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# Investment behavior of mutual fund shareholders: The evidence from aggregate fund flows☆

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**Abstract**

The relationship of stock market returns with components of aggregate equity mutual fund flows (new sales, redemptions, exchanges-in, and exchanges-out) is examined. Vector autoregressions and tests of linear feedback show that the flow-return relationship exists solely between returns and exchanges-in and -out. Further, only exchanges-out are responsible for the contrarian flow behavior noted by Warther (1995). The evidence suggests that the various components reflect different investor objectives and information. 

*JEL classification:* G11; G12; G14

*Keywords:* Mutual funds; Investment flows; Market timing; Conditional risk premia

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## 1. Introduction

The degree to which prior stock market returns influence investor demand for mutual fund shares and to what extent this demand drives returns have important implications for the stability of the U.S. stock market. Consequently, these relationships are currently the objects of intense scrutiny in financial circles, both practitioner and academic. Warther (1995) describes three potential relationships that may exist between flows and returns. Two of these pertain to ways in which flows may influence returns. First, flows may contain new information. Second, flows may exert price-pressure. Lastly, returns may influence fund flows if investors chase returns. This is the feedback-trader hypothesis. The possibilities for returns affecting flows are perhaps more complex than suggested by the positive feedback hypothesis alone, however. Market timing may also be consistent with returns affecting fund flows. Market timing involves buying/selling when perceived risk premia are high/low. If risk premia are time-varying (see Fama and French, 1989; Ferson and Harvey, 1991), then buying/selling may occur following periods of low/high returns.

Warther (1995) finds no relationship between lagged, aggregate fund flows and future months' returns, except that these lagged flows appear to serve as instruments for expected fund flows. Breaking fund flows into expected and unexpected components, he finds a strong, positive relationship between unexpected, contemporaneous mutual fund flows and monthly returns. His results thus suggest no lingering effect of mutual fund flows on the stock market beyond the month in which the flows occur. The lack of a return reversal (a negative relationship between flows and future returns) is inconsistent with the price-pressure hypothesis. In contrast to the notion that mutual fund investors are positive feedback investors, Warther (1995) documents the opposite. There is a negative relationship between the prior month's returns and current month fund flows. Failing to find a positive relationship even between the previous weeks' returns and current month fund flows, he interprets this as evidence against returns affecting flows. He concludes that the price-pressure and information explanations (i.e., flows affect returns) are more plausible, but is unable to offer definitive evidence supporting one over the other.[1] It is worth noting, however, that Warther's finding of contrarianism is supportive of returns affecting flows through market-timing.

[1] Warther (1998) reprises these findings and also suggests that the shift of individual investors toward mutual fund ownership (and away from other channels of stock ownership) has only minimally added to stock market instability. Fortune (1998) and Potter and Schneeweis (1998) confirm Warther's (1995) findings for equity mutual funds. Using quarterly data, Zheng (1998) finds that purchases of equities by mutual funds exhibit relatively long-term memory with respect to shocks in stock returns, and that these purchases are related (positively) to stock returns

This study examines the relationship between fund flows and stock market returns. The measure of aggregate fund flows is broken down into its four components: new sales, redemptions, exchanges-in, and exchanges-out. New sales and redemptions represent actual cash flows between the mutual fund complex and the investor. Exchanges, on the other hand, are simply aggregate transfers between equity and non-equity mutual funds within the same fund complex. Separate analysis of these components is a necessary step towards understanding the causality between flows and returns, since there is little reason to expect that the components will behave similarly with respect to prior returns, nor that they will correlate with concurrent and future returns in the same manner.

A plausible reason for differential flow–return relationships across the components is differing levels of transaction friction. Investors are able to move funds more easily via exchanges. Regardless of the direction of flow–return causality, these frictions may result in exchanges reflecting more recent information than new sales and redemptions or may cause exchanges to reflect different information than new sales and redemptions. If either of these possibilities hold, then certain features of the flow–return relationship may be masked from detection when flows are examined only in the aggregate. Vector autoregressions (VAR's) and near-VAR's are used to analyze the linear dependence between returns and the flow components, as well as between the flow components themselves.

There are three principal findings of this study. First, while each component is autocorrelated, new sales and redemptions are much more so than exchanges-in and -out. Second, the flow–return relationships documented by Warther (1995) solely involve exchanges-in and -out. Both are related to contemporaneous returns, but only exchanges-out are responsible for Warther's finding of contrarianism. There is no relationship whatsoever between stock returns and new sales or redemptions. Finally, the primary relation between new sales/redemptions and the exchanges series is a contemporaneous one, although there is some lagged, bi-directional feedback, as well. Thus, while there is some common variation between the flow components, this variation reflects no information related to stock returns. These findings are consistent with exchanges-in and -out being used partly for market-timing and tactical asset allocation (trading on short-term, conditional risk premia), with new sales/redemptions reflecting long-term, unconditional equity risk premia.

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only in bear markets. Goetzmann and Massa (1998) examine daily fund flows to Fidelity index funds and conclude that the market reacts to daily demand for mutual funds. Edelen and Warner (1998) find a strongly positive, concurrent relation between flows and returns, using semi-weekly and daily flow data. Further, they note a positive relation between flows and the prior day's returns. Remolona et al. (1997) and Edwards and Zhang (1998) also study the aggregate flow–return relationship.

## 2. Differential behavior of fund flow components

Aggregate mutual fund flows (net sales) can be expressed as the sum of four components. That is, Net sales = New sales − Redemptions + Exchanges-in − Exchanges-out. A likely and straightforward reason for different flow–return relationships across the components is different levels of friction. Exchanges are subject to less transaction friction than new sales and redemptions, because investors are generally able to move funds more quickly, cheaply, and conveniently with exchanges. Two simple and reasonable hypotheses about how investors use fund flows can be constructed based on this notion of frictions.

In the first case, assume that mutual fund investors choose their exposure to equities through mutual funds based on conditional risk premia, and that the conditioning information is the same regardless of whether exchanges or new sales/redemptions are the vehicles for investing or divesting.[2] This conditioning information may be based on prior returns (information in returns affects flows) or may be derived from other sources (information in flows affects returns). Regardless, the information causing these flows will be more timely when it is being transacted on through exchanges, whereas it will be more stale by the time transactions via new sales/redemptions are executed. Thus, the relation of the flow components with returns will be different. If flows respond to returns, the response of new sales/redemptions will be more lagged than that of exchanges. If returns respond to information in flows, the release of that information will occur through exchanges, rather than new sales/redemptions. Again, exchanges will be related to concurrent returns, and there will be a tendency for the slower responding new sales/redemptions to be related to lagged returns, simply by virtue of their correlation with earlier and more timely exchanges.

On the other hand, frictions may cause the components to reflect different investment objectives and horizons and, therefore, different conditioning information. For instance, the costs and time associated with moving funds via new sales/redemptions may be prohibitive for shorter-term trading, particularly if the perceived gains are small and/or fleeting. Exchanges are thus expected to be the primary means for market-timing and tactical asset allocation, that is, for responding to changes in shorter-term expected returns.[3] New sales and

[2] Ferson and Warther (1996) document that net sales are positively related to the dividend yield of the market, which is one example of conditioning information. They find that another conditioning variable, the Treasury bond yield, is unrelated to net sales. Potter and Schneeweis (1998) provide evidence that net sales are negatively related to both the price-to-earnings ratio and the 6-month CD rate.

[3] A similar argument could be advanced that if investors trade on momentum, and if the perceived benefits of doing so are limited, then they will use exchanges to carry out this activity. However, the market-timing story is more consistent with Warther's (1995) findings.

redemptions, a significant portion of which consists of periodic contributions to pension plans and other scheduled investments, would tend to reflect investors' unconditional risk premia (i.e., strategic asset allocation decisions). These components would therefore have greater predictability than the exchanges series. If the components reflect different information, then they should exhibit unique relationships with concurrent returns, no matter the direction of causality.

## 3. Description of the data

Aggregate fund flow data for 1984:01 through 1995:12 was obtained from the Investment Company Institute. Because only four of these categories can be described as primarily U.S. domestic equity funds and because the measure of stock market returns used in this study is based on U.S. equities, the aggregate fund flow measures are based on the Aggressive Growth, Growth, Growth and Income, and Income-Equity categories, only.[4] Because of the increase in the value of the stock market over time, the relative impact of $1 of fund flows on returns (and vice versa) is not expected to be constant over time. Thus, Warther (1995) normalizes fund flow amounts by dividing them by the total value of the stock market at the end of the previous month. This total value is the sum of the value of NYSE, AMEX, and NASDAQ stocks as given by the Center for Research in Security Prices (CRSP) data files. Summary statistics for the normalized series are presented in Table 1. Observations for the period 1987:10 through 1988:01 are not included in order to remove months which might be affected by the 1987 crash.[5] The four normalized components were examined for unit roots using the test of Phillips-Perron. The null of a unit root was rejected in all instances. Monthly stock returns are returns to the CRSP value-weighted index.

## 4. VAR analysis of flow components and returns

To analyze the dynamics between the flow series and returns, as well as between the series themselves, a VAR model containing five equations (one for

[4] Warther (1995) includes the Precious Metals, International, and Global Equity categories, as well. The distinction is only important subsequent to 1992. It is only during this period that the two series show any notable divergence.

[5] Warther's (1995) findings that net sales follow an AR(3) process suggests that net sales for the months 1987:11 to 1988:01 may have been influenced by the crash, as well as net sales for the month of the crash.

Table 1
Descriptive statistics for monthly fund flow components according to the Investment Company Institute for the period 1984:01 to 1995:12, with 1987:10 to 1988:01 omitted. The components are normalized by dividing them by the ending total value of all NYSE, AMEX, and NASDAQ stocks for the previous month, as reported in the CRSP database

| Variable | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|
| New Sales | 0.001889 | 0.000951 | 0.000561 | 0.004194 |
| Redemptions | 0.001119 | 0.000444 | 0.000401 | 0.002753 |
| Exchanges-in | 0.001122 | 0.000403 | 0.000331 | 0.002408 |
| Exchanges-out | 0.001143 | 0.000358 | 0.000442 | 0.002174 |

each flow component and one for stock returns) was estimated. That is, the model can be expressed as

$$y_t = c + \boldsymbol{\phi}_1 y_{t-1} + \boldsymbol{\phi}_2 y_{t-2} + \boldsymbol{\phi}_3 y_{t-3} + \boldsymbol{\phi}_{12} y_{t-12} + \varepsilon_t, \quad (1)$$

where $\boldsymbol{y}_t$ is a $5 \times 1$ vector consisting of the variables of interest, $\boldsymbol{c}$ is an intercept vector, the $\boldsymbol{\phi}_i$ are coefficient vectors for lagged values of $\boldsymbol{y}$, and $\boldsymbol{\varepsilon}_t$ is a vector of disturbances. The right-hand side of each equation included three lags of $\boldsymbol{y}$ because Warther (1995) found net sales to be autocorrelated to three lags.[6] A 12th lag was included as well, since there may be some annual seasonal effects in the series. For instance, defined benefit pension plans may tend to make once-a-year contributions which might introduce an annual seasonal into the new sales series.[7] A summary of the results is presented in Table 2, Panel A, which contains $F$-tests of whether each dependent variable is related to lags 1–3 and 12 of each of the variables.

Not surprisingly, the results indicate no relation between returns and lagged flows of any component. This is consistent with Warther's (1995) findings using aggregate flows. However, they do show that Warther's finding that higher returns lead to lower flows in the following month is solely attributable to exchanges-out. All coefficients on lagged returns in the exchanges-out equation are negative (not shown in the table). This is the only series significantly related to lagged returns. Warther also documents a high degree of autocorrelation for

[6] A test of an alternative of four lags versus the null of three lags was insignificant.

[7] Plots of sample autocorrelation functions and their approximate standard errors do not support the presence of seasonality (quarterly or annual) in the flow components. However, the 12th lags of some variables are individually significant in some of the equations in (1). In addition, a test for the significance of the 12th lag for all variables across all equations in (1) rejects the null of a simple VAR(3) model.

Table 2
Summary results from vector autoregressions of contemporaneous monthly returns to the CRSP value-weighted index and the four fund flow components (new sales, redemptions, exchanges-in, and exchanges-out, normalized as described in Table 1). The independent variables in each equation consist of lags 1–3 and 12 of returns and each flow component, as well as a constant. The result is a system of five equations, each with the same 21 regressors. The period covered is 1985:02 to 1995:12, with 1987:10 to 1988:01 omitted

*Panel A: F-statistics for the combined significance of lags 1–3 and 12 of the independent variables. P-values are in parentheses*

| Dependent variables | Lagged independent variables | | | | | |
|---|---|---|---|---|---|---|
| | Returns | New sales | Redemptions | Exchanges-in | Exchanges-out | Adj-$R^2$ |
| Returns | 0.5138<br>(0.7257) | 0.7095<br>(0.5872) | 0.2743<br>(0.8940) | 0.3763<br>(0.8251) | 0.2935<br>(0.8816) | − 9% |
| New sales | 0.7201<br>(0.5800) | 50.5337<br>(0.0000) | 4.9348<br>(0.0011) | 0.6011<br>(0.6626) | 0.0976<br>(0.9830) | 91% |
| Redemptions | 1.8216<br>(0.1301) | 4.6442<br>(0.0017) | 24.1709<br>(0.0000) | 0.6418<br>(0.6339) | 0.2613<br>(0.9021) | 87% |
| Exchanges-in | 0.5009<br>(0.7351) | 0.5946<br>(0.6673) | 1.7647<br>(0.1414) | 2.8130<br>(0.0290) | 0.6840<br>(0.6046) | 55% |
| Exchanges-out | 3.0435<br>(0.0203) | 0.9595<br>(0.4330) | 1.4912<br>(0.2101) | 0.9006<br>(0.4664) | 2.8324<br>(0.0281) | 54% |

*Panel B: Tests for linear dependence following Geweke (1982)*

| Test for | Chi-squared statistic | Degrees of freedom | *p*-value |
|---|---|---|---|
| Feedback from lags 1–3 and 12 of returns to flows | 26.8649 | 16 | 0.0430 |
| Feedback from lags 1–3 and 12 of flows to returns | 13.1409 | 16 | 0.6624 |
| Instantaneous feedback | 165.5596 | 4 | 0.0000 |
| Linear dependence | 205.5654 | 36 | 0.0000 |

the aggregate flow series. The VAR model estimated here indicates that all of the components are autocorrelated. Further, there is significant cross-autocorrelation between new sales and redemptions, with each variable related to lags of the other. The model explains a fairly large amount of the variance of the flow components. The adjusted-$R^2$'s for new sales and redemptions are 91% and 87%, respectively. The larger proportion of variances explained for the new sales/redemptions equations relative to the exchanges equations are supportive of the hypothesis that new sales/redemptions are based, at least

partly, on unconditional equity risk premia, leading to a greater level of predictability.

In order to more completely test the matter of flow–return causality, tests of linear dependence were carried out using statistics based on Geweke's (1982) feedback measures. These allow the linear relation between two sets of variables in a VAR, say, vector $\boldsymbol{y}_1$ and vector $\boldsymbol{y}_2$, where

$$\boldsymbol{y}_t = \begin{bmatrix} \boldsymbol{y}_{1t} \\ \boldsymbol{y}_{2t} \end{bmatrix}, \tag{2}$$

to be partitioned into three statistical measures: feedback from lagged values of $\boldsymbol{y}_1$ to the contemporaneous values of $\boldsymbol{y}_2$, feedback from lagged values of $\boldsymbol{y}_2$ to the contemporaneous values of $\boldsymbol{y}_1$, and instantaneous feedback between $\boldsymbol{y}_1$ and $\boldsymbol{y}_2$.[8] These statistical components sum to a measure of total linear dependence.

Tests for feedback are presented in Table 2, Panel B. The overall linear dependence between returns and the four components as a group is highly significant. The principal source of this relation is the instantaneous feedback between the components and returns, although the feedback from lagged returns to the four components (owing to exchanges-out) is also significant. The tests confirm that returns are unrelated to lagged flows.

While the data cannot reveal the direction of the feedback within a given month, additional analysis can reveal which components possess the instantaneous relationship with returns. This is done by testing whether, conditional on lags 0–3 and 12 of exchanges-in and -out, there is feedback between new sales/redemptions and returns, and then by testing whether, conditional on lags 0–3 and 12 of new sales and redemptions, there is feedback between the exchanges series and returns.[9]

The results are presented in Table 3. Interestingly, there is no linear dependence between returns and new sales or redemptions, whatsoever. In contrast, there is instantaneous feedback between returns and the exchanges series, as well as feedback from lagged returns to the exchanges. Thus, the flow–return relation documented by Warther (1995) using aggregate fund flows actually exists solely between returns and exchanges.

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[8] In this instance, the full, five-equation model is estimated, then the single-equation model for returns ($\boldsymbol{y}_{1t}$) is estimated while restricting coefficients on the lagged flow variables ($\boldsymbol{y}_2$) to be zero, and finally the four-equation model for flows ($\boldsymbol{y}_{2t}$) is estimated while restricting the coefficients on the lagged returns ($\boldsymbol{y}_1$) to be zero. The feedback measures are likelihood ratio test statistics based on the covariance matrices of residuals from the three models, which are chi-squared distributed. Further elaboration can be found in Hamilton (1994) and in Mills (1990).

[9] These tests are carried out in similar fashion as before (three systems of equations are estimated), with the exception that the conditioning variables on the right-hand side are never restricted. Tests for conditional feedback are based on Geweke (1984), and are also described in Mills (1990), pp. 301–302.

Table 3
Tests for conditional linear dependence between returns to the CRSP value-weighted index and fund flow components, following Geweke (1984). The period covered is 1985:02 to 1995:12, with 1987:10 to 1988:01 omitted

| Test for | Chi-squared statistic | Degrees of freedom | *p*-value |
|---|---|---|---|
| *Panel A: Results from near-VAR's for returns, new sales, and redemptions. Lags 0–3 and 12 of both exchanges-in and -out are included as the conditioning variables in each equation* | | | |
| Feedback from lags 1–3 and 12 of returns to new sales and redemptions | 6.1803 | 8 | 0.6270 |
| Feedback from lags 1–3 and 12 of new sales and redemptions to returns | 12.4328 | 8 | 0.1329 |
| Instantaneous feedback | 1.9686 | 2 | 0.3737 |
| Linear dependence | 20.5817 | 18 | 0.3010 |
| *Panel B: Results from near-VAR's for returns, exchanges-in, and exchanges-out. Lags 0–3 and 12 of both new sales and redemptions are included as the conditioning variables in each equation* | | | |
| Feedback from lags 1–3 and 12 of returns to exchanges-in and -out | 17.1479 | 8 | 0.0286 |
| Feedback from lags 1–3 and 12 of exchanges-in and -out to returns | 2.3923 | 8 | 0.9666 |
| Instantaneous feedback | 129.2703 | 2 | 0.0000 |
| Linear dependence | 148.8105 | 18 | 0.0000 |

Although the relationship between returns and the fund flow components has been clarified, the relationships between the various components of fund flows remain to be examined. Specifically, the question is to what extent new sales and redemptions reflect information contained in the exchanges series. To answer this question, a near-VAR was estimated with four equations, one for each fund flow component, with lags 1–3 and 12 of each variable on the right-hand side. Lags 0–3 and 12 of returns were included as conditioning variables in each equation. This also allows the concurrent relation between returns and the exchanges series that was verified in Table 3 to be signed as positive or negative.

The resulting tests of linear dependence are shown in Table 4. There is a very strong contemporaneous relation between the two pairs of series. Further, there is lagged feedback running from new sales/redemptions to exchanges, as well as lagged feedback running in the other direction. The interpretation, taken with the preceding results, is that while there is a common variation between new sales/redemptions and exchanges, this common variation is unrelated to returns. There is clearly return-related information in exchanges which is unique to those

Table 4
Tests for linear dependence between new sales/redemptions and the two exchanges series, following Geweke (1982). The tests are based on results from near-VAR estimations for the four variables, where lags 1–3 and 12 of each endogenous variable appear on the right-hand side of each equation, as do lags 0–3 and 12 of returns to the CRSP value-weighted index. The period covered is 1985:02 to 1995:12, with 1987:10 to 1988:01 omitted

| Test for | Chi-squared statistic | Degrees of freedom | *p*-value |
|---|---|---|---|
| Feedback from lags 1–3 and 12 of new sales and redemptions to exchanges-in and -out | 29.7765 | 16 | 0.0192 |
| Feedback from lags 1–3 and 12 of exchanges-in and -out to new sales and redemptions | 25.9830 | 16 | 0.0543 |
| Instantaneous feedback | 31.1252 | 4 | 0.0000 |
| Linear dependence | 86.8847 | 36 | 0.0000 |

two components of aggregate fund flows. Although not shown in the table, the relationships between concurrent returns and exchanges-in and -out are positive and negative, respectively, consistent with intuition.[10]

## 5. Discussion and conclusion

This study investigates the aggregate investment behavior of mutual fund shareholders by analyzing the interaction of their demand for equity securities with stock returns. Aggregate fund flows are broken down into four components (new sales, redemptions, exchanges-in, and exchanges-out). These four components are expected to exhibit different relationships with returns due to differing levels of transaction friction. This friction may cause exchanges to reflect more recent information than new sales or redemptions or may cause them to reflect different types of information.

The flow-return relationship documented by Warther (1995) exists entirely between returns and exchanges-in and -out. There is no relationship between returns and new sales or redemptions. Returns are positively related to concurrent exchanges-in, and negatively related to exchanges-out. Further, the contrarian relation between aggregate flows and returns exists solely between returns and exchanges-out. Some mutual fund investors attempt to lock in higher

[10] Specifically, the coefficient on lag 0 returns in the exchanges-in equation is 0.0038 ($t = 7.1839$). The coefficient on lag 0 returns in the exchanges-out equation is $-0.0024$ ($t = -4.3222$).

returns in previous months by shifting monies into non-domestic-equity funds, and to retain exposure to domestic equities following months of lower returns. From a Granger-causality perspective, this study provides evidence of feedback from returns to exchanges-out, as well as instantaneous feedback (of unknown direction) in a given month between returns and exchanges-in and -out. Like Warther, I find no evidence of a return reversal which would support the price-pressure hypothesis.

This study also finds that there is common variation between new sales/redemptions and the exchanges series that is unrelated to stock returns. Further, new sales and redemptions are substantially more autocorrelated and predictable than exchanges-in and -out. Taken together, these findings indicate that mutual fund investors use new sales/redemptions differently from exchanges, which results in the components reflecting different information. The findings are not consistent with new sales/redemptions reflecting the same return-related information as exchanges, even with a lag. Investors appear to use exchanges to time the market and/or engage in tactical asset allocation. This is consistent with exchanges reflecting short-term, conditional risk premia, and with the perceived gains to trading being too small and/or too fleeting to be captured by new sales/redemptions. New sales/redemptions, on the other hand, would appear to reflect long-term, unconditional risk premia. While the possibility that investors momentum trade on the current month's returns cannot be rejected out-of-hand, there is no evidence of this behavior at longer lags.

Determining exactly what conditioning information mutual fund exchanges are responding to would be a worthwhile line of inquiry for future research. Ferson and Warther (1996) provide some evidence on the matter, having noted a positive relation between aggregate fund flows and the lagged dividend yield on the market, and no relation between these flows and lagged, short-term Treasury yields. Nevertheless, further research into the flow-return relation clearly should focus on exchanges-in and exchanges-out.

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