.035[a] | 0.007 | −0.197[a] | 0.018 | 0.71 |
| 1992 | −0.955 | 0.040 | 0.031[a] | 0.007 | −0.078[a] | 0.018 | 0.71 |
| 1993 | −0.956 | 0.029 | 0.021[a] | 0.004 | −0.080[a] | 0.014 | 0.82 |
| 1994 | −0.996 | 0.033 | 0.015[a] | 0.004 | −0.122[a] | 0.013 | 0.85 |
| **Funds > $300 million** | | | | | | | |
| 1990–1994 | −1.015 | 0.031 | 0.006 | 0.006 | −0.138[a] | 0.014 | 0.87 |
| 1990 | −1.036 | 0.030 | 0.007 | 0.006 | −0.177[a] | 0.015 | 0.88 |
| 1991 | −0.938 | 0.055 | 0.022 | 0.012 | −0.205[a] | 0.022 | 0.67 |
| 1992 | −0.926 | 0.041 | 0.007 | 0.010 | −0.107[a] | 0.021 | 0.67 |
| 1993 | −0.962 | 0.030 | 0.005 | 0.008 | −0.094[a] | 0.015 | 0.82 |
| 1994 | −0.992 | 0.032 | 0.005 | 0.007 | −0.129[a] | 0.015 | 0.83 |
| **Funds < $300 million** | | | | | | | |
| 1990–1994 | −0.993 | 0.044 | 0.030[a] | 0.009 | −0.127[a] | 0.017 | 0.86 |
| 1990 | −0.949 | 0.037 | 0.018 | 0.015 | −0.216[a] | 0.018 | 0.85 |
| 1991 | −0.961 | 0.088 | 0.057[a] | 0.017 | −0.190[a] | 0.031 | 0.68 |
| 1992 | −1.016 | 0.069 | 0.060[a] | 0.016 | −0.034 | 0.032 | 0.70 |
| 1993 | −0.970 | 0.048 | 0.049[a] | 0.011 | −0.066[a] | 0.026 | 0.79 |
| 1994 | −0.947 | 0.057 | 0.035[a] | 0.011 | −0.118[a] | 0.022 | 0.82 |

*Notes:* [a] Significantly different from zero at the 5 percent level. [b] The EXPENSE coefficient is indistinguishable from −1.0 in every regression.

For the sample of all funds, the SIZE coefficient is always positive and significant at the 5 percent level, the level of significance used throughout this study. However, separate analysis implies that positive economies of scale only exist until fund size reaches about $300 million. Among funds larger than $300 million, the SIZE coefficient is never significant. Among funds smaller than $300 million, SIZE is significant in the 1990–1994 regression and all but one of the individual year regressions. Moreover, separate analyses of GO funds and OT funds are consistent with the story that positive economies of scale exist until the fund reaches $300 million in net assets.

We do not want to imply that $300 million is the only acceptable point of separation. We considered regressions that separate small and large funds at $100 million increments through $500 million. Economies of scale clearly exist below $300 million and clearly do not exist above $500 million. In the 1990-1994 regression for funds exceeding $300 million, the SIZE coefficient of 0.006 (with a t-statistic of 1.0) *suggests* that weak economies of scale *may* continue to exist among larger funds. However, the SIZE coefficient falls to 0.001 when the sample is limited to funds above $500 million.

In summary, we conclude that positive economies of scale exist in the management of money funds until net assets reach $300 million, but they do not exist in the management of larger money funds. In contrast, Ciccotello and Grant (1996) conclude that a larger fund size tends to reduce the performance of aggressive growth equity funds.

In the next section, we examine whether the commodity view can explain the cross-sectional variance of net returns among larger money funds. One of the predictions of this view is that net returns are driven almost exclusively by expense ratios. Thus we want to exclude the smaller funds whose returns may be affected by size. The larger funds contain over 95 percent of money fund assets. So, they represent the bulk of the industry.

### B) The Commodity View

The financial press and academicians often view all money market funds *of a given portfolio type* (i.e., GO or OT) as indistinguishable commodities. For example, Bogle (1994) says "gross returns are virtually identical within each type of money fund and...net returns are therefore driven almost exclusively by fund costs" (p. 131). We label this the commodity view of money market funds.

The driving principle behind the commodity view is that money markets are extremely efficient. Therefore, financial markets set gross mutual fund returns; managers cannot enhance gross returns. Furthermore, cross-sectional differences in funds' net returns are driven almost exclusively by differences in their expense ratios and portfolio types.

The strong version of the commodity view makes the following statistical predictions. In cross-sectional regressions of net returns on predictor variables,

1. GO, the dummy variable denoting a government-only fund, should be negative;
2. The EXPENSE coefficient should be −1.0;
3. The coefficient of determination should be large;
4. No variable besides the expense ratio and GO should prove significant; and
5. The grossed-up return should be essentially the same for all funds of the same portfolio type. Statistically, the standard deviation of the cross-sectional distribution of grossed-up returns should be small.

**TABLE 3**
Tests of the Commodity View of Money Funds

| *Year* | *EXPENSE* | *(S.E.)* | *GO* | *(S.E.)* | *Other* | *COEF* | *(S.E.)* | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| 1990–1994 | −1.019 | (0.031) | −0.139[a] | (0.014) | | | | 0.87 |
| | −1.012 | (0.033) | −0.140[a] | (0.014) | GP | −0.008 | (0.015) | 0.86 |
| | −1.013 | (0.031) | −0.140[a] | (0.014) | SB | −0.027 | (0.017) | 0.87 |
| | −1.022 | (0.030) | −0.137[a] | (0.014) | SP | 0.024 | (0.027) | 0.87 |
| | −0.986 | (0.039) | −0.144[a] | (0.014) | IN | 0.027 | (0.018) | 0.87 |
| | −1.028 | (0.037) | −0.139[a] | (0.014) | CK | 0.007 | (0.016) | 0.86 |
| 1990 | −1.042 | (0.030) | −0.179[a] | (0.016) | | | | 0.88 |
| | −1.031 | (0.037) | −0.180[a] | (0.016) | GP | −0.013 | (0.016) | 0.88 |
| | −1.035 | (0.030) | −0.180[a] | (0.016) | SB | −0.032 | (0.019) | 0.88 |
| | −1.042 | (0.030) | −0.179[a] | (0.016) | SP | 0.003 | (0.023) | 0.88 |
| | −0.984 | (0.044) | −0.188[a] | (0.016) | IN | 0.050[a] | (0.021) | 0.89 |
| | −1.043 | (0.041) | −0.179[a] | (0.016) | CK | 0.001 | (0.018) | 0.88 |
| 1991 | −0.956 | (0.055) | −0.209[a] | (0.022) | | | | 0.67 |
| | −0.982 | (0.058) | −0.210[a] | (0.022) | GP | 0.028 | (0.023) | 0.67 |
| | −0.943 | (0.056) | −0.209[a] | (0.022) | SB | −0.062[a] | (0.029) | 0.67 |
| | −0.956 | (0.054) | −0.209[a] | (0.022) | SP | 0.005 | (0.046) | 0.66 |
| | −0.950 | (0.063) | −0.210[a] | (0.022) | IN | 0.005 | (0.026) | 0.66 |
| | −0.990 | (0.059) | −0.209[a] | (0.022) | CK | 0.031 | (0.024) | 0.67 |
| 1992 | −0.934 | (0.040) | −0.109[a] | (0.021) | | | | 0.67 |
| | −0.927 | (0.041) | −0.108[a] | (0.021) | GP | −0.008 | (0.022) | 0.67 |
| | −0.927 | (0.041) | −0.109[a] | (0.021) | SB | −0.029 | (0.034) | 0.67 |
| | −0.935 | (0.040) | −0.108[a] | (0.021) | SP | 0.013 | (0.037) | 0.67 |
| | −0.900[b] | (0.047) | −0.110[a] | (0.021) | IN | 0.028 | (0.024) | 0.67 |
| | −0.956 | (0.046) | −0.109[a] | (0.021) | CK | 0.021 | (0.024) | 0.67 |
| 1993 | −0.969 | (0.029) | −0.095[a] | (0.015) | | | | 0.82 |
| | −0.964 | (0.034) | −0.095[a] | (0.015) | GP | −0.005 | (0.017) | 0.82 |
| | −0.966 | (0.029) | −0.095[a] | (0.015) | SB | −0.014 | (0.018) | 0.82 |
| | −0.970 | (0.029) | −0.095[a] | (0.015) | SP | 0.009 | (0.022) | 0.82 |
| | −0.952 | (0.041) | −0.096[a] | (0.015) | IN | 0.014 | (0.019) | 0.82 |
| | −0.985 | (0.039) | −0.095[a] | (0.015) | CK | 0.014 | (0.019) | 0.82 |
| 1994 | −0.996 | (0.033) | −0.130[a] | (0.015) | | | | 0.83 |
| | −0.967 | (0.038) | −0.130[a] | (0.015) | GP | −0.027 | (0.016) | 0.83 |
| | −0.986 | (0.033) | −0.130[a] | (0.015) | SB | −0.032 | (0.017) | 0.83 |
| | −0.995 | (0.033) | −0.129[a] | (0.015) | SP | 0.018 | (0.026) | 0.83 |
| | −0.919 | (0.044) | −0.132[a] | (0.015) | IN | 0.058[a] | (0.021) | 0.84 |
| | −0.969 | (0.042) | −0.130[a] | (0.015) | CK | −0.022 | (0.019) | 0.83 |

*Notes:* This table shows regressions of net returns on EXPENSE, GO, and, sometimes, another variable for 1990–1994 and each year. The sample consists of all funds with $300 million of net assets at the beginning of the period. The independent variables are the expense ratio (EXPENSE) and dummy variables denoting a government-only fund (GO), a general purpose fund (GP), a special purpose fund (SP), stockbroker fund (SB), an institutions-only fund (IN), and a fund offering checking privileges (CK). There are 167 observations for 1990 and 1990–1994, 198 for 1991, 203 for 1992, 198 for 1993, and 197 for 1994.

[a] Significantly different from zero at the 5 percent level.

[b] Significantly different from −1.0 at the 5 percent level.

The weak version of the commodity view retains predictions 1, 2, 3, and 5, but replaces 4 with,

4a. Adding another variable to the regression of net returns on EXPENSE and GO will not appreciably raise the adjusted coefficient of determination.

Table 3 presents, for the larger-than-$300 million sample, a summary of regressions examining the determinants of net returns for 1990–1994 and each year. As predicted by both forms of the commodity view, the GO coefficient is negative and significant in each regression. Also as predicted, the expense ratio's coefficient is indistinguishable from −1.0 in 35 of 36 regressions. These results imply that expenses are a dead-weight loss to investors.

The third prediction says the adjusted coefficient of determination (henceforth, coefficient of determination or $R^2$) should be "large". In regressions on GO and EXPENSE, it ranges from 0.67 to 0.88 for individual years and is 0.87 for 1990–1994. Are these values "large"? We believe they are. By comparison, Malkiel (1995) finds that the average expense ratio can explain only 51 percent of the variance of 10-year average net returns on a sample of stock funds. Moreover, when Malkiel excludes two outliers and funds with expenses greater than 2.5 percent, the average expense ratio explains only 5 percent of the variance of *10-year* returns. In contrast, the expense ratio explains at least 67 percent of the variance of *one-year* net returns and 87 percent of the variance of *five-year* net returns on money funds. Figure 1 graphs 1994 net returns and expense ratios for OT money funds; graphs for GO funds in 1994 and for GO and OT funds in other years are essentially the same. We believe this picture supports the claim that differences in net returns are largely attributable to differences in expense ratios. For example, the lowest net return among funds with expenses of 0.50 percent or below exceeds the highest net return among funds with expenses above 0.70 percent.

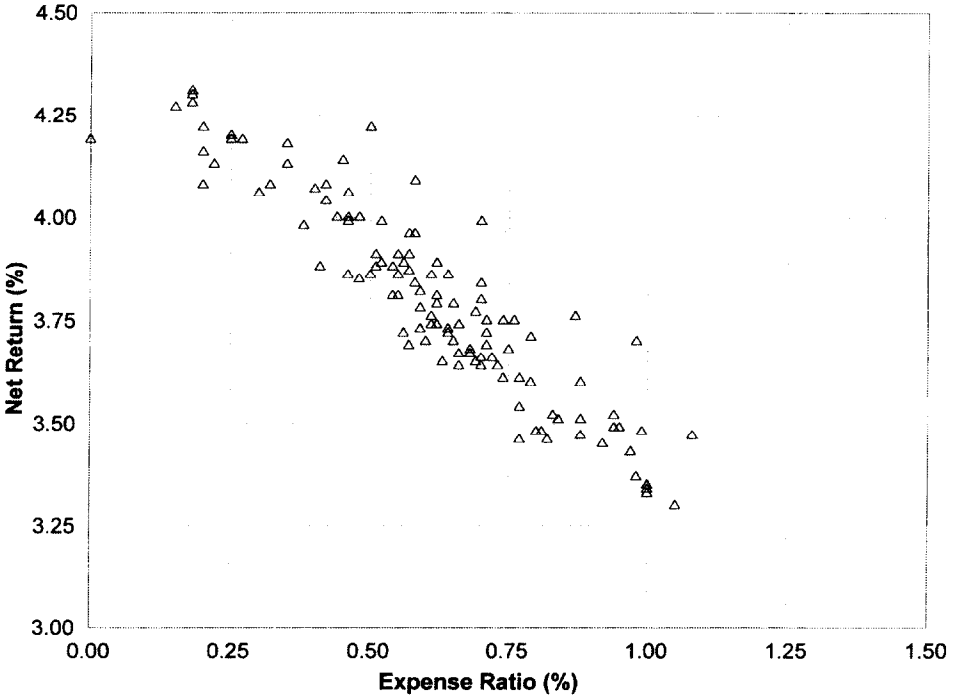


***Figure 1.*** 1994 Returns and Expenses
118 OT (Other-Taxable) Funds with Assets above $300 Million

The strong version of the commodity view says, within a portfolio type, net returns are driven exclusively by fund costs. The weak form says net returns are driven *almost* exclusively by costs. In the regressions, the strong form receives mixed support and the weak form receives strong support.

The five-year regressions support the strong version. In particular, the variables denoting fund type or the existence of checking—i.e., GP, SB, SP, IN, and CK—prove insignificant. However, in individual year regressions, the IN slope is positive in all years and significant in 1990 and 1994. So, we cannot rule out the claim that the average IN fund beats its competitors by perhaps 3 basis points after adjusting for expenses. To repeat, even this claim receives mixed support. We find no evidence supporting the supposition made annually in the *IBC/Donoghue's Money Fund Directory* that aggressive management allows managers to substantially raise the gross returns at IN funds. Clearly, IN funds' net return advantage is due mostly, if not entirely, to their lower expenses.

The weak form of the commodity view receives consistent support. Adding GP, SB, SP, IN, or CK raises the $R^2$ by at most 0.01. So, within a portfolio type, net returns are driven almost exclusively by fund expenses.

The commodity view says that gross returns are essentially similar across funds with the same portfolio type. Table 1 provides support for this position. Among the larger money funds (in the bottom half of the table), the standard deviation of grossed-up returns for GO funds is 0.11 percent. The standard deviation for OT funds is 0.09 percent. So, about two-thirds of GO funds will earn a gross return within 0.11 percentage points of the average for its portfolio type, and 95 percent will earn within 0.22 percentage points of the average. By contrast, differences in funds' expense ratios often exceed 0.60 percentage points. It is not surprising, therefore, that investors can reliably predict relative fund returns based on prior knowledge of their expense ratios. The next section supports this position.

### C) Can We Predict A Winning Fund?

In the last section, we saw that the cross section of funds' one-year expense ratios explains at least 67 percent of the cross section of one-year net returns. With few exceptions, a fund's expense ratio is stable from year to year. Consequently, winning money market funds tend to repeat.

The Spearman rank correlations between net return rankings in year $t$ and $t + 1$ average 0.89 for GO funds and 0.90 for OT funds ($t$ = 1990 through 1993). They imply that rankings of funds by net return change little from one year to the next.

Another method of testing persistence in returns is to calculate the percent of winning funds that repeat as winners, where a winning fund is defined as any fund that earns a net return above the median. Table 4 presents the number of winning money funds that repeat in later years. In 1990, 65 GO funds had net returns above the median. Of the 65, 56 funds produced winning returns in 1991. Moreover, 49 of the 56 funds repeated as winners in 1992, 45 of the 49 repeated in 1993, and 44 repeated in 1994. On average, 87 percent of GO winners repeated the next year, 77 percent repeated the next two years, 71 percent repeated the next three years, and 68 percent repeated the next four years. The results were almost identical for OT funds. Clearly, relative returns show persistence.

Since relative returns can be easily predicted, individual investors should not settle for a slightly above median return. They should try to pick a top-returning fund. Table 5 shows how the top five performers in one year ranked the next year. Consider the GO funds first.

**TABLE 4**
Winning Money Funds That Repeat

| *Year t* | *t* | *t + 1* | *t + 2* | *t + 3* | *t + 4* |
|---|---|---|---|---|---|
| **Government-Only (GO) Funds** | | | | | |
| 1990 | 65 | 56 | 49 | 45 | 44 |
| 1991 | 63 | 55 | 49 | 46 | |
| 1992 | 63 | 54 | 50 | | |
| 1993 | 65 | 58 | | | |
| | | 87% | 77% | 71% | 68% |
| **Other-Taxable (OT) Funds** | | | | | |
| 1990 | 94 | 76 | 70 | 67 | 60 |
| 1991 | 94 | 82 | 77 | 67 | |
| 1992 | 94 | 86 | 73 | | |
| 1993 | 95 | 80 | | | |
| | | 86% | 78% | 71% | 65% |

*Notes:* A winning fund is one with an above-median return.
Among GO funds, 65 produced winning net returns in 1990. Of the 65, 56 repeated as winners in 1991, 49 repeated as winners in 1991 and 1992, 45 repeated in 1991 through 1993, and 44 repeated in 1991 through 1994. In some initial years (i. e., year *t*), several funds earned the median return, so less than half the funds were winners.

Of the top five funds, every fund finished in the top quintile the next year, 85 percent finished in the top decile, and 75 percent finished in the top 10. For the OT funds, every top-five fund finished in the top quintile the next year, 86 percent finished in the top decile, and 64 percent finished in the top 10. Past performance allows individuals to be virtually guaranteed of choosing a top quintile fund and almost certain of choosing a top decile fund, especially if they exclude funds that have temporarily lowered expenses.

Table 6 presents the simulated returns from strategies of buying the money funds with the best prior-year net returns. The returns assume that on January 1st of 1991 through

**TABLE 5**
Do the Elite Repeat?: Next-Year Rankings of the Top-Five Money Funds

| *Rank in:* | *1990* | *1991* | *1991* | *1992* | *1992* | *1993* | *1993* | *1994* |
|---|---|---|---|---|---|---|---|---|
| **Government-Only Funds** | | | | | | | | |
| | 1 | 8 | 1 | 22 | 1 | 2 | 1 | 14 |
| | 2 | 3 | 2 | 2 | 2 | 1 | 2 | 2 |
| | 3 | 7 | 3 | 1 | 3 | 4T | 3 | 1 |
| | 4 | 11 | 4 | 4 | 4 | 3 | 4T | 5T |
| | 5 | 2 | 5 | 18 | 5 | 13T | 4T | 5T |
| Total Funds = 131 | | | | | | | | |
| **Other-Taxable Funds** | | | | | | | | |
| | 1T | 4 | 1 | 2 | 1 | 20 | 1 | 6T |
| | 1T | 3 | 2 | 3 | 2 | 1 | 2 | 8T |
| | 3 | 19T | 3 | 6 | 3 | 2 | 3 | 37T |
| | 4 | 14 | 4 | 19 | 4 | 8T | 4T | 1 |
| | 5T | 10 | 5T | 17T | 5 | 16T | 4T | 11 |
| | 5T | 11 | 5T | 22T | | | | |
| Total Funds = 190 | | | | | | | | |

*Note:* "T" denotes tie.

**TABLE 6**
Simulated Average Returns from Buying Money Funds with Best Single-Year Returns

| | *1991–1994* | |
|---|---|---|
| | *Simulated Return* | *Annual Alpha* |
| **Government-Only Funds** | | |
| Buy top fund prior year | 4.19% | 0.22% |
| Buy top 5 funds prior year | 4.26% | 0.29% |
| Buy and hold top fund in 1990 | 3.94% | –0.03% |
| Buy and hold top 5 funds in 1990 | 4.21% | 0.24% |
| **Other-Taxable Funds** | | |
| Buy top fund prior year[a] | 4.42% | 0.40% |
| Buy top 5 funds prior year | 4.39% | 0.37% |
| Buy and hold top fund in 1990[a] | 4.09% | 0.07% |
| Buy and hold top fund in 1990[a] | 4.41% | 0.39% |
| Buy and hold top 5 funds in 1990 | 4.33% | 0.31% |

*Notes:* Alpha denotes the additional average annual return on the simulated portfolios compared to the (asset-weighted) average return on money funds of the same portfolio type.
[a]Two funds tied for the top return among other-taxable funds in 1990. For "buy top fund prior year," we assume an equal investment in both funds for 1991.

1994 an individual ranks all GO and all OT money funds based on their net returns over the preceding year. We examine four simulated strategies. In the first, he buys the top ranked fund in the prior year and adjusts each January 1st. In the second, he buys an equal-weighted portfolio of the top-five funds and adjusts each January 1st. In the last two strategies, he either buys and holds the top ranked fund in 1990 or buys and holds an equal-weighted portfolio of the top five funds in 1990. The strategies' alphas indicate the additional average return compared to the investor who earned the (asset-weighted) average return among funds with the same portfolio type.

The strategy of buying the top GO fund from the prior year produced a 4.19 percent average return, or 0.22 percent higher than the return received by the average investor. Buying an equal-weighted portfolio of the top-five funds produced an average return of 4.26 percent and an alpha of 0.29 percent.

Buying and holding the top GO fund in 1990 produced a –0.03 percent alpha. Management of the Benham Government Agency Fund, the top fund in 1990, temporarily absorbed a portion of the expenses. As the expense ratio was raised from 0.28 percent in 1990 to 0.45 percent in 1991 and 0.50 percent in 1992, the fund's ranking fell. In contrast, the second through fifth ranked funds in 1990 maintained consistently low expense ratios (0.20 percent or lower) and consistently high rankings (never worse than $14^{th}$). So, the strategy of buying and holding the top five funds produced a positive alpha of 0.24 percent. This discussion highlights the need to beware of high rankings based on temporarily reduced expenses. Money funds, especially new ones, sometimes waive or partially waive expenses in their marketing campaigns to attract investors.

For OT funds, the results for the four simulated strategies are similar. The strategies of buying the top fund and the top five funds from the prior year produced alphas of 0.40 percent and 0.37 percent. Two funds tied for the top honors in 1990. One produced mediocre returns and the other produced good returns for the next four years. The Dreyfus Worldwide Dollar Money Market Fund produced an alpha of 0.07 percent. It raised its expense

**TABLE 7**
Simulated Average Returns from Buying Money Funds with Best Multi-Year Returns

| | *1992–1994* | |
|---|---|---|
| | *Simulated Return* | *Annual Alpha* |
| **Government-Only Funds** | | |
| Buy top 5 funds in 1990–1991 | 3.61% | 0.25% |
| Buy top 10 funds in 1990–1991 | 3.60% | 0.24% |
| **Other Taxable Funds** | | |
| Buy top 5 funds in 1990–1991 | 3.67% | 0.29% |
| Buy top 10 funds in 1990–1991 | 3.71% | 0.33% |

*Note:* Alpha denotes the additional average annual return on the simulated portfolios compared to the (asset-weighted) average return on money funds of the same portfolio type.

ratio in steps from 0.20 percent in 1990 to 0.77 percent in 1994 and its ranking fell from tied for first to 162nd. The expenses of the Alger Money Market Portfolio ranged from 0.06 percent in 1990 to 0.41 percent in 1993 when it ranked 22nd, its lowest ranking for the five years. It produced an alpha of 0.39 percent. The third through fifth ranked funds in 1990 maintained consistently low expense ratios (0.20 percent or lower) and consistently high rankings (tied for 19th or better).

The alphas from low-cost money funds are relatively small, but they are predictable and entail no additional risk. Selecting a low-cost money fund, one that is not temporarily absorbing expenses, may produce a 0.2 percent to 0.4 percent return advantage. This advantage is large when expressed as a percent of interest income. The interest income from a fund yielding 4 percent is 8.1 percent larger than the interest income from a fund yielding 3.7 percent. A low-cost strategy reliably produces a positive alpha.

The evidence produced thus far reveals that money funds' *one-year* relative returns can be predicted. Table 7 shows that their multi-year relative returns can also be predicted. The top-five GO funds based on 1990–1991 returns earned, on average, 0.25 percent more per year than the (asset weighted) average GO fund in 1992–1994. The top-five OT funds earned 0.29 percent more than the average OT fund.

The results to this point indicate that one-year and multi-year relative returns are highly predictable. To better appreciate this conclusion, let us contrast it with the conclusion from similar studies on stock mutual funds. Rankings of one-year stock returns are considered virtually useless. For example, Bogle (1994) picks the top 20 broad-based stock funds in each year from 1982 through 1991 and observes their average rank in the next year. It is 284 out of 681. In another study, Malkiel (1995) examines the reliability of one-year stock-fund rankings and concludes, "All in all, the simulation results do not give one confidence that investors can consistently beat the market by buying [last year's winning stock] funds." In addition, Malkiel finds that even long-horizon return records are of little benefit when choosing a stock fund. The 20 funds with the highest returns from 1970 through 1980 produce an average rank of 118 out of 260 in the next ten years.

We end this section with some advice for individual investors on determining the best money market funds. Table 8 lists larger-than-$300 million retail funds with the highest returns in 1994, the final year of our study. For more current information, investors can look at weekly listings of 30-day yields—that is, net returns—in *Barron's*.

**TABLE 8**
Top-Ten Money Funds for 1994

| *Fund Name* | *Net Return (%)* | *Expense Ratio (%)* | *Fund Type* |
|---|---|---|---|
| **Government-Only Funds** | | | |
| Vanguard MMR, Federal Portfolio | 4.03 | 0.32 | GP |
| Kemper MMF, Government Securities Portfolio | 3.97 | 0.47 | GP |
| Fidelity MMT, Retirement Government MMP | 3.94 | 0.42 | SP |
| Hanover Government MMF | 3.87 | 0.60 | SP |
| Fidelity U.S. Government Reserves | 3.85 | 0.50 | GP |
| The One Group U.S. Treasury Securities MMF | 3.85 | 0.60 | SP |
| Pacific American Fund, U.S. Treasury Portfolio | 3.84 | 0.43 | SP |
| UST Master Government Money Fund | 3.83 | 0.50 | GP |
| Norwest U.S. Government Fund | 3.82 | 0.50 | GP |
| The Rodney Square Fund, U.S. Government Portfolio | 3.82 | 0.53 | GP |
| **Other Taxable Funds** | | | |
| Fidelity Spartan MMF | 4.14 | 0.45 | GP |
| The One Group Prime MMF/Fiduciary | 4.09 | 0.58 | SP |
| Vanguard MMR, Prime Portfolio | 4.08 | 0.32 | GP |
| Fidelity MMT, Retirement MMP | 4.08 | 0.42 | SP |
| Westcore MMF | 4.06 | 0.30 | GP |
| USAA MMF | 4.06 | 0.46 | GP |
| Kemper MMF, Money Market Portfolio | 3.99 | 0.52 | GP |
| Strong MMF | 3.99 | 0.70 | GP |
| Fidelity Cash Reserves | 3.96 | 0.58 | GP |
| Victory Financial Reserves Portfolio | 3.96 | 0.57 | SP |

## V. SUMMARY AND CONCLUSIONS

We studied the determinants of money market fund returns from 1990 through 1994 and the persistence of funds' relative returns across years. Among money funds larger than $300 million, two factors explain the cross-sectional variance of net returns: the expense ratio and a variable distinguishing U.S. government-only (GO) funds from other-taxable (OT) money funds. GO funds produced lower net returns than OT funds, everything else the same. The fund expense ratio is the dominant factor explaining the variance of net returns. In fact, the evidence supports the commodity view of money funds, which says, after adjusting for portfolio type (i.e., GO or OT), net returns are driven *almost* exclusively by fund expenses. We could find no other factor that had a statistically significantly impact on 1990-1994 average net returns. Among larger-than-$300 million funds of a given portfolio type, net returns are driven exclusively or almost exclusively by expenses.

Money funds' relative returns show strong persistence. Most funds maintain stable expense ratios. So, funds with low costs or high returns in one year usually produce strong relative returns the next year. Of the five GO funds with the highest returns in year $t$ ($t$ = 1990 through 1993), 85 percent produced top decile returns the next year. Of the top-five OT funds in one year, 86 percent produced top decile returns the next year. Every top-five GO and OT fund finished in the top quintile the next year. We conclude that an individual or family can easily pick a top-performing money fund, especially if one excludes funds that have temporarily lowered expenses.

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