Market Returns and Mutual Fund Flows

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The 1990s have seen unprecedented growth in mutual funds. Shares in the funds now represent a major part of household wealth, and the funds themselves have become important intermediaries for savings and investments. In the United States, more than 4,000 mutual funds currently hold stocks and bonds worth a total of more than $2 trillion (Chart 1). Household investment in these funds increased more than fivefold in the last ten years, making it the fastest growing item on the household financial balance sheet. Most of this growth came at the expense of more traditional forms of savings, particularly bank deposits.

With the increased popularity of mutual funds come increased concerns—namely, could a sharp drop in stock or bond prices set off a cascade of redemptions by fund investors and could the redemptions exert further downward pressure on asset markets? In recent years, flows into funds have generally been highly correlated with market returns. That is, mutual fund inflows have tended to accompany market upturns and outflows have tended to accompany downturns. This correlation raises the question whether a positive-feedback process is at work here, in which market returns cause the flows at the same time that the flows cause the returns. Observers such as Hale (1994) and Kaufman (1994) fear that such a process could turn a decline in the stock or bond market into a downward spiral in asset prices.[1]

In this study, we use recent historical evidence to explore one dimension of the broad relationship between market returns and mutual fund flows: the effect of short-term market returns on mutual fund flows. Research on this issue has already confirmed high correlations between market returns and aggregate mutual fund flows (Warther 1995). A positive-feedback process, however, requires not just correlation but two-way causation between flows and returns, in which fund investors react to market movements while the market itself moves in response to the investors' behavior.

Previous studies of causation have focused on the effects of past performance on flows into individual mutual funds, typically with a one-year lag separating cause and effect. In this article, however, we examine the effect of market-wide returns on aggregate mutual fund flows within a month, a level of aggregation and a time horizon that seem more consistent with the dynamics of a downward spiral in asset prices. Our statistical analysis uses instrumental variables, a technique that is particularly well suited for measuring causation when observed variables are likely to be determined simultaneously. The technique has not been applied before to mutual fund flows and market returns.

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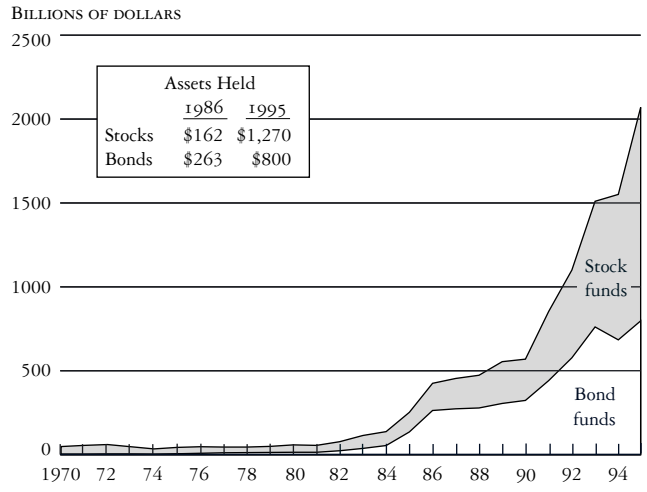
Despite market observers' fears of a downward spiral, our study suggests that the short-term effect of market returns on mutual fund flows typically has been too weak to sustain a spiral. During unusually severe market declines, stock and bond movements have prompted proportionately greater outflows than under normal conditions, but even at these times, the effect has not seemed strong enough to perpetuate a sharp fall in asset prices.

We begin by describing the nature of mutual funds and characterizing their recent growth. Next, we examine the data on aggregate mutual fund flows by dividing them into expected and unexpected components and investigating their correlations with market returns. The effects of returns on flows are then estimated using instrumental variables. Finally, we test the robustness of our estimates by looking at the flows during severe market declines.

Chart 1

GROWTH OF MUTUAL FUND NET ASSETS



Source: Investment Company Institute.

THE NATURE AND GROWTH OF MUTUAL FUNDS

Mutual funds operate as tax-exempt financial institutions that pool resources from numerous shareholders to invest in a diversified portfolio of securities.[2] Unlike closed-end funds, which issue a fixed number of shares, open-end mutual funds are obligated to redeem shares at the request of the shareholder. When a shareholder redeems shares, he or she receives their net asset value, which equals the value of the fund's net assets divided by the number of shares outstanding. An investment manager determines the composition of the fund's investment portfolio in accordance with the fund's return objectives and risk criteria.

INVESTMENT OBJECTIVES AND FEE STRUCTURES

Mutual funds vary widely in their investment objectives. The Investment Company Institute (ICI)—the industry trade group whose membership includes almost all registered U.S. mutual funds—classifies mutual funds according to twenty-one investment objectives (Appendix A). For instance, some funds aim to provide a steady stream of income while others emphasize capital appreciation; some funds specialize in U.S. common stocks while others specialize in U.S. bonds or in foreign stocks and bonds. It is

important to gauge a fund's performance relative to its investment objective because the different objectives represent trade-offs between risk and return. Some objectives aim for high returns at high risk, others for more modest returns but at less risk.

Mutual funds also differ in their fee structures, which can affect the sensitivity of flows to a fund's short-term performance. Many mutual funds charge an up-front sales fee, called a *load*, that is typically around 5 percent of the initial investment. The desire to spread the cost of the load over time may make a shareholder reluctant to sell in the short run. For example, Ippolito (1992) finds that poor performance leads to half as many withdrawals from load funds as from no-load funds. Chordia (1996) also provides evidence that such fees discourage redemptions. At the end of 1995, 62 percent of the assets in stock mutual funds and 66 percent of the assets in bond mutual funds were in load funds.[3] Although no-load funds impose no up-front fees, many collect back-end fees, called contingent deferred sales charges, when shares are redeemed. These fees generally decline the longer the shares are held and thus also discourage investors from selling in the short run.

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The Growth of Mutual Funds

Although mutual funds have existed in the United States since 1924, truly significant amounts of money did not start flowing into the funds until the mid-1980s. A decline in deposit rates in the early 1990s marked the beginning of explosive growth in the funds. As a result, mutual funds as a group have become important financial intermediaries and repositories of household wealth. Households in 1995 held 10 percent of their net financial wealth in mutual fund shares directly and 3 percent indirectly through pension funds (Table 1). At the end of 1995, the net assets of mutual funds were 60 percent as large as the assets held by commercial banks, a leap from only 27 percent at year-end 1986 (Table 2). Such rapid growth has prompted Hale (1994) to suggest that the rise of mutual funds is creating a whole new financial system.

Much of the growth in mutual funds can be attributed to the influx of retirement money driven by long-term demographic forces. Morgan (1994) shows that changes in the share of household assets held in stocks and

Table 1
MAJOR HOUSEHOLD FINANCIAL ASSETS
Billions of Dollars

Asset Type	1986	1995
Deposits (check, time, savings)	2,650	3,258
Pension reserves	2,265	5,510
Life insurance	264	542
Money market shares	229	452
Total securities,	2,497	7,436
of which:		
Corporate equities	1,453	4,313
Mutual funds	334	1,265
Memo:		
Mutual fund assets as a percentage of total securities	13	17
Mutual fund assets as a percentage of net financial wealth	7	10

Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts.

Table 2
TOTAL ASSETS OF MAJOR FINANCIAL INTERMEDIARIES

	1986		1995	
Intermediary	Assets (Billions of Dollars)	Percentage of Intermediary Assets	Assets (Billions of Dollars)	Percentage of Intermediary Assets
Commercial banks	2,620	32	4,501	28
Thrift institutions	1,539	19	1,326	8
Insurance companies	1,260	15	2,832	18
Pension plans	1,723	21	4,014	25
Finance companies	421	5	827	5
Mutual funds	717	9	2,598	16
TOTAL	8,280	100	16,097	100

Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts.

Note: Mutual funds include short-term funds.

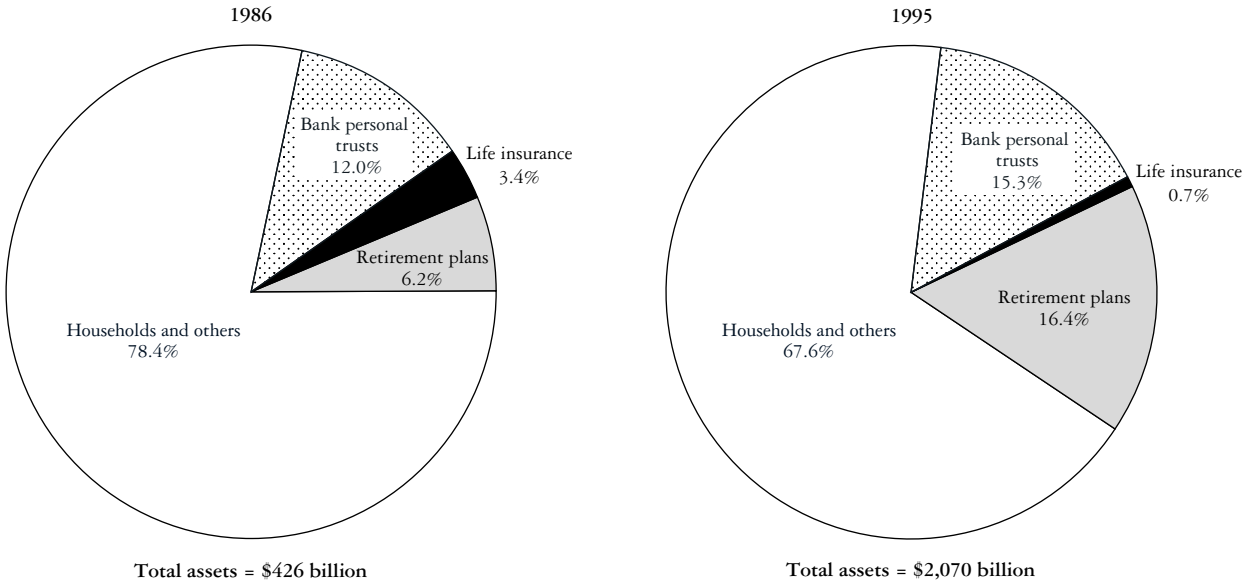
bonds are explained by the proportion of workers thirty-five years of age or older. Workers reaching thirty-five years of age tend to earn enough to start saving for retirement, and mutual fund shares represent a way to invest their savings. Households also save through retirement plans, life insurance policies, and trust accounts with banks. Among these investments, retirement plans have been acquiring mutual fund shares at the highest rate: the share of mutual fund assets held by retirement plans expanded from 6.2 percent in 1986 to 16.4 percent in 1995 (Chart 2). Life-cycle motives for investing in mutual funds—such as saving for retirement—can make certain flows insensitive to short-term returns, and much of these flows would be predictable on the basis of past flows. Hence, this analysis will distinguish between long-term trends and short-term fluctuations in mutual fund flows.

As large as the recent flows have been, mutual funds still hold relatively small shares of the markets in which they invest.

As large as the recent flows have been, mutual funds still hold relatively small shares of the markets in which they invest. At the end of 1995, they held 16 percent of the capitalization of the municipal bond market, 12 percent of the corporate equity market, 7 percent of the corporate and foreign bond market, and 5 percent of the U.S. Treasury and agency securities market (Chart 3). These fairly small shares limit the potential impact of the flows on asset prices. Estimates by Shleifer (1986) suggest that an exogenous decline in mutual funds' demand for stocks by one dollar would reduce the value of the market by one dollar. Such estimates imply that selling pressure by mutual funds alone is unlikely to cause a sharp market decline.

Chart 2

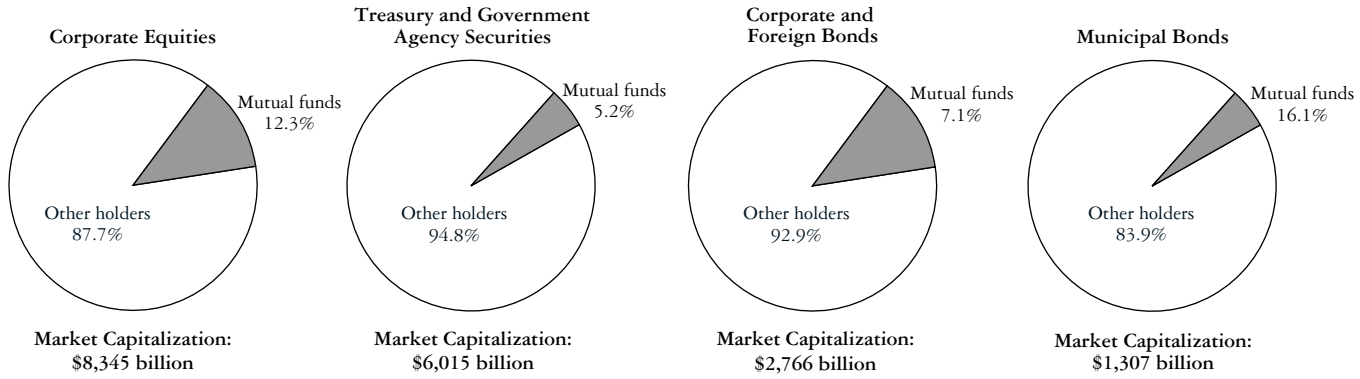
SOURCES OF FLOWS: HOLDERS OF STOCK AND BOND MUTUAL FUNDS



Sources: Board of Governors of the Federal Reserve System, Flow of Funds Accounts; Investment Company Institute (1995); authors' estimates.

Chart 3

SHARE OF SECURITIES HELD BY MUTUAL FUNDS, 1995



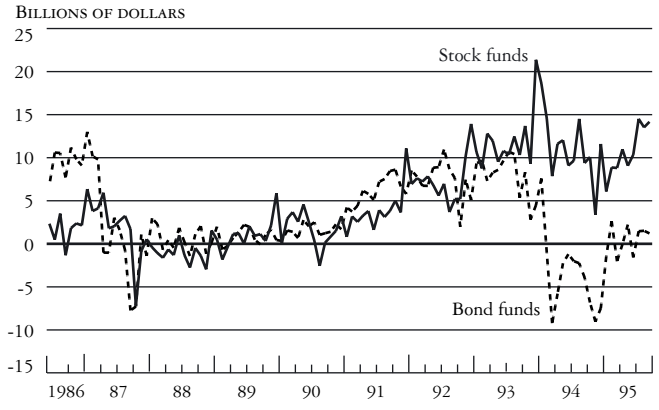
Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts.

THE CORRELATION BETWEEN RETURNS AND FLOWS

The recent movements of large mutual fund flows suggest a strong correlation between market returns and the flows. In the early 1990s, the flows into stock and bond mutual funds were equally strong (Chart 4). However, when the Federal Reserve started to raise its target federal funds rate in February 1994, the bond market became bearish and the flows shifted sharply from bond to stock funds. More recently, the equity bull market in 1995 was accompanied by record flows into stock funds. Such correlations between aggregate fund flows and marketwide returns suggest a positive-feedback process in which the market returns cause the fund flows at the same time that the flows cause the returns.

Chart 4

MONTHLY FLOWS INTO STOCK AND BOND MUTUAL FUNDS



Source: Investment Company Institute.

For our analysis, it is important to distinguish among various notions of correlations between flows and returns. For instance, Warther (1995) has documented strong correlations between *monthly* market returns and *monthly* aggregate mutual fund flows. The question then arises, Do such monthly correlations reflect causation between returns and flows? If they do, could they lead to a strong positive-feedback process? Note that the correlations that Kaufman (1994) and Hale (1994) have in mind may be quite different. Kaufman, for example, emphasizes that the average investor in mutual funds has never experienced a prolonged bear market. In such a market, investors may suddenly react by redeeming their shares heavily.[4] The correlation would therefore be between returns over an unspecified period and flows over a somewhat shorter period. Our analysis examines only monthly flow-return correlations from 1986 to 1996, a period for which there may not have been a bear market of long enough duration to test Kaufman's hypothesis.

Measuring Mutual Fund Flows

To measure mutual fund flows, we use monthly ICI data on cash flows into and out of mutual funds from July 1986 to April 1996.[5] In the ICI data, cash flows are computed for each of the twenty-one groupings of funds by investment objective. Within each group, cash flows are further broken down into total sales, redemptions, exchange sales, and exchange redemptions. Total sales and redemptions represent outside flows, while exchange sales and exchange redemptions represent flows between funds within a fund family. We compute net flows as total sales minus redemptions, plus exchange sales minus exchange redemptions.

The expected flows . . . reflect a relatively smooth and slow process, while the unexpected flows show a great deal more short-run volatility.

We make several adjustments to the mutual fund categories by either aggregating categories or excluding some from our study. We exclude money market mutual funds and precious metal funds because they do not seem to be subject to the same risks as stock and bond funds. We also exclude various hybrid funds (flexible portfolio, income mixed, balanced, and income bond) because of the lack of an appropriate market price index. We combine aggressive growth and growth stock funds, income and growth-and-income stock funds, and global and international stock funds. Hence, we collapse six equity categories into three: growth, income, and global stock funds. We also combine long-term municipal bond and state municipal bond funds into a single category of municipal bond funds. We retain four other bond fund categories: government bond, corporate bond, Government National Mortgage Association (GNMA) bond, and high yield bond. We use growth stock funds as the benchmark stock fund and government bond funds as the benchmark bond fund.

To control for the flows' strong rising trend during the period, we normalize the flows by dividing them by the funds' net asset value in the previous month. Flows are thus stated as a percentage of a fund category's net assets. (The data analyzed in this study are summarized in Table 3.) Over the period, global stock funds and corporate bond funds received the largest net flows relative to net assets, while government bond funds received the smallest. Global stock funds and GNMA bond funds had the most volatile net flows, while income stock funds had the most stable flows. All the flows exhibit high autocorrelations, with government bond funds and GNMA bond funds showing the most persistent flows. These autocorrelations imply that large components of the flows are predictable on the basis of past flows.

To divide the flows into expected and unexpected components, we regress flows on three months of lags and on a time trend (Appendix B).[6] The predicted values from the regressions then serve as our expected flows and the residuals as our unexpected flows. The expected flows for growth stock funds and government bond funds reflect a

Table 3
Summary Statistics for Stock and Bond Mutual Fund Flows

Fund Group	Number of Observations	Mean Flows (Percent)	Standard Deviation (Percent)	First Order Autocorrelations
Stock funds				
Growth	118	1.0	1.3	0.34
Global equity	118	1.4	2.2	0.70
Income	118	1.1	0.9	0.69
Bond funds				
Government	118	0.4	1.8	0.90
Corporate	118	1.4	1.7	0.75
GNMA	118	0.4	2.2	0.84
High yield	118	1.1	2.0	0.36
Municipal	118	1.1	1.5	0.67

Sources: Investment Company Institute; authors' calculations.

Notes: Monthly flows into mutual funds over the July 1986–April 1996 period are computed as the sum of 1) total sales minus redemptions and 2) exchanges into a fund minus exchanges out of a fund. The flow into each group is divided by that fund's net asset value from the previous month. The fund groups are drawn from the Investment Company Institute (ICI) classification of mutual funds by objective. Some groups combine two ICI categories: *growth stock funds* includes growth and aggressive growth stock funds; *global equity funds*, global equity and international stock funds; *income stock funds*, equity income and growth-and-income stock funds; *municipal funds*, national and state municipal bond funds.

relatively smooth and slow process, while the unexpected flows show a great deal more short-run volatility (Chart 5).[7]

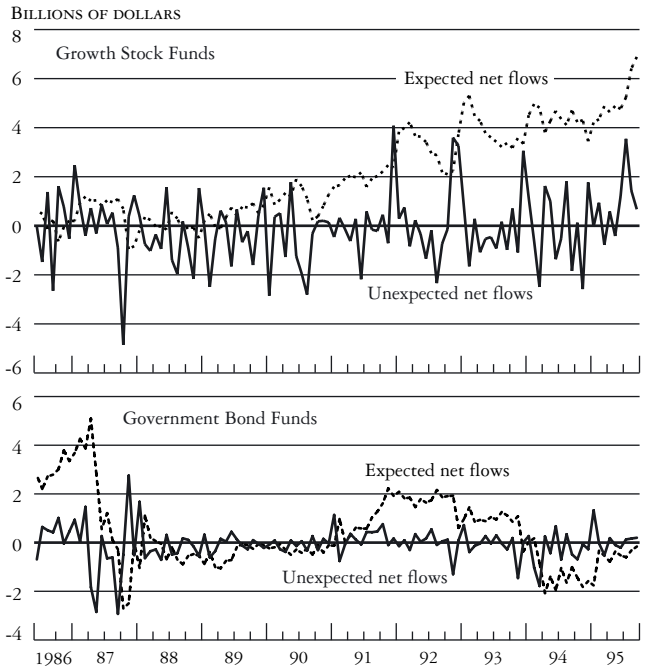
Measuring Market Returns

To measure market returns, we select market price indexes to gauge the performance of the markets in which the funds in each group invest (Table 4). Within each group, some funds will do better than others, and flows may shift to the best performers. However, we are more interested in the aggregate flows, which depend not on the performance of specific portfolios but on that of whole market sectors. In choosing among the various market indexes, it is not critical that we select precisely the right index because the various stock market indexes tend to be highly correlated, as do the bond market indexes.

We compute returns as the changes in the logarithms of the end-of-month market indexes and annualize them by multiplying by twelve. As a result, the annualized return for market i for month t would be given by $R_{it} = 12\ (log\ P_{it} - log\ P_{i,t-1})$, where P_{it} represents that market's index at the end of month t. We then compute excess returns as the difference between this market return and the yield on prime thirty-day commercial paper (CP) in the previous month. The CP rate tracks returns on money market mutual funds, which are the natural alternative for an investor not wishing to invest in stock or bond funds.

Chart 5

Comparison of Expected and Unexpected Flows



Source: Authors' calculations.

Table 4

Mutual Fund Return Indexes

Fund Group	Index
Stock funds	
Growth	Russell 2000
Income	Russell 1000
Global equity	Morgan Stanley Capital International Index (World)
Bond funds	
Government	Lehman Brothers Composite Treasury Index
Corporate	Merrill Lynch Corporate Master
GNMA	Merrill Lynch GNMA Index
High yield	Merrill Lynch High Yield Bond Index
Municipal	Standard and Poor's Municipal Index (One Million)

Sources: DRI/McGraw-Hill; Datastream International Limited; Haver Analytics.

Correlations between Returns and Flows

In general, net flows into the various mutual fund groups are highly correlated with market performance (Table 5). The correlations between net flows and market returns range from 12 percent for government bond funds to 72 percent for high yield bond funds. In most cases, these correlations can be attributed almost entirely to the *unexpected* component of net flows. The correlations between returns and the unexpected components range from 31 percent for GNMA bond funds to 71 percent for growth stock funds. In Chart 6, we plot these correlations for government bond funds and growth stock funds, which serve as our benchmark bond and stock funds. In contrast, the correlations between returns and the *expected* components of net flows are by and large not statistically different from zero. These findings are consistent with those of Warther (1995), who looked at similar flow data covering the period from January 1984 through December 1992. Combining all the stock funds into one category, Warther found a correlation of 73 percent between stock returns and unexpected net flows into stock funds and a

correlation of -10 percent between stock returns and expected net flows.

Correlation versus Causation

High correlations between flows and returns do not necessarily mean that a strong positive-feedback process is at work. There are at least two ways in which such correlations can arise in the absence of this process. First, a third factor—such as investor sentiment—may be driving both flows and returns. An optimistic sentiment may encourage investment in mutual funds at the same time that it pushes up asset prices.[8] In this case, the resulting correlation between flows and returns would not imply any kind of self-sustaining market mechanism. Second, the correlation may arise from a causal relationship in only one direction: flows may cause returns but not vice versa. Even when flows are small relative to the size of the markets, flows may cause returns if other investors observing the flows take large positions in the belief that the flows convey useful investment information. The correlation arising from such one-way causation, however, still does not imply a positive-feedback process, which requires that the causation operate in both directions.

Table 5

Correlations between Mutual Fund Flows and Excess Market Returns

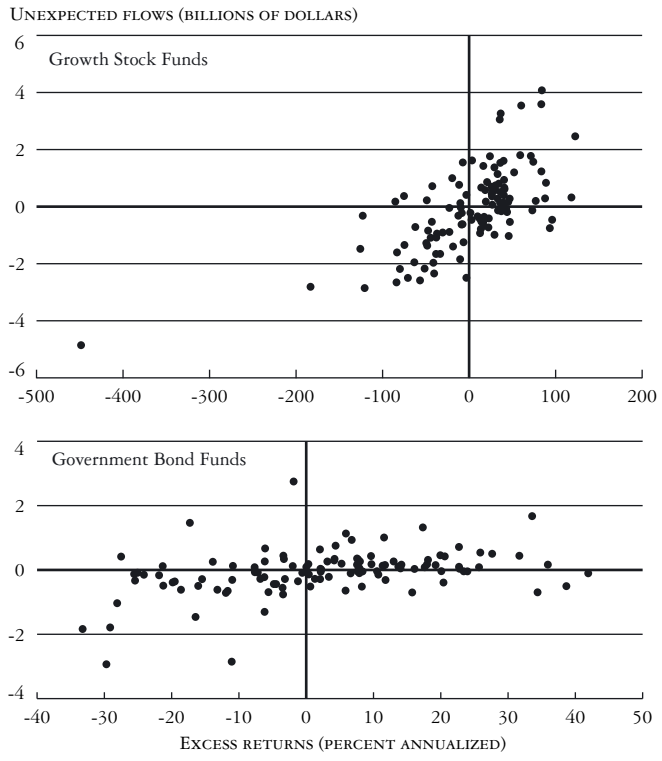
Fund Group	Total Flow	Expected Flow	Unexpected Flow
Stock funds			
Growth	0.61	0.02	0.71
Income	0.36	0.05	0.49
Global equity	0.31	-0.08	0.55
Bond funds			
Government	0.12	-0.07	0.41
Corporate	0.47	0.02	0.68
GNMA	0.21	0.12	0.31
High yield	0.72	0.19	0.70
Municipal	0.48	-0.05	0.69

Sources: Investment Company Institute; authors' calculations.

Notes: Monthly flows into mutual funds over the July 1986–April 1996 period are computed as the sum of 1) total sales minus redemptions and 2) exchanges into a fund minus exchanges out of a fund. The flow into each group is divided by that fund's net asset value from the previous month. The fund groups are drawn from the Investment Company Institute (ICI) classification of mutual funds by objective. Some groups combine two ICI categories: *growth stock funds* includes growth and aggressive growth stock funds; *global equity funds*, global equity and international stock funds; *income stock funds*, equity income and growth-and-income stock funds; *municipal funds*, national and state municipal bond funds. Excess market returns are computed by subtracting the thirty-day commercial paper rate from the return index.

Chart 6

Correlation between Unexpected Flows and Market Returns



Source: Authors' calculations.

Do Short-Term Returns Cause Short-Term Flows?

Timing and Aggregation

Previous studies of causation have typically examined the effect of returns on current flows into individual funds over a period longer than a month. For example, Ippolito (1992), Sirri and Tufano (1993), and Patel, Zeckhauser, and Hendricks (1994) use annual data to show that investors shift their money to funds that performed well in the previous year. For our purposes, however, it is important to examine effects with lags much shorter than a year and to examine the flows at an aggregate level. Short lags are necessary for the kind of positive-feedback process that could lead to a self-sustaining decline. Therefore, we look at the effects of market returns on flows within a month. This period is too short for most investors to know precisely

how their own funds have performed relative to other funds, but they will be able to surmise how the funds, including their own, have performed on average. At the same time, shifts in flows from one individual fund to another that do not change aggregate flows are unlikely to move prices in the market as a whole. Hence, we measure the effects of market returns on aggregate flows for funds within a given investment objective.

The Instrumental-Variable Approach

To measure whether returns cause flows, we rely on so-called instrumental variables. Such variables have not been used before to analyze causation between mutual fund flows and market returns. The purpose of these variables is to isolate a component of returns that we are confident could not have been caused by flows. We can then estimate the effect of this component on flows to obtain a measure of the independent effect of returns on flows. It is therefore important to identify instrumental variables that are not only independent of flows, but also relevant to returns. Specifically, the instruments should be sufficiently correlated with returns to capture a component large enough to allow a reliable measure of the component's effect on flows. If the instruments are weak, some bias will distort the estimates. With biased estimates, the measured effects will fall somewhere between the ordinary least squares (OLS) estimates and the true effects.

We derive our instrumental-variable estimates in two stages. First, we regress stock and bond market excess returns on the instruments. The predicted values from the first-stage regression then represent a component of returns that we can consider not to be attributable to mutual fund flows. Second, we regress mutual fund flows on the predicted values from the first-stage regression. The coefficients from the second-stage regression then measure the independent effect of returns on flows.[9]

Note that our application of instrumental variables leaves two issues unaddressed. First, although we can examine the possible effects of market returns on aggregate mutual fund flows, we cannot measure the effects in the opposite direction, because we lack good instrumental variables for flows. Second, our instrumental-variable analysis does not allow us to determine the possible effects of longer term returns on flows, such as those of bull or bear markets that last longer than two months. Hence, this analysis is limited to testing a positive-feedback hypothesis based on causation from only two months of returns.

Instruments for Stock and Bond Returns

We use four macroeconomic variables as instruments for stock and bond excess returns: capacity utilization, the consumer price index, domestic employment, and the Federal Reserve's target federal funds rate. We chose these variables because we may reasonably assume that none are affected by mutual fund flows in the short run. Moreover, the variables are significantly correlated with excess stock and bond returns.[10] By their nature, such excess returns would be hard to predict on the basis of lagged data because stock and bond markets are so quick to reflect any available information. Instead of using lagged data for instruments, however, we use contemporaneous data on macroeconomic variables—that is, data for the same month over which we measure returns. The contemporaneous correlations between the instruments and returns arise because the stock and bond markets react to the macroeconomic variables as the information is released. The F-statistics and Nelson and Startz's TR^2 statistics all suggest that the instruments have significant explanatory power.[11] Nonetheless, the coefficients may still be biased because the first-stage F-statistics tend to be less than 10.[12] If the estimates are biased because of poor instruments, we know that they will be biased toward the OLS estimates. It will therefore be useful to compare the instrumental-variable estimates with the OLS estimates.

The Effect of Short-Term Returns on Flows

Our instrumental-variable regressions control for changing volatilities and for conditions in markets other than the ones in which particular funds invest. (The complete regressions are reported in Appendix C.) Specifically, each regression includes as explanatory variables two months of excess returns and two months of conditional volatilities in the corresponding market and the same four variables in the alternative market. For flows into stock funds, the

alternative market is the government bond market; for flows into bond funds, it is the market for growth stocks (Table 4). The same-month returns are modeled using the instrumental variables, while the lagged-month returns are not. The conditional volatilities are based on an estimated process that allows the volatilities to vary over time.[13] Warther (1995) runs OLS regressions that include two lags of monthly returns but not volatilities or returns in other markets. We find that our specification of explanatory variables results in stronger estimated effects of short-term returns on fund flows.[14]

Our regressions suggest that short-term market returns have little to no effect on mutual fund flows (Table 6). In the case of the three stock funds examined, the estimated effect of market returns on flows in the same month is statistically no different from zero at conventional significance levels. For the five bond funds examined, the estimated same-month effect is significant for government bond, corporate bond, and municipal bond funds and is insignificant for GNMA bond and high yield bond funds. Even when the effect is statistically significant, however, it is very small. A market decline of 1 percentage point would lead to outflows of less than 1/10 of 1 percent of the net assets of funds of a given type. In most cases, market returns in the month before have the opposite effect or no effect on flows. The exceptions are the government bond and GNMA bond funds, but even here the combined effect of two months of returns remains small.

Table 6
REGRESSION OF UNEXPECTED FLOWS ON MARKET RETURNS

Dependent Variable	Instrumental-Variable Coefficient on Excess Returns, Same Month	Instrumental-Variable Coefficient on Excess Returns, Two Months Combined	Ordinary Least Squares Coefficient on Excess Returns, Same Month	Ordinary Least Squares Coefficient on Excess Returns, Two Months Combined
Stock funds				
Growth	0.006	0.005	0.013**	0.010**
	(1.25)		(12.74)	
Income	0.016	0.014	0.005**	0.013
	(1.68)		(2.20)	
Global equity	0.010	0.008	0.015**	0.003
	(0.92)		(6.27)	
Bond funds				
Government	0.033**	0.043**	0.015**	0.027**
	(2.21)		(3.92)	
Corporate	0.049**	0.045**	0.041**	0.038**
	(3.40)		(9.18)	
Municipal	0.084**	0.075**	0.053**	0.053
	(3.96)		(9.08)	
GNMA	0.013	0.031**	0.016**	0.042**
	(0.71)		(2.67)	
High yield	0.023	0.016	0.082**	0.065**
	(0.39)		(10.04)	

Source: Authors' estimates.

Notes: The regressions control for excess returns in an alternative market (the government bond market for stock funds and the growth stock market for bond funds) and for conditional volatility in the markets. The t-statistics are in parentheses.
* Significant at the 90 percent level.
** Significant at the 95 percent level.

Remarkably, our instrumental-variable estimates also suggest that the funds with the more conservative investment objectives are also the ones most vulnerable to outflows.[15] That is, the bond funds' flows are more sensitive to market returns than the stock funds' flows are. Among the bond funds, the government, corporate, and municipal bond funds show larger outflows for a given market decline than do the GNMA and high yield bond funds. The largest effect we find involves municipal bond funds, for which a fall of 1 percentage point in the market leads to unexpected outflows of 0.084 percent of these funds' net assets. For the stock funds, none of the estimated effects is statistically significant, but the point estimates suggest that income funds are more subject to outflows than growth and global stock funds. Investors seem to self-select in such a way that the more risk-averse ones are also more sensitive to short-term performance.

POSSIBLE BIASES

To the extent that our instrumental-variable estimates are still biased, the true effects would serve to strengthen our conclusions about the relationship between the funds' flow reactions and the apparent riskiness of their investment objectives. Although the standard statistical gauges suggest that our instruments are adequate, the instruments may still not be good enough to rule out biased estimates, which would tend to bring the instrumental-variable estimates closer to the OLS estimates. Interestingly, our comparison of the estimates suggests that when the estimated effects are relatively small, the true effects may be smaller still, and when

the estimated effects are relatively large, the true effects may be even larger (Table 6).

Recall that within the class of stock funds or bond funds, the funds with the riskier investment objectives show smaller flow reactions than the more conservative ones. At the same time, the instrumental-variable estimates for the growth and global stock funds are smaller than the OLS estimates, suggesting that the true effects may be even smaller than our measures indicate. For the income stock funds, the instrumental-variable estimates are larger than the OLS estimates, suggesting that the true effects may be even larger. For the GNMA and high yield bond funds, the estimates fall short of the OLS estimates, suggesting that the true effects may be even smaller, while the opposite holds true for the government, corporate, and municipal bond funds.

Mutual funds' fee structures may be one reason for the generally weak effects of short-term returns on funds' flows and for the relatively weaker effects of returns on the more aggressive mutual funds.

Fee Structures and Effects of Returns on Flows

As we noted earlier, the mutual funds' fee structures may be one reason for the generally weak effects of short-term returns on funds' flows and for the relatively weaker effects of returns on the more aggressive mutual funds. Although some fund groups discourage short-run redemptions by limiting the number of exchanges between funds within a calendar year, for the most part, funds seem to rely on loads and redemption fees to discourage fund investors from selling in the short run. In examining these issues, Ippolito (1992) finds that poor returns lead to smaller outflows from load funds than from no-load funds, while Chordia (1996) finds that aggressive funds are more likely to rely on these fees to discourage redemptions.

The Effect of Major Market Declines

To characterize the effects of market returns on mutual fund flows, it is important to examine whether large shocks have special effects. Our instrumental-variable analysis assumes that the effects on flows are proportional to the size of the shocks. We now assess this assumption by taking a closer look at mutual fund flows during five episodes of unusually severe market declines (Table 7).[16] We also look for evidence that the flows perpetuated the declines. The market declines were most pronounced in the bond market in April 1987 and February 1994, in the stock market in October 1987, in the stock and high yield bond markets in October 1989, and in the municipal bond market in November 1994.[17] Although these were the markets most affected, price movements in other markets also tended to be significant; therefore, we also take these markets into account. Finally, we examine whether the funds' investment managers tended to panic and thus exacerbate the selling in the markets.

The Bond Market Plunge of April 1987

In the spring of 1987, Japanese institutional investors pulled out of the U.S. stock and bond markets after the threat of a trade war between the United States and Japan precipitated a sharp dollar depreciation (*Economist* 1987). In April, government bond prices plunged an average of 2.3 percent, while stock prices and other bond prices also fell. Taking into account the decline in the government

Table 7
Effect of Major Market Declines on Mutual Fund Flows

Market	Episode	Size of Decline (Percentage of Net Assets)	Predicted Outflow (Percentage of Net Assets)	Actual Outflow (Percentage of Net Assets)
Government bond	April 1987	2.27	1.23	1.79
Growth stock	October 1987	37.67	1.13	4.58
Growth stock	October 1989	6.22	0.34	1.44
High yield bond	October 1989	1.59	1.34	2.94
Government bond	February 1994	2.07	0.85	0.91
Municipal bond	November 1994	1.43	1.25	1.44

Source: Authors' calculations.

bond and stock markets, our instrumental-variable estimates would have predicted unexpected outflows from government bond funds of 1.2 percent of net assets (Table 7). Actual unexpected outflows were 1.8 percent, much greater than predicted but still bearing little resemblance to a run. Although there is some evidence that the flows served to perpetuate the decline, the magnitudes were still too small for a self-sustaining decline. In May, the unexpected outflows from government bonds rose to 2.9 percent of net assets, while bond prices continued to fall. However, flows and prices recovered in June.

The Stock Market Break of October 1987

The largest single market decline in our sample was the stock market break of October 1987. The crash hit growth stocks the hardest, with prices falling an average of 37.7 percent in the month or about seven times their volatility. The Federal Reserve reacted by announcing a readiness to provide liquidity, and the bond market led a modest stock market recovery. On the basis of stock and bond price movements, we would have predicted unexpected outflows from growth stock funds of 1.1 percent of net assets. In fact, unexpected outflows were four times greater, 4.6 percent. Even so, the outflows were still quite manageable given the funds' liquidity levels, which averaged 9.4 percent of net assets. A moderation trend followed as unexpected outflows from growth stock funds abated in November and stock prices started to recover in December.

The Stock Market Decline of October 1989

The decline of October 1989 signaled the end of the leveraged buyout wave of the 1980s. Previously, stock prices of many companies had been boosted by premiums reflecting the possibility of future buyouts at favorable prices. Although the high yield bond market had been the main source of financing for the buyouts, it had been weakened by a series of defaults (*Economist* 1989). In October, the management of United Airlines turned to several international banks to finance their leveraged takeover of the airline. The deal failed when some of the banks refused. Many investors then realized that buyouts would no longer be as likely as they had thought. Takeover premiums vanished overnight, and prices of growth stocks fell by 6.2 percent during the month while those of high yield bonds fell by 1.6 percent. Our estimates would have predicted unexpected outflows of 0.3 percent of net assets from growth stock funds and 1.3 percent from high yield bond funds. The actual unexpected outflows were 1.4 percent and 2.9 percent, respectively—much greater than predicted but still far from constituting a run on mutual funds. The funds saw flows return in November.

The Bond Market Decline of February 1994

In February 1994, the Federal Reserve raised its target federal funds rate 25 basis points. The increase, the first in a series, was not altogether a surprise, but prices of government bonds still fell by about 2.1 percent. Stock prices also fell. Given these developments, we would have predicted unexpected outflows from government bond funds of 0.8 percent of net assets, an estimate that is close to the actual figure of 0.9 percent. Unexpected outflows rose in March and bond prices continued to decline, but the magnitudes remained unimpressive. Prices started to stabilize in April.

Faced with heavy redemptions and the possibility that current outflows could lead to more outflows in the near future, the fund managers took the reasonable step of adding to their liquid balances.

The Market Declines of November 1994

In November 1994, the Federal Reserve again raised its target federal funds rate—this time by 75 basis points, a larger increase than most investors had anticipated. In addition, the troubles of the Orange County municipal investment pool came to light later in the month. Stock

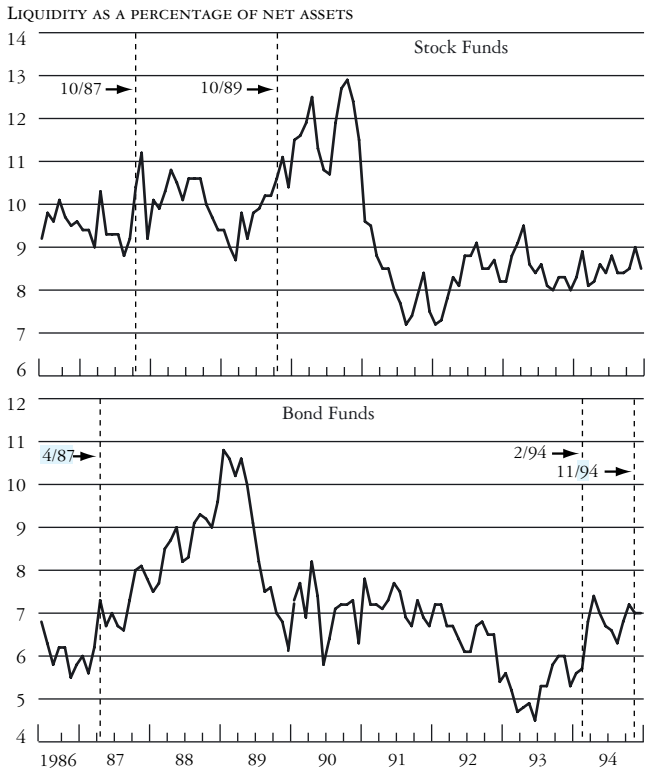
and bond markets experienced substantial declines, with municipal bond prices falling by 1.4 percent during the month. Taking these market movements into account, we would have predicted unexpected outflows from municipal bond funds of 1.2 percent of net assets, yet actual unexpected outflows were 1.4 percent. The inflows in December exceeded the outflows in November.

Fund Managers' Reactions

Fund managers may react sharply to abrupt market declines and thus could exacerbate the effects of the outflows. For instance, to meet redemptions, they may either draw on their funds' liquid balances or sell off portions of the portfolio. Or they may go further still by selling more securities than they need to meet the redemptions. Indeed, in four of the five episodes summarized, average liquidity ratios rose in the month of the market decline, indicating that the fund managers sold more than they needed to meet redemptions (Chart 7). In three episodes, the liquidity ratio continued to rise in the following month. Nevertheless, the reactions of fund managers fell well short of a panic. Faced with heavy redemptions and the possibility that current outflows could lead to more outflows in the near future, the fund managers took the reasonable step of adding to their liquid balances. Moreover, in the five episodes of market decline, the average liquidity ratio never rose by more than 2 percent of net assets and never exceeded the highest levels reached in periods without major market declines.

Chart 7

Market Declines and Mutual Fund Liquidity Ratios



Source: Investment Company Institute (1996).

Conclusion

Can the recent high monthly correlations between aggregate mutual fund flows and market returns be at least partially attributed to short-term market returns' strong effect on flows? If returns have such an effect on flows and flows also have a strong effect on returns, then the implied positive-feedback process may lead to a self-sustaining decline in asset prices. However, our instrumental-variable analysis suggests that, on average, the effects of short-term returns on mutual fund flows have been weak.

To the extent that the effects of returns on flows are present, they seem to be stronger for the funds with relatively conservative investment objectives, such as government bond funds and income stock funds, than for those with relatively risky objectives, such as growth stock funds, GNMA bond funds, and high yield bond funds. We also find that these effects have been stronger in certain episodes of major market declines, although still not strong enough to sustain a downward spiral in asset prices.

APPENDIX A: TYPES OF MUTUAL FUNDS BY INVESTMENT OBJECTIVE

Aggressive growth funds seek maximum capital appreciation; current dividend income is not a significant factor. Some funds invest in out-of-the-mainstream stocks, such as those of struggling companies or stocks of companies in new or temporarily out-of-favor industries. Some may also use specialized investment techniques, such as option writing or short-term trading.

Balanced funds generally try to achieve moderate long-term growth of capital, moderate income from dividend and/or interest payments, and moderate stability in an investor's principal. Balanced funds invest in a mixture of stocks, bonds, and money market instruments.

Corporate bond funds purchase primarily bonds of corporations based in the United States; they may also invest in other fixed-income securities, such as U.S. Treasury bonds.

Flexible portfolio funds generally invest in a variety of securities such as stocks, bonds, or money market instruments. They seek to capture market opportunities in each of these asset classes.

Global bond funds seek a high level of interest income by investing in the debt securities of companies and countries worldwide, including those of issuers in the United States.

Global equity funds seek capital appreciation by investing in securities traded worldwide, including those of issuers in the United States.

GNMA funds seek a high level of interest income by investing primarily in mortgage securities backed by the Government National Mortgage Association (GNMA).

Growth-and-income stock funds invest mainly in the common stock of companies that offer potentially increasing value as well as consistent dividend payments. Such funds attempt to provide investors with long-term capital growth and a steady stream of income.

Growth funds invest in the common stock of companies that offer potentially rising share prices. These funds aim to provide capital appreciation, rather than steady income.

High yield bond funds seek a high level of interest income by investing at least two-thirds of their assets in lower rated corporate bonds (rated Baa or lower by Moody's and BBB or lower by Standard and Poor's).

Income bond funds seek a high level of income by investing in a mixture of corporate and government bonds.

Income equity funds seek a high level of income by investing mainly in stocks of companies with a consistent history of dividend payments.

Income mixed funds seek a high level of interest and/or dividend income by investing in income-producing securities, including equities and debt instruments.

International equity funds seek capital appreciation by investing in equity securities of companies located outside the United States (these securities at all times represent two-thirds of the fund portfolios).

National municipal bond funds (long-term) seek dividend income by investing primarily in bonds issued by states and municipalities.

Precious metal funds seek capital appreciation by investing at least two-thirds of their fund assets in securities associated with gold, silver, and other precious metals.

State municipal bond funds (long-term) seek dividend income by investing primarily in bonds issued by states and by municipalities of one state.

Taxable money market mutual funds seek the highest income consistent with preserving investment principal. Examples of the securities these funds invest in include U.S.

Treasury bills, commercial paper of corporations, and large-denomination bank certificates of deposit.

Tax-exempt money market funds (national) seek the highest level of federal tax-free dividend income consistent with preserving investment principal. These funds invest in short-term municipal securities.

Tax-exempt money market funds (state) seek the highest level of federal tax-free dividend income consistent with preserving investment principal. These funds invest primarily in short-term municipal securities from one state.

U.S. government income funds seek income by investing in a variety of U.S. government securities, including Treasury bonds, federally guaranteed mortgage-backed securities, and other U.S.-government-backed issues.

APPENDIX B

VECTOR AUTOREGRESSION RESULTS FOR CURRENT MONTHLY MUTUAL FUND FLOWS

Fund Group	Constant	Lag 1	Lag 2	Lag 3	Time Trend	Adjusted R-Squared
Stock funds						
Growth	0.00082	0.191	0.077	0.230	0.000074	0.26
	(0.38)	(2.16)**	(0.87)	(2.64)**	(1.97)*	
Global equity	-0.00062	0.618	-0.058	0.184	0.000071	0.54
	(-0.22)	(6.87)**	(-0.56)	(2.12)**	(1.54)	
Income	0.00102	0.465	0.075	0.290	0.0000123	0.54
	(0.75)	(5.11)**	(0.75)	(3.23)**	(0.71)	
Bond funds						
Government	-0.00024	0.851	-0.130	0.162	0.000001	0.80
	(-0.144)	(9.04)**	(-1.05)	(1.75)*	(0.03)	
Corporate	0.001805	0.592	-0.039	0.238	0.000009	0.54
	(0.74)	(6.43)**	(-0.37)	(2.69)**	(0.30)	
GNMA	-0.00075	0.665	0.114	0.085	0.000010	0.71
	(-0.35)	(7.27)**	(1.03)	(1.03)	(0.34)	
High yield	0.00238	0.249	0.123	0.116	0.000044	0.12
	(0.64)	(2.63)**	(1.27)	(1.27)	(0.86)	
Municipal	0.00460	0.511	0.040	0.131	-0.000029	0.42
	(1.78)*	(5.43)**	(0.39)	(1.45)	(-0.93)	

Source: Authors' estimations.

Notes: Monthly flows into mutual funds over the July 1986–April 1996 period are computed as the sum of 1) total sales minus redemptions and 2) exchanges into a fund minus exchanges out of a fund. The flow into each group is divided by that fund's net asset value from the previous month. The fund groups are drawn from the Investment Company Institute (ICI) classification of mutual funds by objective. Some groups combine two ICI categories: growth stock funds includes growth and aggressive growth stock funds; global equity funds, global equity and international stock funds; income stock funds, equity income and growth-and-income stock funds; municipal funds, national and state municipal bond funds. The t-statistics are in parentheses.

* Significant at the 90 percent level.

** Significant at the 95 percent level.

APPENDIX C

INSTRUMENTAL VARIABLE REGRESSIONS

	Dependent Variable: Unexpected Flows as a Percentage of Assets							
	Stock Funds			Bond Funds				
Independent Variable	Growth	Income	Global Equity	Government	Corporate	Municipal	GNMA	High Yield
FUNDS' OWN MARKET								
Same-month excess return	0.006	0.016	0.010	0.033**	0.049**	0.084**	0.013	0.023
	(1.25)	(1.68)	(0.92)	(2.21)	(3.40)	(3.96)	(0.71)	(0.39)
Lagged excess return	-0.002	-0.001	-0.002	0.01*	-0.004	-0.009	0.018**	-0.007
	(-0.67)	(1.68)	(-0.67)	(1.80)	(-0.72)	(-0.98)	(2.57)	(-0.45)
Same-month conditional volatility	-0.081	0.001	0.045	-0.100	-0.005	-0.005	0.030	0.016
	(-0.33)	(-0.53)	(1.23)	(-1.64)	(0.06)	(-0.03)	(0.24)	(0.45)
Lagged conditional volatility	-0.040	0.001	-0.013	-0.001	0.029	0.001	0.084	-0.003
	(-0.23)	(1.44)	(-0.40)	(-1.64)	(0.35)	(0.52)	(0.66)	(-0.11)
ALTERNATIVE MARKET								
Same-month excess return	0.037**	-0.008	0.009	-0.004	0.001	0.000	0.002	0.009
	(2.18)	(0.83)	(0.34)	(-0.87)	(0.24)	(0.21)	(0.42)	(0.36)
Lagged excess return	-0.017**	0.003	0.005	-0.004	-0.004*	-0.002	-0.002	0.001
	(-2.61)	(-1.03)	(0.49)	(-0.19)	(-1.75)	(-0.81)	(-1.06)	(0.38)
Same-month conditional volatility	-0.042	-0.001	-0.178*	0.341	-0.207	-0.003	0.222	0.068
	(-0.62)	(-0.37)	(-1.67)	(1.58)	(-0.98)	(-1.21)	(0.82)	(0.11)
Lagged conditional volatility	-0.044	-0.000	-0.161*	0.274*	-0.148	-0.002	0.132	0.114
	(-0.64)	(-0.08)	(-1.67)	(1.79)	(-0.96)	(-1.15)	(0.67)	(0.29)
Adjusted R-squared	0.350	0.050	0.251	-0.070	0.460	0.370	0.180	0.280
F-statistic	3.060	1.170	1.882	3.670	6.350	4.840	2.980	1.740

Source: Authors' estimates.

Notes: The same-month returns are based on the following instruments: capacity utilization, the Federal Reserve's target federal funds rate, nonfarm employment, and the consumer price index. For stock funds, the alternative market is government bond funds. For bond funds, the alternative market is growth funds. The t-statistics are in parentheses.

* Significant at the 90 percent level.

** Significant at the 95 percent level.

APPENDIX D

REGRESSIONS BASED ON WARTHER'S EXPLANATORY VARIABLES

	Dependent Variable: Unexpected Flows as a Percentage of Assets							
	Growth Stock Funds				Government Bond Funds			
Independent Variable	Ordinary Least Squares Regressions		Instrumental-Variable Regressions		Ordinary Least Squares Regressions		Instrumental-Variable Regressions	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
FUNDS' OWN MARKET								
Same-month excess return	0.012**	0.012**	0.011**	0.011**	0.017**	0.017**	0.029**	0.029**
	(11.51)	(11.38)	(3.73)	(3.55)	(4.25)	(4.27)	(3.16)	(3.15)
Excess return lagged one month	-0.003**	-0.003**	-0.003**	-0.003**	0.012**	0.012**	0.009*	0.010**
	(-2.99)	(-2.99)	(-2.39)	(-2.36)	(2.88)	(2.96)	(1.97)	(2.11)
Excess return lagged two months	-0.001	-0.001	-0.001	-0.001	-0.001	0.000	0.002	0.001
	(-0.68)	(-0.58)	(-0.73)	(-0.63)	(0.14)	(-0.01)	(0.41)	(0.24)
Excess return lagged three months		0.000		-0.001		-0.004		0.004
		(-0.43)		(-0.51)		(0.94)		(0.98)
Adjusted R-squared	0.538	0.535	0.534	0.529	0.209	0.208	0.141	0.149
F-statistic	45.240	33.730	5.711	4.474	11.048	8.497	7.972	6.147

Source: Authors' calculations.

Notes: The ordinary least squares regressions use the same explanatory variables as in Warther (1995). The instrumental-variable regressions also use the same variables as in Warther, but include instruments for the same-month excess returns. For the instrumental-variable regressions, the same-month returns are based on the following instruments: capacity utilization, the Federal Reserve's target federal funds rate, nonfarm employment, and the consumer price index. The t-statistics are in parentheses.
* Significant at the 90 percent level.
** Significant at the 95 percent level.

ENDNOTES

The authors thank Richard Cantor, John Clark, and Tony Rodrigues for helpful discussions. William May and Dan Nickolich provided valuable contributions at an early stage of our research.

1. The large mutual fund flows have caught the attention of the financial press. For example, see *Economist* (1995), Norris (1996), and Gasparino (1996).

2. The Internal Revenue Code of 1954 treats a mutual fund's shareholders as investors who directly hold the securities in the fund's portfolio. To maintain their status as tax-exempt conduits, the funds must satisfy certain standards for diversification and sources of income.

3. These statistics were provided by the Investment Company Institute. They are available upon request from the ICI.

4. Investors may have seen such a market in 1973 and 1974, when the stock market fell an average of 23.3 percent a year. Mutual funds apparently saw heavy outflows from 1972 to 1979 (based on an ICI data series that was discontinued in 1983). In addition, Shiller (1984) cites a decline in the number of investment clubs from a peak of 14,102 in 1970 to 3,642 in 1980.

5. Although the flow data are available from January 1984 on, our sample period does not begin until two and a half years later, when full data on market returns become available.

6. Alternatively, we could have controlled for the time trend at a later stage of the analysis, but the conclusions would have remained unchanged. In the analysis, we regress flows on measures of excess returns. Since these returns are uncorrelated with the time trend, excluding the trend from this later regression does not result in an omitted variable bias.

7. Statistically, we can define these unexpected flows as a stationary process that allows us to draw the appropriate inferences from regression estimates. More specifically, augmented Dickey-Fuller tests reject the presence of a unit root.

8. Lee, Shleifer, and Thaler (1991), for example, consider mutual fund flows and discounts on closed-end funds as measures of investor sentiment. However, Warther (1995) finds no correlation between such flows and discounts.

9. For a good textbook treatment of the use of instrumental variables, see Davidson and MacKinnon (1993, pp. 622-51).

10. The literature on the effects of macroeconomic variables on the stock and bond markets is extensive. See Fleming and Remolona (1997) for a survey.

11. Because of correlation among the instruments, some coefficients in the first-stage regression are individually not statistically significant. The significant coefficients have the expected signs (as discussed in Fleming and Remolona [1997], for example). We did not exclude the insignificant instruments, however, because our tests showed them to be jointly significant.

12. See Nelson and Startz (1990), Bound, Jaeger, and Baker (1993), and Staiger and Stock (1994) for discussions of the uses and limitations of instrumental variables.

13. More specifically, the conditional volatilities are based on an estimated generalized autoregressive conditional heteroskedastic (GARCH) process.

14. We report OLS and instrumental-variable regressions in Appendix D to show that the extra lag does not contribute explanatory power, while the volatilities and other-market returns serve to strengthen the measured short-term effects of own-market returns on flows.

15. Note that the more conservative funds also exhibit less volatile flows.

16. We also tried to test this assumption econometrically by including variables representing returns that are more than a standard deviation from either side of the mean. We found that these variables contributed no significant explanatory power. There were relatively few large shocks, and their effects were apparently too different to be captured statistically. We also tried to test the possibility of asymmetric effects by including variables representing only negative returns. Again, we found that these variables contributed no significant explanatory power.

17. Marcis, West, and Leonard-Chambers (1995) also look at mutual fund flows during market disruptions in 1994 and come to conclusions similar to ours.

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