Title: PERVERSE TIMING OR BIASED COEFFICIENTS?

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ABSTRACT
The aim of this work is to introduce the flow's influence in market timing models, thus providing unbiased timing coefficients. This analysis is motivated by the widely studied relationship between flows and market returns. When analyzing this relation we take previous and concurrent market returns, but, unlike previous studies, we do not consider future returns since investors do not observe them when makes decisions on moving their money; we better consider expected market returns.
We construct the expected market returns by running an AR model and considering the previous public information about the macro-economy.
That relation is analyzed under different conditions: considering different flow measures and considering (or not) the different sensitivity of flows to positive and negative market returns.
We also propose different controls for the traditional timing models and we further analyze the reverse-causality problem.
The paper demonstrates, for a sample of equity mutual funds registered for sale in the USA, that the poor market timing performance found in this and other previous studies, can be completely attributed to the perverse effect of the fund managers' liquidity service.

KEYWORDS: Flows – Market Timing – Mutual Funds

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1. INTRODUCTION

Academics and professionals have tried for years to answer the question of whether professional managers have the ability to time the market. The investing public's interest in identifying successful managers is understandable, especially in light of mounting evidence that the returns of most actively managed funds are lower than index fund returns. From an academic perspective, the goal of identifying superior fund managers is interesting because it challenges the efficient market hypothesis.

Treynor and Mazuy (1966, after TM) develop the first test of market timing for mutual funds from the standard CAPM framework. They add a quadratic term to the CAPM equation, leading to a nonlinear relation between a portfolio's return and the market return. They show that fund managers possess market timing ability if they forecast the market, so they will hold a greater proportion of the market portfolio if they forecast high market returns and a smaller proportion when they expect the market return to be low.

Merton (1981) and Merton and Henriksson (1981, after MH) derive two new approaches to examine market timing abilities of fund managers: (i) a parametric test for the usual case of having access only to the time series of realized returns on a managed portfolio, and (ii) a non-parametric procedure for testing market-timing ability when the forecasts are directly observable. In their model, the portfolio manager allocates funds between cash and equities based on predictions of the future market return.

A market timing ability is, therefore, the fund manager's ability to obtain returns by changing the portfolio's exposure to the market at the right moment; i.e., to anticipate market movements. This ability is therefore a performance-enhancing strategy that adjusts fund beta based on the manager's market return forecast.

Market timing studies provide mixed evidence that fund managers possess market timing abilities. In this way, some authors deny the presence of market timing, or find negative timing ability. This is the case of Lee (1999), Fung et al. (2002), Schmidt et al. (2004), Boney et al. (2005), Christensen (2005), Woodward & Brooks (2006), Abdel-Kader & Qing (2007) and Elton et al. (2009), among other authors.

However, other scholars, including Busse (1999), Bollen and Busse (2001), Laplante (2003), Jiang et al. (2005), Glassman & Riddick (2006), Jiang et al. (2007), Amman & Zingg (2008), Neuhierl & Schlusche (2009), Raju & Rao (2009) or Chen et al (2010), find positive empirical evidence for market timing ability.

Strangely, existing studies generally find little evidence of market timing, which has led to many studies aiming to discover the reasons. One of these is exposed in Bollen and Busse (2001), who indicate that it might be due to frequency data, and they demonstrate empirically that daily data provide different inference than monthly data, increasing the explanatory power of existing market timing models.

Other authors, in their attempt to explain the unsatisfactory timing performance found, have appointed several biases in traditional timing TM and MH models as possible sources of spurious timing ability. Some of them have tried to seek for a solution, the most known being led by Ferson and Schadt (1996), who extend the unconditional timing measures of TM and MH to a conditional performance framework. The conditional performance framework allows for time variation in the fund betas and factor risk premiums due to public information. Market timing strategies that use public information will not be rewarded within the conditional framework. Ferson and Schadt find that, the inferior timing performance by US mutual funds disappears using the conditional timing measures. However, other authors as Chen and Liang (2005) find that conditional models cannot explain the negative performance of mutual funds.

Another possible source of spurious timing ability is the cash-flow hypothesis described in Warther (1995), Ferson and Warther (1996) and Edelen (1999). In this sense, the relation between fund and market returns with cash-flows into a mutual fund has been large studied. Various measures have been employed to determine fund flows; a very common one is defined as the net change in fund assets beyond reinvested dividends, as in Sirri and Tufano (1998), Renneboog et al (2006) or Benson and Humphrey (2007). This definition of the fund flow reflects the percentage growth of a fund that is due to new investments. Other definitions, in Del Guercio and Tkac (2002), only consider net manager flows, defined as the annual change in total net assets minus appreciation in the funds assets. In a further step, Lou (2008), following the prior study of Chevalier and Ellison (1997), include, in the flows measure, the increase in TNA (Total Net Assets) due to a fund merger.

Ippolito (1992), Hendricks et al (1993) or Sirri and Tufano (1998) find that investors tend to move cash into the funds that had the highest returns in the preceding year.

Ippolito (1992) uses annual data to show that investors react to individual fund performance, investing into funds that have performed well in the recent past and disinvesting in poor performance funds. Hendricks et al (1993) and Sirri and Tufano (1998) also find that money flows into best performance funds in the previous year, but does not flow out of worst performance funds.

Warther (1995) finds that aggregate security returns are highly correlated with concurrent unexpected cash flows into mutual funds, but unrelated to concurrent expected flows. This author also proves that if liquidity-motivated demands affect the market price, then aggregate fund flow is positively correlated with subsequent market returns, leading to a positive concurrent monthly correlation; and if flow is positively correlated with same day and/or previous day returns, then the flow is potentially positively correlated with subsequent market returns, giving rise to negative market timing.

Edelen (1999) documents a statistically significant indirect cost in the form of a negative relation between a fund's abnormal return and investor flows. Controlling for this indirect cost of liquidity changes the average fund's abnormal return and also fully explains the negative market-timing performance found in the studies of mutual fund returns. So this author attributes the common finding of negative return performance at open-end mutual funds to the costs of liquidity-motivated trading.

The author introduces the flow's influence in market timing models, controlling for the effect of flow on market timing[4] and providing unbiased timing coefficients.

Edelen and Warner (1999) consider the relation between market returns and unexpected aggregate flow into U.S. equity funds. The flow-return relation is concurrent and past, because flow also follows past returns with a one-day lag. The lagged effect indicates either a common response of both returns and flow to new information, or positive feedback trading.

Subsequently, Edelen and Warner (2001) revise the relation between market returns and concurrent aggregate flow into U.S. equity funds, finding the same results as previously.

Froot et al (2001) and Ko and Kim (2003) investigate the relation between international mutual fund flow and local market returns, confirming that concurrent

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[4] The analysis of market timing ability through flows' influence is also analysed in Schmidt et al (2004), although this study develops new market timing measures, based on investment and divestment periods, to evaluate this ability in venture capital funds.

local market return explain the international mutual fund flow. Nevertheless, in this work, the lagged local market returns do not have any significant effect on the flow, implying that no positive-feedback trading exists. Last, the U.S. market factor explains the local return after controlling for the effects of expected and unexpected fund flows.

Boyer and Zheng (2009) examine contemporaneous and past relation between stock market returns and flows of mutual funds and foreign investors, finding a positive contemporaneous relation between them.

On the other hand, Humphrey et al (2009) study the relation between macro-level fund flow and market, finding evidence of a contemporaneous relation between flow and market return for retail funds but not for institutional funds.

Bollen (2007) studies the case of cash flows in socially responsible mutual funds, finding strong evidence that cash flows into socially responsible funds are more sensitive to lagged positive returns than cash flows into conventional funds, and weaker evidence that cash outflows from socially responsible funds are less sensitive to lagged negative returns.

In the same line, Renneboog et al (2011) study the money flows into and out of socially responsible investment (SRI) funds around the world. They notice that SRI money flows are less related to past fund returns than conventional fund flows. However, money flows into funds with environmental screens are more sensitive to past positive returns than conventional fund flows. Finally, these authors find that stock picking based on in-house SRI research increases the money flows.

In this paper we analyze in depth the impact of mutual fund flows on the market timing ability of mutual fund managers. For this purpose we take as starting point the works by Warther (1995) and Edelen (1999) and try to contribute to the literature by extending several points of the aforementioned papers. In particular, we study the influence of inflows and outflows separately in TM and MH models and also the influence of net inflows to account for flows crossing with others of the opposite sign. Furthermore, we also use an interactive term with flow lagged one month to avoid a spurious positive covariance between flow and market returns due to reverse causality within the month; nevertheless, we first check if an increase in market returns leads to inflows and a market return's decrease causes outflows, as Bollen and Busse (2001) indicate. Moreover, we analyze whether the investor observe the concurrent, past or future expected market return (the latter is built from a prediction model) when deciding to move his money. However, as the sensitivity of the investor to positive and negative market returns could be different, we introduce two indicator variables in our analyses to capture this potential convex flow-return relation.

Other difference of this paper in relation with Warther (1995) and Edelen (1999) is the computation of fund flows; we use the TNA, as Sirri and Tufano (1998), Benson and Humphrey (2007) or Renneboog et al. (2011), whilst they use the trading information (purchases and sales).

In order to conduct our analysis we take a domestic US equity mutual fund sample, coming from January 1994 through September 2010.

The organization of the paper is as follows. Section 2 develops the preceding arguments more fully. Section 3 briefly describes the US mutual fund market and outlines the data used in the study. Section 4 examines the empirical relation between mutual fund flows and market returns. Section 5 analyzes the relation between flow and market timing performance measures. Section 6 concludes the study.

2. ARGUMENT

Bollen and Busse (2001) suggest that we might bias timing coefficients downwards, even to negative levels, because when market returns are high, investors increase subscriptions to mutual funds, resulting in a temporarily larger cash position and a lower fund beta. However, the cash-flow biases timing coefficients downwards but not upwards:

In the opposite case, when market declines, we expect fund redemptions to increase, and a consequent increase in beta, since cash reverse become depleted, which serves to bias the timing coefficient downwards again, so in times of negative market excess returns, we expect fund returns to be lower than they would be without the redemptions, hence this forces the timing coefficient to be lower than it would be otherwise.

This cash flow hypothesis postulates that the general market timing results may underestimate the true ability of fund managers.

Ferson and Schadt (1996) also display that under certain conditions, flows are associated with negative market timing in fund returns, thus, market timing studies without considering flow might be biased in a negative way. In addition, as flow affects the funds' beta at the wrong time, these authors add a conditional benchmark that takes into account the induced time-variation in the fund's expected returns.

Other authors appoint that mutual funds' perverse timing performance is because the funds' open-ended nature. While fund managers try to time the market, investors attempt at timing the mutual funds. Only if investors' money flows in prior to market ascendancy or flows out prior to market descent, investor flows will offset the fund managers' market timing endeavour (Jiang, 2003).

From this point of view, market mis-timing of mutual funds constitutes a price that investors have to pay for the liquidity that they enjoy with open-end funds.

In this sense, Edelen (1999) points out two relevant intervals in the setting of a single-risky-security model: the time between the flow and signal realizations and trade, and the time between trade and the payoff to the risky security. The return over the first interval is affected by aggregate liquidity-motivated trading and by aggregate information as to the final payoff, as these two factors determine the equilibrium price at the time of trade. Moreover, considering a market basket of all stocks as the single risky security, Edelen concludes that flow induces a negative market timing effect if it is positively correlated either with the aggregate liquidity-motivated trading in the market or with the aggregate information regarding the final payoff on the market in the subsequent round of trading. Furthermore, Edelen indicates that since a fund manager who realizes a flow shock cannot regain a fully invested position until after trading, flow induces negative market timing in the first period.

Specifically, to solve this problem, Edelen (1999) adds a new term to the traditional timing TM and MH models to control for the fund flow effect: the estimated flow-trading response coefficient (it is estimated from the regression of trading activity – fund purchases and sales – on fund flows) times the sum of gross inflows and outflows, where flows are either concurrent with returns or lagged one month.

On the other hand, Warther (1995) points out that the strong positive correlation between aggregate flow and monthly market returns found in his paper can arise because high-frequency returns are correlated with subsequent high-frequency flow. Since market returns exhibit positive one-day autocorrelation, if flow is positively correlated with same-day and/or previous-day returns, then flow is potentially positively correlated with subsequent market returns, giving rise to negative market timing.

Given this evidence, negative market timing resulting from flow is conceivable for either of the two aforementioned reasons.

In this work, we also control timing models for fund flows but first, since the impact of flows on market timing is due to the correlation between flows and market return, we analyse this relation. In this sense, we run three regressions; in one of them the dependent variable is fund inflows, in other we use outflows as dependent variable and in the third one the net inflows are considered. In all regressions, as in Warther (1995), the explanatory variables are monthly lagged and concurrent market returns. However we don't include the subsequent market returns as explanatory variables like Warther, because we take it that cash-flows depend on the lagged and concurrent market returns but not on the subsequent market returns, since this latter variable is unknown by the investor at the time of moving his money, so we better replace the subsequent market returns with the expected ones in the future. We compute the expected market returns by regressing market return in a certain period on the lagged market returns and also on several lagged public information variables about the macro-economy, as we believe these latter variables also affect expected market returns. This idea is consistent with Ferson and Schadt (1996), who use a conditional benchmark, shown in Ferson and Warther (1996), to control for a relation between aggregate fund flows and time-varying expected returns.

To develop our study, in a first step we examine what the true relation (lead, lag or concurrent) is between inflows/outflows/net inflows and market returns, and whether this relation exists, since only if it does, the control of timing models for fund flows makes sense (notice that we take the idea of Bollen and Busse (2001) and consider that an increase in market return leads to inflows whilst a fall leads to outflows). Moreover, as commented before, in order to go into this relation in any depth, we distinguish between positive and negative market returns of the purpose of analyzing the convexity of the flow-return relation.

This prior analysis should allow us to know if we must control timing models for inflows and/or outflows and/or net flows. This preliminary analysis constitutes a contribution to the literature.

Later on, in a second step, as in Edelen (1999), we control timing models for fund flows (concurrent and lagged one month, this latter to account for the reverse causality exposed by Edelen, 1999) taking into account the results found in the first step; however, in this work we explicitly correct the market timing models (TM and MH) by inflows, outflows and net flows separately, unlike in previous studies. Another contribution of our paper is that we are the first to analyze the impact of the past, concurrent and expected market returns in flows' evolution, separately in inflows, outflows and net flows. Additionally, we measure the potentially different effect on the market timing of the sensitivity of flows to positive and negative market returns.

3. DATA

3.1. Brief description of the US mutual fund market.[5]

The United States is the world leader in terms of fund investment, with 12,164 Billions of Dollars in 2009, divided into mutual funds ($11,121 Billions), closed-end funds ($228 Billions), ETFs ($777 Billions) and UITs ($38 Billions). Note that the greatest investment is in mutual funds, representing more than 90 percent of the total.

The U.S. mutual fund industry remained the largest in the world at year-end 2009, accounting for 48 percent of the $23.0 trillion in mutual fund assets worldwide. The total net assets increased $1.5 trillion from year-end 2008's level. Thereby, mutual funds have experienced a large growth, as we observe in graph 1, from $2,811 billion of assets under management in 1995 to $11,121 billion in 2009, reaching a peak of $12,001 billion in 2007. Similarly, the number of mutual funds has increased from 5,761 in 1995 to 8,624 in 2009. And the number of shareholder accounts has risen from 61 millions in 1990 to over 270 millions in 2009.

[INSERT GRAPH 1 HERE]

USA mutual funds could be divided into several types according to their time investment objective. In the long-term, we find equity, bond and hybrid mutual funds; and in the short-term, investors use money market funds, because they provide a high degree of liquidity and competitive short-term yields. However, as can be seen in figure 1, equity funds are the most important investment vehicle in the American mutual fund industry (except in 2008 when money market funds surpassed them, possibly due to mistrust in Markets following the financial crisis).

[INSERT FIGURE 1 HERE]

[5] Data obtained from the Investment Company Institute (ICI): Investment Company Fact Book 50th edition, 2010.

Equity funds made up over 44 percent of U.S. mutual fund assets at year-end 2009. This percentage can be broken down as follows: Domestic equity funds held 33 percent of total industry assets, and international equity funds accounted for another 11 percent. Money market funds accounted for 30 percent of U.S. mutual fund assets. Bond funds (20 percent) and hybrid funds (6 percent) held the remainder of total U.S. mutual fund assets.

On the other hand, investor demand for mutual funds declined in 2009 with net withdrawals from all types of mutual funds amounting to $150 billion. Nevertheless, shareholders reinvested $151 billion of income dividends and $14 billion in capital gain distributions that mutual funds paid out during the year. Although the $150 billion net outflow in 2009 was the largest on record in dollar terms, as a percentage of the average market value of assets, it amounted to only 1.4 percent, smaller than the $23 billion outflow in 1988, which measured 2.8 percent of average assets. Additionally, investor demand for certain types of mutual funds was driven in large part by the interest rate environment and continued uncertainty regarding the strength of the economic recovery. Money market funds, particularly those geared towards U.S. government securities, experienced substantial outflows, while inflows to bond funds reached a record high.

Regarding equity funds, which are the focus of our study, investors continued to withdraw cash from them —particularly domestic equity funds—in 2009, albeit less than in 2008. In 2009, withdrawals amounted to $9 billion for the year, far less than the $234 billion investors withdrew, on net, the previous year. As we observe in figure 2, the demand for USA equity funds reflects performance in the stock markets, so net flows to equity funds tend to rise with stock prices and the opposite occurs when stock prices fall.

[INSERT FIGURE 2 HERE]

Approximately 600 sponsors managed mutual fund assets in the United States in 2009. Long-run competitive dynamics have prevented any single firm or group of firms from dominating the market. For example, of the largest 25 fund complexes in 1985, only 10 remained in this top group in 2009, which indicates an industry un-concentrated. However, in the past decade, the percentage of industry assets at larger fund complexes has increased. This is due in part to the acquisition of smaller fund complexes by larger ones. The share of assets managed by the largest 25 firms increased to 74 percent in 2009 from 68 percent in 2000.

Ownership of mutual funds has grown significantly in the past 30 years. Forty-three percent of all U.S. households owned mutual funds in 2009, compared with less than 6 percent in 1980. The estimated 87 million individuals who owned mutual funds in 2009 included many different types of people across all ages and income groups with a variety of financial goals. These investors purchase and sell mutual funds through four principal sources: professional financial advisers (e.g., full-service brokers, independent financial planners), employer-sponsored retirement plans, fund companies directly, and fund supermarkets.

3.2. The sample

Monthly data on USA mutual funds come from Thomson Reuters. The data base comprises the monthly returns and the monthly TNA (Total Net Assets) on all of the mutual funds with an "Equity North America" investment vocation registered for sale in the United States (a total of 9580) in the period from January 1994 to September 2010. All of the funds included in the sample were required to present data for at least 36 months to ensure the consistency of the analyses. Our database is free of survivorship bias as all the domestic equity mutual funds existing at some point during the analysed period are considered.

In accordance with the procedure of Chevalier and Ellison (1997) and Bollen (2007), to be included in the analysis an observation of fund flow must be from a fund with at least $10,000,000 of total net assets in the two successive months used to compute the flow. This eliminates extremely small funds which may exhibit explosive growth and distort the results

Moreover, to reduce the effect of outliers, following Bollen (2007) we exclude observations of fund flow below -90 percent or above 1,000 percent in order to avoid the presence of outliers that might be influencing the results.

The excess returns are net of the monthly return of investing in a Treasury bill with maturity equal to three months. We use the MSCI-North America Index as a proxy for the Market.

Table 1 records the cross-sectional characteristics of USA equity funds and the summary statistics of our sample. We identify the mutual fund's nationality by the country where the funds are sold (sometimes it does not match up with the legal domicile). Panel A reports the number of funds, the number of fund management companies, the average age (years since funds' inception), and the average and total assets under management (AUM) in million $ for USA equity mutual funds at the end of September 2010. The total number of funds (9,580) is handled by 524 management companies. The USA equity fund industry is relatively young, presenting an average age of 7.7 years (1,016 funds are not considered in this computation because they started before our time period). The average size for fund is $547 million and the total AUM handled by all funds adds up to more than $5.2 trillion.

Panel B reports the average and standard deviation of the monthly money flows measured as the rate of change in the fund AUM beyond asset appreciation; the monthly returns; the flow volatility, which we measure over 12-month rolling windows; the return volatility, which is the standard deviation of returns over 12-month rolling windows; the fund size, which is the natural logarithm of fund assets in $. We compute the statistics over time and across funds. This panel shows that the USA equity funds record an average return (net of fees) around 0.5%; the average monthly growth rate is 4.1 %, and the flows experience a considerable volatility; finally the average fund size is $46.589 million.

[INSERT TABLE 1 HERE]

Table 2 reports the characteristics of flows. Panel A provides the sample statistics of inflows, outflows, cash turnover (the minimum of the inflow over the month and the outflow, annualized) and net inflows (the month's inflow minus outflow, annualized). Panel B shows the coefficient estimates of inflows, outflows, cash turnover and net inflows from an AR(1) model. Finally, Panel C reports the average regression statistics across funds obtained from regressions of each fund inflow/outflow on concurrent aggregate inflows/outflows.

[INSERT TABLE 2 HERE]

Note that the average fund experiences a major volume of inflow than outflow over the course of a year. Close to one-sixth of the average and median fund's assets are redeemed in the course of a year, and over one-half of the average and median fund's assets arrived as new inflow in the previous year. In the average (median) one-year period, 29% (16%) of the dollars invested in the fund enter and leave within the year. Thus, the typical fund experiences a material volume of both inflow and outflow. Further, there is substantial time-series volatility in that the time-series standard deviation of the annual rate of net inflow is 52%. Note also that there is substantial variation across funds in the average rate of net inflow (the standard deviation across funds is over 50%). We hardly observe any autocorrelations in flows, with outflow being the more persistent process (monthly autocorrelation equal to 0.26). Finally, note that there is a market-wide component to flow (especially to inflow), but most of the time-series variation in flow is idiosyncratic in nature (the average correlation between an individual-fund's flow volume and aggregate flows is about 45%).

Graph 2 shows the aggregate fund flow for the funds. This figure depicts the growth of the industry analyzed here: dollar fund flow is aggregated across funds, and this is divided by the beginning-of-year total net assets aggregated across funds. It presents a great time variation in fund flow, dominating a downward trend. There is a notable down between years 1994 and 1995 and more marked between years 1996 and 2002. A lighter down is also recorded in years 2006-2008. In periods 1995-1996 and 2002-2006 there is an upward trend. In years 2002 and 2008 the aggregate fund flow is negative but after that there is a recovery.

[INSERT GRAPH 2 HERE]

4. MUTUAL FUND FLOWS AND MARKET RETURNS

The aim of this paper is to control the market timing models of TM and MH for fund flows given that, as documented by literature, assessing fund managers' market-timing ability without considering flow can result in negatively biased inferences (when market returns are high, investors increase subscriptions to mutual funds, resulting in a temporarily larger cash position and a lower fund beta; when market declines we might expect fund redemptions to increase, resulting in a higher fund beta. In both cases the timing coefficient will be biased downwards). However this argument is only valid if there is indeed a correlation between flows and market return. So, in this section we check this relationship.

For this purpose, we regress separately the fund inflows, outflows and net flows (this latter in order to avoid flows crossing with others of opposite sign) on the monthly lagged, concurrent and expected market returns, because we hypothesize that the investor might consider either the past market returns, the concurrent ones, or the expected ones when deciding to move the money in or out the fund. Furthermore, since investor sensitivity to positive market returns could be different from his sensitivity to negative ones, we include two indicator variables when analyzing the market return-flow relation in order to account for a possible convexity in the relationship.

Then, the first step is to compute the expected market returns and we consider them to be influenced by lagged market returns and by several lagged public information variables. As public information variables affecting USA market returns we consider the same as in Ferson and Schadt (1996): the lagged level of the one-month Treasury bill yield (it is 30-day annualized); the lagged dividend yield of the MSCI USA value-weighted stock index (it is calculated as the price level at the end of the previous month on the MSCI North-America value-weighted index divided into the previous 12 months of dividend payments for the index); a lagged measure of the slope of the term structure (it is a constant-maturity 10-year Treasury bond yield less the 3-month Treasury bill yield); a lagged quality spread in the corporate bond market (it is Moody's BAA-rated corporate bond yield less the AAA-rated corporate bond yield); and a dummy variable for the month of January.

In order to know how many lags (p) we need to consider for computing the expected market return of month t+1 we run an autoregressive model of order p[6]:

$$Exp(R_{m,t+1}) = \sum_{j=1}^{p} \varphi_j R_{m,t+1-j} + \varepsilon_{t+1} \qquad [1]$$

Where $Exp(R_{m,t+1})$ is the expected market return at month t+1; φ_j are the parameters of the model; $R_{m,t+1-j}$ is the realized market return at month t+1-j; and ε_{t+1} is the forecast error and it is a white noise with zero mean and variance σ_ε^2.

Second we introduce the lagged public information variables (we consider the same number of lags as those obtained with the AR as we believe if the manager

[6] The generalized LaGrange multiplier test of Godfrey (1978) and Breusch (1978) is used to check for the presence of first-order autocorrelation in the residuals.

observes the market return for the p previous months to construct his expectation at period t, it is logical that he will also consider the public information for the same previous months):

$$Exp(R_{m,t+1}) = \sum_{j=1}^{p} \varphi_j R_{m,t+1-j} + \sum_{j=1}^{p} z_{t+1-j} + \varepsilon_{t+1} \qquad [2]$$

Where z_{t+1-j} is a vector of the public information variables at time t+1-j.

From equation [1] we obtain that the expected return on the market at month t+1 depends on the lagged returns registered during the eight previous months. So we introduce the eight lags of market return and the eight lags of public information variables in equation [2] and we notice that all the coefficients hold significant. However if we introduce a ninth lag of market return and of public information variables, this lag turns out insignificant[7].

Once we know the number of lags used by the investor to predict the future market returns, the next step is to run the regressions of fund inflows/outflows/net flows on the lagged, concurrent and expected market returns.

To do this, we must first define mutual fund flows (following Sirri and Tufano, 1998):

$$F_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1} \times (1 + R_{i,t})}{TNA_{i,t-1}} \qquad [3]$$

Where $F_{i,t}$ is the mutual fund flow and reflects the percentage growth of the fund i at time t in excess of the growth that would have occurred had no new funds flowed in and had all dividends been reinvested. Thus, if $F_{i,t}$ is positive the fund i has registered inflows at time t and if it is negative, money has flowed out the fund i at time t; $TNA_{i,t}$ is fund's i total net assets or the dollar value of all assets outstanding at time t; and $R_{i,t}$ is the fund's return over the prior year . In order to eliminate the impact of fund fees and investors' transaction costs on money flows, we do not consider load fees when computing the flows.

The regression of fund inflows/outflows/net flows on the concurrent, lagged and future expected market return is conducted separately for inflows, outflows and for net

[7] Table showing these results is available upon request.

flows. We need to know the number of lags and the number of the months ahead t to be considered for the lagged and expected market returns. To do that we proceed by introducing as much lagged and future expected variables as result significant:

$$F_{i,t} = \alpha_i + \beta_i R_{m,t} + \sum_{k=1}^{n} \delta_k R_{m,t-k} + \sum_{l=1}^{n} \Delta_l \, Exp\left(R_{m,t+l}\right) + \varepsilon_{i,t} \qquad [4]$$

Where F_{it} is inflows, outflows or net flows; $R_{m,t}$ is the concurrent market return; $R_{m,t-k}$ is the k-lagged market return; $Exp(R_{m,t+l})$ is the expected market return l months ahead; α_i, β_i, δ_k and Δ_l are the parameters of the model.

Furthermore, in order to consider the potential different sensitivity of mutual fund flows to positive and negative market returns, we introduce in equation [4] two indicator variables:

$$F_{i,t} = \alpha_i + (\beta_1 R^+ + \beta_2 R^-) R_{m,t} + R^+ \sum_{j=1}^{n} \zeta_j R_{m,t-j} + R^- \sum_{k=1}^{n} \vartheta_k R_{m,t-k}$$
$$+ R^+ \sum_{l=1}^{n} \eta_l R_{m,t+l} + R^- \sum_{q=1}^{n} \Theta_q R_{m,t+q} \qquad [5]$$

Where R+ and R- are indicator variables that equal one if the market return is non-negative or negative, respectively; β_1 captures the sensitivity of flows to positive concurrent market returns; β_2 captures the sensitivity of flows to negative concurrent market returns; ζ_j captures the sensitivity of flows to positive j-lagged market returns; ϑ_k captures the sensitivity of flows to negative k-lagged market returns; η_l captures the sensitivity of flows to positive expected market returns l months ahead; and Θ_q captures the sensitivity of flows to negative expected market returns q months ahead.

The purpose of conducting all these regressions, is to know if fund flows are really determined by positive or negative concurrent market returns, by positive or negative lagged market returns (and the number of lags considered by the manager when deciding to move the money), by positive or negative expected market returns (and the number of months ahead considered by the manager to make his decision on flows), or by none of them. This point is important because if the last scenario holds, then the control of market timing models for the mutual fund flows would not make sense since we base our study on the hypothesis by Bollen and Busse (2001) who argue that market timing models are biased downwards if we don't take into account the flows and that these flows appear as a consequence of the market decline or rise.

We first estimate coefficients of regressions in [4] and [5] by applying the Ordinary Least Squares (OLS) estimating method; however, in spite of the high significance found in parameters, the sign of some of these is strange[8]. Even after excluding observations of fund flow below –90 percent or above 1,000 percent, analysis of the regression residuals suggests the presence of outliers that might be influencing the results. Both the Jarque-Bera and Kolmogorov-Smirnov tests for normality reject the null hypothesis that the residuals are Gaussian. To ensure that the conclusions are robust to the presence of outliers, we estimate coefficients of the regressions in [4] and [5] by minimizing the sum of absolute errors, rather than the sum of squared errors. The Least Absolute Deviations (LAD) regression places less weight on outliers. The problem now is that we can not run the regressions in [4] and [5] when inflows or outflows are used as dependent variable; given the high number of outliers registered here. We therefore run equations [4] and [5] only for net flows. Table 3 reports the results:

[INSERT TABLE 3 HERE]

Table 3 displays the results of LAD cross-sectional regressions of net flows on concurrent, past and future expected market returns. In panel A the potential different sensitivity of net flows to positive and negative market returns is not considered; in panel B this potential different sensitivity is considered.

Considering Panel A, the results indicate that net flows depend on the concurrent market return, on the one-month-lagged market return and on the expected market return in the next month. Thus, cash inflows to funds increase 0.012 percent for every 1 percent increase in concurrent market return; 0.025 percent for every 1 percent increase in prior month market return and 0.042 for every 1 percent increase in next month expected market return.

Next, considering Panel B, the results indicate that net flows depend on the concurrent market return, on the one-month-lagged market return and on the expected market return in the next month provided that this is negative. Thus, cash inflows to

[8] Table showing these results is available upon request.

funds increase 0.006 percent for every 1 percent increase in concurrent market return when concurrent market return is positive; and 0.009 percent for every 1 percent increase in prior month market return when lagged return is positive. Furthermore, cash outflows from funds increase by 0.029 percent for every 1 percent decrease in concurrent market return when concurrent return is negative; 0.031 percent for every 1 percent decrease in prior month market return when lagged return is negative and 0.033 percent for every 1 percent decrease in next month expected market return when expected return is negative.

In the light of these results we can conclude that the hypothesis by Bollen and Busse (2001) holds, so the control of traditional timing models for the cash flows effect makes sense. In section 5 we conduct this analysis but we control timing models not only for net flows but also for inflows and outflows in order to measure the possible different impact of them. It is because, in spite of the results found in this prior analysis with a LAD estimating method, when the OLS method was applied we also found an influence of concurrent, lagged and expected market returns on inflows and outflows.

5. MUTUAL FUND FLOWS AND MARKET TIMING

As commented before, the purpose of this paper is to control traditional market timing models for mutual fund flows in an attempt to correct the spurious timing ability usually found with traditional models. The support for this correction is, among others, the hypothesis by Bollen and Busse (2001), who argue that an increase in market return leads to mutual fund subscriptions, whereas a decrease leads to mutual fund redemptions, the result being that the demand for liquidity of mutual fund investors (or their market timing) affects the market timing of managers.

In the previous section we have demonstrated that the Bollen and Busse (2001) hypothesis holds, so the control of traditional timing models for mutual fund flows makes sense. To this end, we take the traditional timing models of TM (1966) and MH (1981) as the starting point:

$$\widetilde{R_{it}} = \alpha_i + \beta_i \widetilde{R_{mt}} + \gamma_{1i} \widetilde{X_{mt}} + \varepsilon_{it} \qquad [6]$$

Where $\widetilde{R_{it}}$ is the excess return on the fund and $\widetilde{R_{mt}}$ is the excess return on the market. $\widetilde{X_{mt}}$ is the market timing regressor, and it is either $\widetilde{R_{mt}}^2$ in the TM model or $[\widetilde{R_{mt}}]^+ = \max(0, \widetilde{R_{mt}})$ in the MH model. And γ_{1i} captures the market timing ability.

We propose several controls for the traditional timing models: for net flows, for inflows and outflows separately, and considering or not the different sensitivity of flows to positive and negative market returns. These different controls allow us to measure the impact of flows on timing models under different conditions. In equation [7] we control timing models for net flows without considering their different sensitivity to positive and negative market returns[9]:

$$\widetilde{R_{it}} = \alpha_i + \beta_i \widetilde{R_{mt}} + \gamma_{1i} \widetilde{X_{mt}} + \gamma_{2i} F_{it} \widetilde{X_{mt}} + \varepsilon_{it} \qquad [7]$$

Here γ_{2i} captures the effect of net flows on the market timing ability, thus letting γ_{1i} measuring the true market timing ability of the manager.

If we now consider the potential different sensitivity of flows to positive and negative market returns, we obtain equation [8]:

$$\widetilde{R_{it}} = \alpha_i + \beta_i \widetilde{R_{mt}} + \gamma_{1i} \widetilde{X_{mt}} + (\gamma_{2i} R^+ + \gamma_{3i} R^-) F_{it} \widetilde{X_{mt}} + \varepsilon_{it} \qquad [8]$$

Here γ_{2i} and γ_{3i} capture the flows' influence on market timing when the market excess return is positive and negative, respectively.

However, equation [8] can only be applied in the TM framework, but not in the MH sphere. It is because MH only considers the scenario of positive market excess returns.

[9] We do not introduce a estimated flow-trading response coefficient as in Edelen (1999) because the purpose of including it is to remove from the analysis the inflows crossing with outflows within a cash accumulation period, along with flows that remain in the fund because the manager does not respond to the change in cash position. We avoid the problem of inflows crossing with outflows by using net flows; and we believe also flows remaining in the cash must be taking into account in our analysis because they modify the proportion of funds exposed to the market (beta), and thus affect market timing in accordance with Bollen and Busse (2001) hypothesis. Moreover, Edelen (1999) asserts that when accumulation period is short the overall volume of purchase (sale) activity will approach the total inflow (outflow). Furthermore, although Edelen indicates that flow-trading response coefficient estimates less than one are consistent with flow shocks being partially incorporated into information-motivated trading and thus not triggering marginal trading activity, he asserts that flow induces a negative market timing effect if it is positively correlated either with the aggregate liquidity-motivated trading in the market or with the aggregate information regarding the final payoff on the market.

Next, equation [9] establishes a control in traditional timing models for the effects of inflows and outflows, considered separately:

$$\widetilde{R_{it}} = \alpha_i + \beta_i \widetilde{R_{mt}} + \gamma_{1i} \widetilde{X_{mt}} + \gamma_{2i} F^{+}{}_{it} \widetilde{X_{mt}} + \gamma_{3i} F^{-}{}_{it} \widetilde{X_{mt}} + \varepsilon_{it} \qquad [9]$$

Here F^{+} is inflows and F^{-} is outflows. Now, γ_{2i} and γ_{3i} capture the inflows' and outflows' influence on market timing ability, respectively.

Finally, in equation [10] we control traditional timing models for inflows and outflows separately, and also consider the potential different sensitivity of flows to positive and negative market excess returns (this equation can be only applied in the case of TM model for the same reason as in equation [8]):

$$\widetilde{R_{it}} = \alpha_i + \beta_i \widetilde{R_{mt}} + \gamma_{1i} \widetilde{X_{mt}} + (\gamma_{2i} R^{+} + \gamma_{3i} R^{-}) F^{+}_{it} \widetilde{X_{mt}} + (\gamma_{4i} R^{+} + \gamma_{5i} R^{-}) F^{-}_{it} \widetilde{X_{mt}} + \varepsilon_{it} \qquad [10]$$

Here γ_{2i} and γ_{3i} capture the inflows' influence on market timing when the market excess return is positive and negative, respectively. γ_{4i} and γ_{5i} capture the outflows' influence on market timing when the market excess return is positive and negative, respectively.

Table 4 reports the results found for equations [6] to [10] and table 5 the results for equations [6], [7] and [9]. In table 4 TM model is used, whereas in table 5 MH model is applied. The results in both tables are found with a LAD estimating method for the reasons set out in previous section.

[INSERT HERE TABLES 4 AND 5]

Table 4 is composed of five panels and in all of them the results found for the TM model are described. All the coefficients are estimated with a LAD method and the regressions are cross-sectional. Panel A lists the results for the traditional TM model. Panel B reports the results for the TM model when a control for the net flows is established. Panel C shows the results for the TM model when a control for the net flows is addressed and when the potential different sensitivity of net flows to positive and negative market excess returns is measured. Panel D describes the results for the TM model when a control for the inflows and outflows is included. Finally, Panel E describes the results for the TM model when a control for inflows and outflows is established and when the potential different sensitivity of inflows and outflows to positive and negative market excess returns is measured.

From Panel A we obtain a negative market timing ability (the estimated γ_{1i} is -0.054 with a t-statistic of -11.37), which is consistent with previous studies and indicates a perverse tendency of fund managers to negatively time the market. However, we realize that when we introduce in the model the control for the net flows effect on market timing (Panel B) this perverse timing ability disappears and the estimated γ_{1i} is now 0.108 with a t-statistic of 13.74, while the interactive term is significantly negative (-0.268 with a t-statistic of -8.05). From Panels C, D and E we obtain the same inference; i.e., the negative market timing found using [6] can be completely attributed to the realized flow at the fund, regardless of the interactive term introduced (control for net flows, for inflows, for outflows, considering or not the different sensitivity of net flows/inflows/outflows to positive and negative market excess returns). In all cases we obtain a significantly positive γ_{1i} coefficient and significantly negative interactive terms, except for the γ_{2i} coefficient in Panel C, which is negative but not significant indicating that the negative market timing here is attributed to the net flows at the fund in a scenario of negative market excess returns (when the market excess returns are positive, the net flow does not affect the market timing ability of the manager).

Table 5 contains the same information as contained in table 4 but in this case the model used is MH. All the coefficients are estimated with a LAD method and the regressions are cross-sectional. Panel A lists the results for the traditional MH model. Panel B reports the results for the MH model when a control for the net flows is established. Panel C describes the results for the TM model when a control for the inflows and outflows is included. In this case, as commented before, we can not measure the potential different sensitivity of flows to positive and negative market excess returns since the MH model only considers the scenario of positive market excess returns.

From Panel A we again obtain a negative market timing coefficient (the estimated γ_{1i} is -0.096 with a t-statistic of -11.67) and we realize again that this perverse tendency of managers to negatively time the market is completely attributed to the realized flow at the fund. Thus, both if the effect of net flows on market timing or the effect of inflows and outflows is considered the negative market timing disappears and is captured in the interactive terms. In Panel B, when the effect of net flows is considered, in spite of γ_{2i} being insignificant, it is negative and γ_{1i} turns out significantly positive. However, when the effect of inflows and outflows on market timing is assessed (Panel C) we find all the interactive terms are significantly negative, thus allowing the market timing coefficient to be significantly positive.

On the other hand, as an additional test, we introduce interactive terms with flow lagged one month in an attempt to account for the reverse-causality problem described in Edelen (1999). This author exposes that flow adversely affects a fund's measured alpha performance because the position acquired in a liquidity-motivated trade has a negative impact on the fund's abnormal return. However testing this assertion is problematic given the ample empirical evidence demonstrating that fund's abnormal returns affect flow. This two-way relationship is called "reverse-causality".

Tables 6 reports the results found for equations [7] to [10] but here the flow is one-month lagged. Table 7 shows the results found for equations [7] and [9], however the flow is one-month lagged. In table 6 TM model has been applied and in table 7 the MH model. All the coefficients are estimated with a LAD method.

[INSERT TABLES 6 AND 7 HERE]

Table 6 is composed of four panels and in all of them we list the results of the TM model when a control for the effect of lagged flows on market timing is established. This lets us to consider the reverse-causality problem described in Edelen (1999). All the coefficients are estimated with a LAD method and the regressions are cross-sectional. Panel A reports the results for the TM model when a control for the one-month lagged net flows is established. Panel B shows the results for the TM model when a control for the one-month lagged net flows is addressed and when the potential different sensitivity of one-month lagged net flows to positive and negative market excess returns is measured. Panel C describes the results for the TM model when a control for the one-month lagged inflows and outflows is included. Finally, Panel D describes the results for the TM model when a control for one-month lagged inflows and outflows is established and when the potential different sensitivity of one-month lagged inflows and outflows to positive and negative market excess returns is measured.

We again observe that the addition of the interactive terms in the traditional timing model removes the negative timing ability, regardless of the flow measurement and regardless of whether we consider or not the potentially different sensitivity of flows to positive and negative market excess returns. If we compare tables 4 and 6 we realize that the timing coefficient (γ_{1i}) multiplies by almost 6 times (Panel A), by more than 12 (Panel B), by 27 (Panel C) and by 24 (Panel C) when the flow is one-month lagged[10]. It demonstrates, as expected, that the results are stronger using lagged flow, which avoids a spurious positive covariance between flow and market returns due to reverse causality within the month. The appearance of poor market timing performance is therefore completely due to the perverse effect of the fund mangers' liquidity service.

Table 7 is made up of two panels and in both of them we list the results of the MH model when a control for the effect of lagged flows on market timing is established. This allows us to consider the reverse-causality problem described in Edelen (1999). All the coefficients are estimated with a LAD method and the regressions are cross-sectional. Panel A reports the results for the MH model when a control for the one-month lagged net flows is established. Finally, Panel B describes the results for the MH model when a control for the one-month lagged inflows and outflows is included.

We again can conclude that the appearance of perverse market timing disappears when the interactive terms are included in the regressions. However, if we now compare tables 5 and 7 we observe that the results are quite similar in magnitude, but the interactive term γ_{i2} in equation [7] turns out significant when the lagged flow is used.

6. SUMMARY AND CONCLUSION

The aim of this paper is to introduce the flow's influence in market timing models, controlling for the effect of flow on market timing and thus providing unbiased timing coefficients. This analysis is motivated by the hypothesis of Bollen and Busse (2001), who argue that an increase in market return leads to inflows whilst a fall leads to outflows, changing the fund's cash position and, therefore, beta, biasing timing coefficients downwards.

We therefore first analyze if the hypothesis by Bollen and Busse holds, but previously we wonder if the investor observes the concurrent, past or expected market return when decides to move his money. In this sense, we analyze the relationship between flows and concurrent market returns, past market returns or future expected

[10] In table 6 the interactive terms remain negative and significant except for γ_{i5} in panel D which is negative but insignificant, which indicates that outflows does not affect market timing in a scenario of negative market excess returns.

market returns and we investigate the number of previous and subsequent months considered by the investor when observing the market returns. Furthermore, we consider different definitions of flows; on one hand we consider net flows and on the other hand we take inflows and outflows separately. This lets us to check if our results are robust to this different definition and also the use of net flows avoids flows crossing with others of the opposite sign.

We construct the expected market returns by running an autoregressive model and by considering that they also depend on the previous public information about the macro-economy.

Moreover, when studying the relationship between flows and market returns we distinguish between positive and negative market returns in order to check if the sensitivity of flows to market returns depends on whether they are positive or negative.

To conduct our analyses we use a sample of monthly data on equity mutual funds registered for sale in the United States. Our sample spans from January 1994 to September 2010. The benchmark used in the analysis is the MSCI-North America Index.

Firstly, we obtain that the investor builds his expectations about the future market return from the market returns at the eight previous months and from public information about the macro-economy at the same time period. Second, we obtain that net flows depend on the concurrent market return, on the one-month lagged return and on the expected market return for the next month. Furthermore, going into these relationships in any depth, we obtain that the relation between net flows and concurrent and lagged market return holds regardless the market return is positive or negative, however the relation between net flows and expected market return only holds when the latter is negative. We can therefore assert that Bollen and Busse (2001) hypothesis is true, even though we can not obtain conclusions with regards to inflows and outflows when applying a LAD estimating method, so the control of timing models for flows makes sense.

In a next step we propose several controls for the traditional timing models: for net flows, for inflows and outflows separately, and considering or not the different sensitivity of flows to positive and negative market returns (this latter condition is only valid for the TM model since MH model only considers the scenario of positive market excess returns). Our results indicate that the perverse tendency of managers to negatively time the market found with traditional TM and MH models can be completely attributed to the realized flow at the fund, regardless of whether we consider net flows, inflows or outflows and independently of whether we take into account the sensitivity of flows to positive and negative market excess returns or not. In all cases, when we establish a control for flows the market timing coefficient turns out positive and significant and the interactive terms remain negative and significant.

Finally we repeat the previous step but now we control traditional timing models for the one-month lagged flows, this is to account for the reverse-causality problem described in Edelen (1999). We obtain the same inferences as in the previous step, and even, for the TM model, we obtain stronger results in favor of controlling timing models for flows.

In short, this paper demonstrates that the poor market timing performance found in this and other previous studies, is completely due to the perverse effect of the fund managers' liquidity service.

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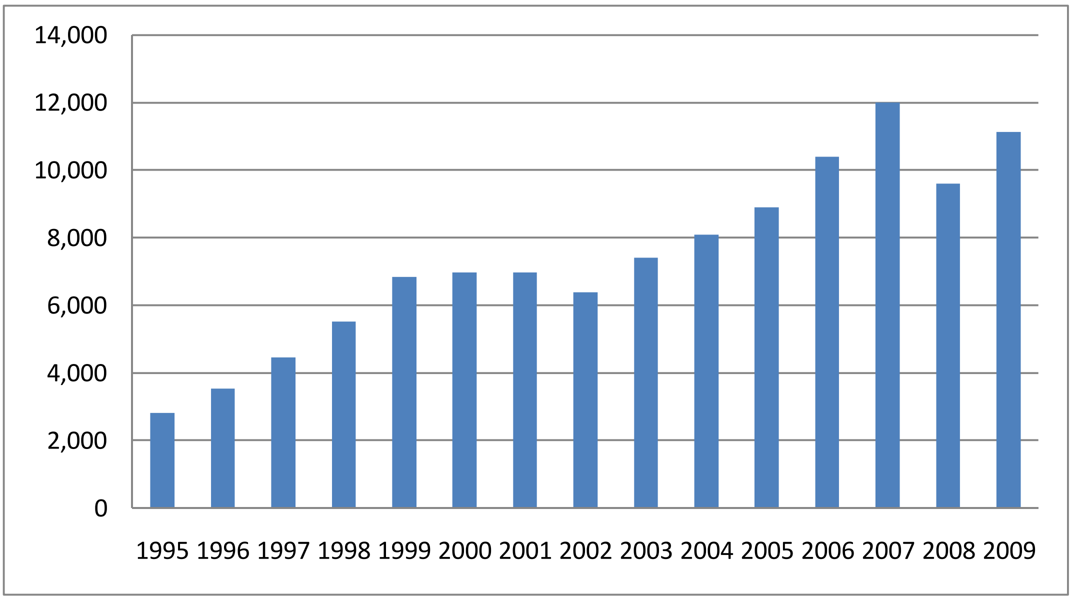
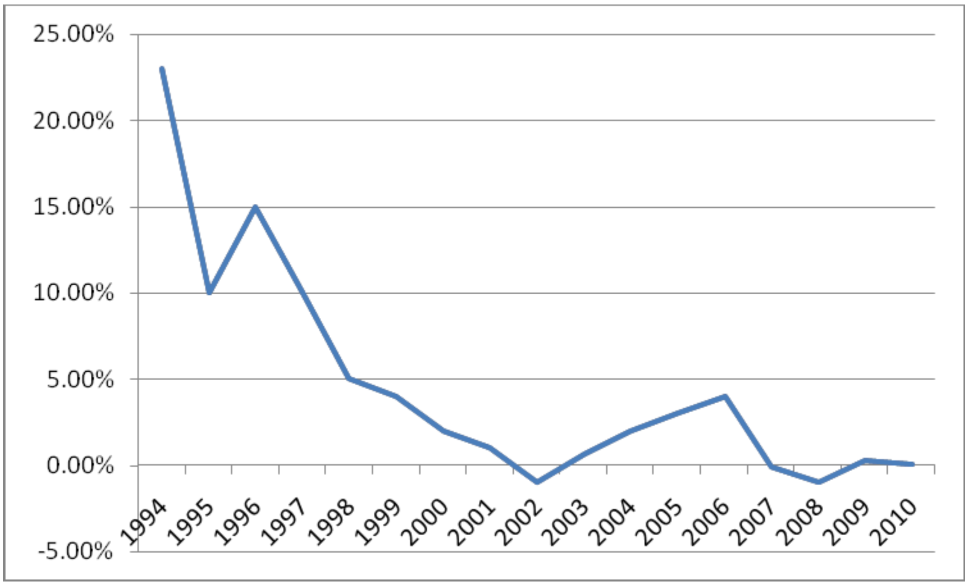
Graph 1: Total net Assets in USA Mutual Funds (billions of Dollars)



Source: ICI (Investment Company Fact Book 50th edition, 2010)

Graph 2: Aggregate Fund Flow of USA Equity Mutual Fund Industry



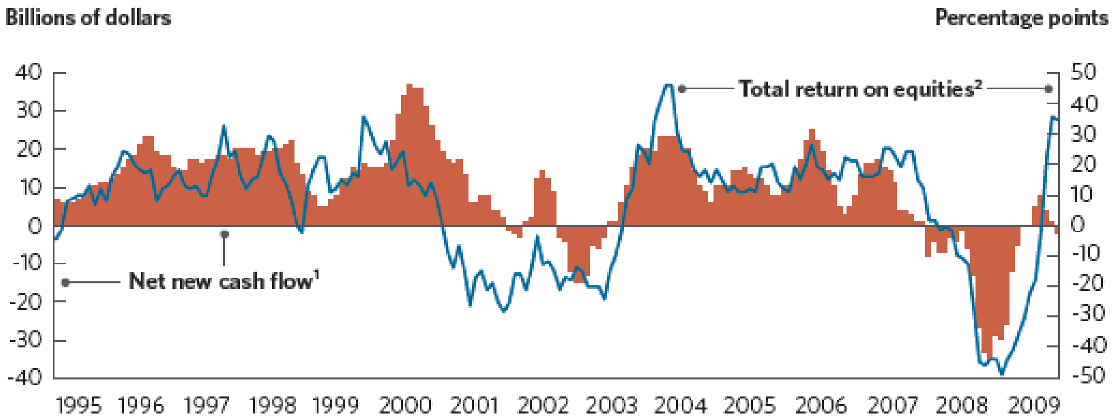
Depicted is the aggregate fund flow as a percentage of beginning-of-year assets of equity funds in the database, by year.

Figure 1: Total Net Assets of USA Mutual Funds held in Individual and Institutional accounts (2000-2009), millions of dollars, year-end

Year	Total	Equity funds	Hybrid funds	Bond funds	Money market funds
Total					
2000	$6,964,634	$3,961,922	$346,276	$811,188	$1,845,248
2001	6,974,913	3,418,163	346,315	925,124	2,285,310
2002	6,383,477	2,662,461	325,493	1,130,448	2,265,075
2003	7,402,420	3,684,162	430,467	1,247,770	2,040,022
2004	8,095,082	4,383,977	519,292	1,290,477	1,901,336
2005	8,891,108	4,939,700	567,304	1,357,283	2,026,822
2006	10,396,508	5,910,500	653,146	1,494,411	2,338,451
2007	12,000,645	6,515,871	718,982	1,680,032	3,085,760
2008	9,602,605	3,704,270	499,500	1,566,598	3,832,236
2009	11,120,725	4,957,576	640,749	2,206,204	3,316,196

Source: ICI (Investment Company Fact Book 50th edition, 2010)

Figure 2: Net flows to USA Equity Funds Related to Global Stock Price Performance (1995-2009)



[1]Net new cash flow to equity funds is plotted as a six-month moving average.
[2]The total return on equities is measured as the year-over-year change in the MSCI All Country World Total Return Stock Index.
Sources: Investment Company Institute and Morgan Stanley Capital International

Source: ICI (Investment Company Fact Book 50th edition, 2010)

Table 1: Cross-Sectional Characteristics & Summary Statistics

Table 1 is divided in two panels. Panel A reports the number of funds, the number of fund management companies, the average age (years since funds' inception), and the average and total assets under management (AUM) in million $ for USA equity mutual funds at the end of September 2010.
Panel B reports the average and standard deviation of monthly money flows measured as the rate of change in the fund assets under management beyond asset appreciation; the monthly returns; the flow volatility, measured over 12-month rolling windows; the return volatility, which is measured by the standard deviation of returns over 12-month rolling windows; the fund size, which is the natural logarithm of fund assets in $.We compute the statistics over time (January 1994- September 2010) and across funds.

Panel A: Cross-Sectional Characteristics of USA Equity Funds

Nº Funds	Nº Management companies	Average age	Average AUM (millions $)	Total AUM (millions $)
9580	524	7.77	547.64	5246391

Panel B: Summary Statistics

Variable	Mean	Standard deviation
Return	0.0049	0.1236
Return volatility	0.0694	0.0785
Flow	0.0410	50.199
Flow volatility	18.366	22.093
Size	46.589	11.905

Table 2: Characteristics of flow

Table 2 reports the characteristics of flows. Panel A provides de sample statistics of inflows, outflows, cash turnover and net inflows. Panel B shows the coefficient estimates of inflows, outflows, cash turnover and net inflows from an AR(1) model. Finally, Panel C reports the average regression statistics across funds obtained from regressions of each fund inflow/outflow on concurrent aggregate inflows/outflows. All variables are scaled by the average assets managed over the six-month filing period. Flow is observed monthly and annualized (multiplied by 12). Cash turnover is the minimum of the inflow over the six-month filing period and the outflow over that period, annualized (multiplied by two). Net flow is the month's inflow minus outflow, annualized (multiplied by 12).

Panel A. Sample statistics

The indicated variable is first averaged across all observations for a particular fund. Statistics are then presented on these mean values.

Flow	Mean	Std. Deviation	Median	Time-series std. Deviation
Inflow	47.79%	75.81%	44.9%	72.7%
Outflow	16.75%	19.81%	15.1%	25%
Cash turnover	29.60%	75.60%	16.10%	73%
Net inflow	31.04%	50.10%	31.02%	52%

Panel B. Autocorrelations

Observations are monthly for flow; the panel presents the coefficient estimates from an AR(1) model.

Flow	Coefficient
Inflow	0.07
Outflow	0.26
Cash turnover	0.19
Net inflow	0.11

Panel C. Marketwide components

The panel presents the average regression statistics across funds. Per-fund inflow (outflow) is regressed on concurrent aggregate inflow (outflow).

	Coefficient	R^2
Inflow	0.55	0.4
Outflow	0.33	0.39

Table 3: Net flow regressed on concurrent, past and future expected market return.

This table displays the results of LAD cross-sectional regressions of net flows on concurrent, past and future expected market returns. The dataset includes 9580 USA equity funds and the time period is January 1994 to September 2010. The coefficients of the LAD regression are illustrated. The R-squared coefficient is also provided for each of the models estimated and the p-value of the absolute heteroskedastic-consistent t-statistics is also reported in parentheses; *, ** and *** indicate significant at the 10%, 5% and 1% level, respectively.

Panel A

This panel presents the results of equation [4] using a LAD estimating method:

$$F_{i,t} = \alpha_i + \beta_i R_{m,t} + \sum_{k=1}^{n} \delta_k R_{m,t-k} + \sum_{l=1}^{n} \Delta_l Exp\left(R_{m,t+l}\right) + \varepsilon_{i,t}$$

Where F_{it} means net flows; $R_{m,t}$ is the concurrent market return; $R_{m,t-k}$ is the k-lagged market return; $Exp(R_{m,t+l})$ is the expected market return l months ahead; α_i, β_i, δ_k and Δ_l are the parameters of the model.

α	β	δ	Δ	R^2
-0.005	0.012	0.025	0.042	0.74
(-8.21) ***	(3.92) ***	(2.92) ***	(9.92) ***	

Panel B

This panel presents the results of equation [5] using a LAD estimating method:

$$F_{i,t} = \alpha_i + (\beta_1 R^+ + \beta_2 R^-)R_{m,t} + R^+ \sum_{j=1}^{n} \zeta_j R_{m,t-j} + R^- \sum_{k=1}^{n} \vartheta_k R_{m,t-k} + R^+ \sum_{l=1}^{n} \eta_l R_{m,t+l} + R^- \sum_{q=1}^{n} \Theta_q R_{m,t+q}$$

Where R+ and R- are indicator variables that equal one if the market return is non-negative or negative, respectively; β_1 captures the sensitivity of net flows to positive concurrent market returns; β_2 captures the sensitivity of net flows to negative concurrent market returns; ζ_j captures the sensitivity of net flows to positive j-lagged market returns; ϑ_k captures the sensitivity of net flows to negative k-lagged market returns; η_l captures the sensitivity of net flows to positive expected market returns l months ahead; and Θ_q captures the sensitivity of net flows to negative expected market returns q months ahead.

α	β_1	β_2	ζ	ϑ	η	θ	R^2
-0.004	0.006	0.029	0.009	0.031	0.010	0.033	0.79
(-5.33) ***	(3.43) ***	(2.93) ***	(4.81) ***	(2.92) ***	(1.5)	(2.68) ***	

Table 4: Flow and TM market-timing

Table 4 is composed of five panels and in all of them the results found for the TM model are described. All the coefficients are estimated with a LAD method and the regressions are cross-sectional. The dataset includes 9580 USA equity funds and the time period is January 1994 to September 2010. Panel A lists the results for the traditional TM model. Panel B reports the results for the TM model when a control for the net flows is established. Panel C shows the results for the TM model when a control for the net flows is addressed and when the potential different sensitivity of net flows to positive and negative market excess returns is measured. Panel D describes the results for the TM model when a control for the inflows and outflows is included. Finally, Panel E describes the results for the TM model when a control for inflows and outflows is established and when the potential different sensitivity of inflows and outflows to positive and negative market excess returns is measured. The R-squared coefficient is also provided for each of the models estimated and the p-value of the absolute heteroskedastic-consistent t-statistics is also reported in parentheses; *, ** and *** indicate significant at the 10%, 5% and 1% level, respectively.

Panel A

This panel lists the results of equation [6] using a LAD estimating method:

$$\bar{R}_{it} = \alpha_i + \beta_i \bar{R}_{mt} + \gamma_{1i} \bar{X}_{mt} + \varepsilon_{it}$$

Where $\bar{R}_{it}$ is the excess return on the fund and $\bar{R}_{mt}$ is the excess return on the market. $\bar{X}_{mt}$ is the market timing regressor, and here is $\bar{R}_{mt}^{2}$ in the TM model. And γ_{1i} captures the market timing ability.

α	β	γ_1	R^2
0.002	1.018	-0.054	0.83
(5.19) ***	(2.98) ***	(-11.37) ***	

Panel B

This panel lists the results of equation [7] using a LAD estimating method:

$$\bar{R}_{it} = \alpha_i + \beta_i \bar{R}_{mt} + \gamma_{1i} \bar{X}_{mt} + \gamma_{2i} F_{it} \bar{X}_{mt} + \varepsilon_{it}$$

Where $\bar{R}_{it}$ is the excess return on the fund and $\bar{R}_{mt}$ is the excess return on the market. $\bar{X}_{mt}$ is the market timing regressor, and here is $\bar{R}_{mt}^{2}$ in the TM model. F_{it} represents the net flows; γ_{2i} captures the effect of net flows on the market timing ability, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	R^2
0.002	1.035	0.108	-0.268	0.84
(5.89) ***	(4.2) ***	(13.74) ***	(-8.05) ***	

Panel C

This panel lists the results of equation [8] using a LAD estimating method:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_{1i} X_{mt} + (\gamma_{2i} R^{+} + \gamma_{3i} R^{-}) F_{it} X_{mt} + \varepsilon_{it}$$

Where R_{it} is the excess return on the fund and R_{mt} is the excess return on the market. X_{mt} is the market timing regressor, and here is R_{mt}^2 in the TM model. F_{it} represents the net flows; R^* and R^- are indicator variables that equal one if the market return is non-negative or negative, respectively; γ_{2i} and γ_{3i} capture the flows' influence on market timing when the market excess return is positive and negative, respectively, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	γ_3	R^2
0.002	1.038	0.051	-0.043	-0.156	0.88
(4.3) ***	(5.17) ***	(7.08) ***	(-0.49)	(-4.8) ***	

Panel D

This panel lists the results of equation [9] using a LAD estimating method:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_{1i} X_{mt} + \gamma_{2i} F^{+}_{it} X_{mt} + \gamma_{3i} F^{-}_{it} X_{mt} + \varepsilon_{it}$$

Where R_{it} is the excess return on the fund and R_{mt} is the excess return on the market. X_{mt} is the market timing regressor, and here is R_{mt}^2 in the TM model. F^+ is inflows and F^- is outflows; γ_{2i} and γ_{3i} capture the inflows' and outflows' influence on market timing ability, respectively, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	γ_3	R^2
0.002 (4.95) ***	1.038 (6.17) ***	0.022 (2.9) ***	-0.074 (-2.37)**	-1.354 (-2.98) ***	0.88

Panel E

This panel lists the results of equation [10] using a LAD estimating method:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_{1i} X_{mt} + (\gamma_{2i} R^{+} + \gamma_{3i} R^{-}) F^{+}_{it} X_{mt} + (\gamma_{4i} R^{+} + \gamma_{5i} R^{-}) F^{-}_{it} X_{mt} + \varepsilon_{it}$$

Where R_{it} is the excess return on the fund and R_{mt} is the excess return on the market. X_{mt} is the market timing regressor, and here is R_{mt}^2 in the TM model. F^+ is inflows and F^- is outflows; R^* and R^- are indicator variables that equal one if the market return is non-negative or negative, respectively; γ_{2i} and γ_{3i} capture the inflows' influence on market timing when the market excess return is positive and negative, respectively; γ_{4i} and γ_{5i} capture the outflows' influence on market timing when the market excess return is positive and negative, respectively, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	γ_3	γ_4	γ_5	R^2
0.002	1.035	0.025	-0.344	-0.18	-2.955	-2.694	0.89
(6.54) ***	(4.04) ***	(3.26) ***	(-3.8) ***	(-5.33) ***	(-9.8) ***	(-2.96) ***	

Table 5: Flow and MH market-timing

Table 5 is composed of three panels and in all of them the results found for the MH model are described. All the coefficients are estimated with a LAD method and the regressions are cross-sectional. The dataset includes 9580 USA equity funds and the time period is January 1994 to September 2010. Panel A lists the results for the traditional MH model. Panel B reports the results for the MH model when a control for the net flows is established. Panel C describes the results for the MH model when a control for the inflows and outflows is included. The R-squared coefficient is also provided for each of the models estimated and the p-value of the absolute heteroskedastic-consistent t-statistics is also reported in parentheses; *, ** and *** indicate significant at the 10%, 5% and 1% level, respectively

Panel A

This panel lists the results of equation [6] using a LAD estimating method:

$$\tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{mt} + \gamma_{1i} \tilde{X}_{mt} + \varepsilon_{it}$$

Where $\tilde{R}_{it}$ is the excess return on the fund and $\tilde{R}_{mt}$ is the excess return on the market. $\tilde{X}_{mt}$ is the market timing regressor, and here is $[\tilde{R}_{mt}]^{+} = \max(0, \tilde{R}_{mt})$ in the MH model. And γ_{1i} captures the market timing ability.

α	β	γ_1	R^2
0.004	1.070	-0.096	0.84
(4.63) ***	(3.04) ***	(-11.67) ***	

Panel B

This panel lists the results of equation [7] using a LAD estimating method:

$$\tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{mt} + \gamma_{1i} \tilde{X}_{mt} + \gamma_{2i} F_{it} \tilde{X}_{mt} + \varepsilon_{it}$$

Where $\tilde{R}_{it}$ is the excess return on the fund and $\tilde{R}_{mt}$ is the excess return on the market. $\tilde{X}_{mt}$ is the market timing regressor, and here is $[\tilde{R}_{mt}]^{+} = \max(0, \tilde{R}_{mt})$in the MH model. F_{it} represents the net flows; γ_{2i} captures the effect of net flows on the market timing ability, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	R^2
0.002	0.997	0.078	-0.019	0.87
(8.64) ***	(6.09) ***	(4.83) ***	(-0.96)	

Panel C

This panel lists the results of equation [9] using a LAD estimating method:

$$\tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{mt} + \gamma_{1i} \tilde{X}_{mt} + \gamma_{2i} F^{+}_{it} \tilde{X}_{mt} + \gamma_{3i} F^{-}_{it} \tilde{X}_{mt} + \varepsilon_{it}$$

Where $\tilde{R}_{it}$ is the excess return on the fund and $\tilde{R}_{mt}$ is the excess return on the market. $\tilde{X}_{mt}$ is the market timing regressor, and here is $[\tilde{R}_{mt}]^{+} = \max(0, \tilde{R}_{mt})$ in the MH model. F^{+} is inflows and F^{-} is outflows; γ_{2i} and γ_{3i} capture the inflows' and outflows' influence on market timing ability, respectively, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	γ_3	R^2
0.002	0.998	0.073	-0.028	-0.180	0.88
(8.74) ***	(6.18) ***	(2.96) ***	(-3.14) ***	(-6.3) ***	

Table 6: Lagged flow and TM market-timing

Table 6 is composed of four panels and in all of them we list the results of the TM model when a control for the effect of lagged flows on market timing is established. This lets us to consider the reverse-causality problem described in Edelen (1999). All the coefficients are estimated with a LAD method and the regressions are cross-sectional. The dataset includes 9580 USA equity funds and the time period is January 1994 to September 2010. Panel A reports the results for the TM model when a control for the one-month lagged net flows is established. Panel B shows the results for the TM model when a control for the one-month lagged net flows is addressed and when the potential different sensitivity of one-month lagged net flows to positive and negative market excess returns is measured. Panel C describes the results for the TM model when a control for the one-month lagged inflows and outflows is included. Finally, Panel D describes the results for the TM model when a control for one-month lagged inflows and outflows in established and when the potential different sensitivity of one-month lagged inflows and outflows to positive and negative market excess returns is measured. The R-squared coefficient is also provided for each of the models estimated and the p-value of the absolute heteroskedastic-consistent t-statistics is also reported in parentheses; *, ** and *** indicate significant at the 10%, 5% and 1% level, respectively.

Panel A

This panel lists the results of equation [7] using a LAD estimating method but with the net flow lagged one month:

$$\tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{mt} + \gamma_{1i}\tilde{X}_{mt} + \gamma_{2i}F_{it-1}\tilde{X}_{mt} + \varepsilon_{it}$$

Where $\tilde{R}_{it}$ is the excess return on the fund and $\tilde{R}_{mt}$ is the excess return on the market. $\tilde{X}_{mt}$ is the market timing regressor, and here is $\tilde{R}_{mt}^2$ in the TM model. F_{it-1} represents the one-month lagged net flows; γ_{2i} captures the effect of net flows on the market timing ability, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	R^2
0.001	1.051	0.615	-0.076	0.85
(2.77) ***	(3.07) ***	(3.94) ***	(-2.11) **	

Panel B

This panel lists the results of equation [8] using a LAD estimating method but considering the one-month lagged net flow:

$$\tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{mt} + \gamma_{1i}\tilde{X}_{mt} + (\gamma_{2i}R^{+} + \gamma_{3i}R^{-})F_{it-1}\tilde{X}_{mt} + \varepsilon_{it}$$

Where $\tilde{R}_{it}$ is the excess return on the fund and $\tilde{R}_{mt}$ is the excess return on the market. $\tilde{X}_{mt}$ is the market timing regressor, and here is $\tilde{R}_{mt}^2$ in the TM model. F_{it-1} represents the one-month lagged net flows; R^* and R^- are indicator variables that equal one if the market return is non-negative or negative, respectively; γ_{2i} and γ_{3i} capture the flows' influence on market timing when the market excess return is positive and negative, respectively, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	γ_3	R^2
0.001	1.051	0.615	-0.284	-0.112	0.87
(2.96) ***	(10.03) ***	(3.89) ***	(-1.77) *	(-2.65) ***	

Panel C

This panel lists the results of equation [9] using a LAD estimating method but considering one-month lagged inflows and outflows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_{1i} X_{mt} + \gamma_{2i} F^{+}_{it-1} X_{mt} + \gamma_{3i} F^{-}_{it-1} X_{mt} + \varepsilon_{it}$$

Where R_{it} is the excess return on the fund and R_{mt} is the excess return on the market. X_{mt} is the market timing regressor, and here is R_{mt}^2 in the TM model. F_{it-1}^{+} is one-month lagged inflows and F_{it-1}^{-} is one-month lagged outflows; γ_{2i} and γ_{3i} capture the inflows' and outflows' influence on market timing ability, respectively, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	γ_3	R^2
0.001 (2.78) ***	1.051 (10.02) ***	0.603 (5.4) ***	-0.124 (-2.93) ***	-0.495 (-2.74) ***	0.86

Panel D

This panel lists the results of equation [10] using a LAD estimating method but considering one-month lagged inflows and outflows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \gamma_{1i} X_{mt} + (\gamma_{2i} R^{+} + \gamma_{3i} R^{-}) F^{+}_{it-1} X_{mt} + (\gamma_{4i} R^{+} + \gamma_{5i} R^{-}) F^{-}_{it-1} X_{mt} + \varepsilon_{it}$$

Where R_{it} is the excess return on the fund and R_{mt} is the excess return on the market. X_{mt} is the market timing regressor, and here is R_{mt}^2 in the TM model. F_{it-1}^{+} is one-month lagged inflows and F_{it-1}^{-} is one-month lagged outflows; R^{*} and R^{-} are indicator variables that equal one if the market return is non-negative or negative, respectively; γ_{2i} and γ_{3i} capture the inflows' influence on market timing when the market excess return is positive and negative, respectively; γ_{4i} and γ_{5i} capture the outflows' influence on market timing when the market excess return is positive and negative, respectively, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	γ_3	γ_4	γ_5	R^2
0.001	1.052	0.610	-0.131	-0.138	-0.130	-0.315	0.89
(2.94) ***	(9.55) ***	(5.83) ***	(-1.76)*	(-3.16) ***	(-1.74)*	(-1.64)	

Table 7: Lagged flow and MH market-timing

Table 7 is composed of two panels and in both of them we list the results of the MH model when a control for the effect of lagged flows on market timing is established. This lets us to consider the reverse-causality problem described in Edelen (1999). All the coefficients are estimated with a LAD method and the regressions are cross-sectional. The dataset includes 9580 USA equity funds and the time period is January 1994 to September 2010. Panel A reports the results for the MH model when a control for the one-month lagged net flows is established. Panel B describes the results for the MH model when a control for the one-month lagged inflows and outflows is included. The R-squared coefficient is also provided for each of the models estimated and the p-value of the absolute heteroskedastic-consistent t-statistics is also reported in parentheses; *, ** and *** indicate significant at the 10%, 5% and 1% level, respectively.

Panel A

This panel lists the results of equation [7] using a LAD estimating method but with the net flow lagged one month:

$$\tilde{R_{it}} = \alpha_i + \beta_i \tilde{R_{mt}} + \gamma_{1i}\tilde{X_{mt}} + \gamma_{2i} F_{it-1}\tilde{X_{mt}} + \varepsilon_{it}$$

Where $\tilde{R_{it}}$ is the excess return on the fund and $\tilde{R_{mt}}$ is the excess return on the market. $\tilde{X_{mt}}$ is the market timing regressor, and here is $[\tilde{R_{mt}}]^+ = \max(0, \tilde{R_{mt}})$ in the MH model. F_{it-1} represents the one-month lagged net flows; γ_{2i} captures the effect of net flows on the market timing ability, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	R^2
0.002	0.993	0.076	-0.019	0.80
(7.69) ***	(6.8) ***	(3.66) ***	(-1.7)*	

Panel B

This panel lists the results of equation [9] using a LAD estimating method but considering one-month lagged inflows and outflows:

$$\tilde{R_{it}} = \alpha_i + \beta_i \tilde{R_{mt}} + \gamma_{1i}\tilde{X_{mt}} + \gamma_{2i} F^{+}{}_{it-1}\tilde{X_{mt}} + \gamma_{3i} F^{-}{}_{it-1}\tilde{X_{mt}} + \varepsilon_{it}$$

Where $\tilde{R_{it}}$ is the excess return on the fund and $\tilde{R_{mt}}$ is the excess return on the market. $\tilde{X_{mt}}$ is the market timing regressor, and here is $[\tilde{R_{mt}}]^+ = \max(0, \tilde{R_{mt}})$ in the MH model. F_{it-1}^{+} is one-month lagged inflows and F_{it-1}^{-} is one-month lagged outflows; γ_{2i} and γ_{3i} capture the inflows' and outflows' influence on market timing ability, respectively, thus letting γ_{1i} measuring the true market timing ability of the manager.

α	β	γ_1	γ_2	γ_3	R^2
0.002	0.994	0.068	-0.022	-0.365	0.84
(7.87) ***	(6.99) ***	(2.95) ***	(-1.99)**	(-9.8) ***	