

# The Portfolio Choice of Individual Shareholders in Large Mutual Fund Families: A Study of Demand-Side Economies of Scope

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## ABSTRACT

We analyze the portfolio choice of a six-year panel of individual shareholders sampled from 14 large mutual fund families. The majority of shareholders choose only one fund when they first enter the fund family. Only a minority of shareholders choose to open new funds after family entry date. Combining these results, we argue that the scope of the mutual fund family is not driven by the typical shareholder because he does not demand one-stop shopping.

## I. Introduction

The 1940 Investment Company Act treats individual mutual funds as distinct legal entities: each fund has its own board of directors, auditor, distributor, transfer agent, and investment advisor. Despite this legal genesis, most mutual fund assets are currently located inside mutual fund families that offer multiple funds: even though 25% of fund families offer only one mutual fund, these single-fund families managed less than 1% of the industry's assets at the end of 2005. Moreover, multiple-fund families tend to offer a wide variety of funds. The mean fund family offers 19 funds across 8 of the 33 investment objectives identified by the Investment Company Institute, the national association of the investment company industry.

The multiproduct structure of the mutual fund family could be driven by supply-side factors. For example, there may be family-level economies of scale if fixed costs such as marketing and legal expenses can be spread over a larger asset base. Alternatively, economies of scope could be important. On the one hand, the funds may benefit if there are research spillovers between, say, a small-cap fund and a bio-tech fund. On the other hand, the investment advisor may benefit if its revenue is diversified across multiple funds, each of which

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attracts shareholder flow under different market conditions. The mutual fund literature generally ignores the family structure of the industry; however, there are a few recent exceptions that suggest it is important.<sup>1</sup>

In this paper, we consider an alternative hypothesis that demand-side factors are important in explaining the scope of the mutual fund family. Specifically, we test whether individual mutual fund shareholders demand one-stop shopping, the ability to invest in multiple funds inside the same fund family. Individual shareholders may value product variety when they first enter the fund family. For example, they might invest in both equity and bond funds on family entry date. Alternatively, they might value variety through time. For example, shareholders might choose a bond fund on family entry date and exchange into an equity fund the following year.

One-stop shopping may be valuable to shareholders who have high search costs because fund families cross promote their funds. The grouping of funds into families may also benefit shareholders who have high switch costs because it is easier to switch between funds in the same fund family than it is to switch between funds in different fund families. Fund families also provide ancillary services such as consolidated account statements that may decrease the shareholder's record keeping costs.

It is widely believed that that shareholders focus their mutual fund investments in one fund family. Articles such as Massa (2003) and Elton, Gruber, and Green (2007) start with this exact premise. Industry executives also suggest that shareholders value one-stop shopping. For example, several recent mergers between large mutual fund families—including the 2006 marriage of BlackRock and Merrill Lynch—have been motivated (in part) by a desire to broaden product offerings for consumers. However, we are unaware of any public study that explicitly shows whether shareholders invest with one or multiple fund families. Surveys taken by The Federal Reserve Board (including the SCF), the Investment Company Institute, and others focus on the amount and type of assets shareholders hold, ignoring the underlying intermediaries.

Our unique database consists of a six-year panel of 229,466 investors in 14 large mutual fund families between December 31, 1999 and December 31, 2005. In terms of total mutual fund assets on January 2000,

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<sup>1</sup>Khorana and Servaes (1999) study the fund family's decision to launch a new fund. They report that new mutual funds are more likely to be launched by large fund families and those that have recently launched new funds. Gervais, Lynch, and Musto (2005) point out that fund families can act as monitors of the individual portfolio managers. In their model, large fund families are better positioned than small fund families to certify the ability of portfolio managers. Gaspar, Massa, and Matos (2006) claim that fund families can strategically reallocate resources within the family in order to benefit the investment advisor at the expense of the fund shareholders.

each family in our sample was in the list of top 100 fund families and at least one was in the list of top 10 fund families. The shareholders were randomly drawn, at the family level, and all of their transactions across all funds in their family were recorded. Their portfolios were valued at approximately \$3.94 billion at the end of 2005. The sample consists of both load and no-load mutual fund families. The funds cover all major investment objectives and include both actively- and passively-managed portfolios.

Our empirical investigation proceeds in two stages. First, we examine the portfolio choice of individual shareholders on family entry date. The results show that approximately two-thirds of shareholders initially invest in only one fund despite the fact that their investments are large enough to meet simultaneously the minimum initial investment requirements at two or more funds. Second, we analyze the trades shareholders make after family entry date. The results show that although many shareholders buy shares after family entry date, they are more likely to add to their existing funds than to open new funds. After four years, for example, 52% of shareholders have added to an existing fund while only 25% of shareholders have opened at least one new fund.

Not all shareholders invest directly with the fund family. We show that shareholders who use brokers to invest in load mutual fund families are more likely than no-load shareholders to invest in multiple funds and multiple asset classes. This is true both on and after family entry date. We also highlight the behavior of shareholders who invest through mutual fund supermarkets, broker-dealers, and financial planners because these intermediaries provide a trading platform that acts essentially as a family of fund families. Consistent with this view, the evidence shows that these shareholders are less likely than the other shareholders to open multiple funds and multiple asset classes on family entry date, and they are more likely to sell shares after family entry date.

Taken together, our evidence suggests that the typical shareholder does not value one-stop shopping and, as a consequence, does not affect the scope of the fund family. Why is the industry dominated by multiple-fund families? First, there is substantial heterogeneity in the amount of assets individual shareholders bring to the fund family, and shareholders with large portfolios are more likely than shareholders with small portfolios to demand multiple funds from the family both on and after family entry date. Although few in number, shareholders with large portfolios contribute most of the assets to the fund family: the 10% of

shareholders with the largest portfolios contribute 68% of the total assets shareholders invest with the fund family on entry date. Fund families may not respond to the preferences of the other shareholders because their portfolios do not aggregate to much: the 35% of shareholders with the smallest portfolios contribute only 1% of the total assets shareholders invest with the fund family on entry date.<sup>2</sup> Second, the mutual fund industry may respond to the preferences of intermediaries such as defined contribution retirement plans. Plan administrators may find it less costly to contract with just one family that offers a variety of funds than to contract with multiple single-fund families. Third, as mentioned above, supply-side factors might drive the economics of industrial organization of this industry.

Our paper relates to a number of other studies. For example, this paper can be viewed as a test of the spillover hypothesis. Nanda, Wang, and Zheng (2004) suggest that if a family has one or more “star funds” (funds with the best track record among some peer group), its non-star funds attract additional shareholder flow. They propose two hypotheses to explain why shareholders put extra money into the non-star funds, but they do not test either one. The one-stop-shopping hypothesis posits that a shareholder who buys the star fund decides to invest simultaneously in the family’s other funds. This suggests that star-fund buyers are disproportionately likely to invest in multiple funds on family entry date. The search-cost hypothesis says that the star fund raises the visibility of the entire fund family which causes some shareholders to buy the non-star funds when they would not have otherwise considered any fund in the family. This suggests that star-fund buyers are not more likely to invest in multiple funds on family entry date.

We cannot directly mimic the spillover methodology of Nanda, Wang, and Zheng (2004) because each of our large fund families offers star funds essentially every month of our sample period. However, the family-level ratio of star funds to total offered funds varies considerably through time and across families. We test, therefore, whether the ratio of star funds to offered funds helps explain the number of funds a shareholder chooses on family entry date. Our affirmative results are consistent with the one-stop-shopping hypothesis that star-fund buyers diversify into other funds in the family on family entry date. Because folk wisdom in the industry suggests that star funds attract “hot money” that is quick to switch out of the fund, we

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<sup>2</sup>This raises a puzzle: why do funds accept small accounts? The Wall Street Journal (August 8, 2001, p. C1) reports that shareholder servicing costs are approximately \$40 per account per year at The Vanguard Group. A fund that charges a 1% management fee could not even cover its transfer agency fees on accounts smaller than \$4,000. In our database, this is the 57th percentile of account size on family entry date and the 40th percentile of account size for all accounts at year-end 2005.

emphasize these shareholders' post-entry trades. The evidence does not support the hot-money hypothesis: shareholders who buy star funds are only 3% more likely than non-star shareholders to exit the family on any given day, and they are 9% *more* likely than non-star shareholders to open new funds after family entry date.

Our results cast doubt on the switching hypothesis of Massa (2003). His model suggests that shareholders exchange dollars within the fund family, but his empirical tests are based on fund-level shareholder flow that does not directly show within-family shareholder exchanges. Our data allow for a very sharp test of the switching hypothesis because our database contains individual trades between funds in large families that offer scores of alternative funds. The evidence shows that our shareholders did not exercise their within-family switching option despite the fact that our sample period includes volatile returns that provided many opportunities to switch across and within investment objectives. This lack of post-entry trade is consistent with both high monitoring costs and high adjustment costs (see Vissing-Jorgensen (2002)).

Elton, Gruber, and Green (2007) study how mutual fund returns are correlated. Their evidence suggests that equity fund returns are more correlated within families than they are between families. They interpret their evidence to mean that mutual fund shareholders should not confine their holdings to a single fund family. Our database is sampled at the fund-family level, so we do not directly see the shareholder's total number of mutual funds. If most shareholders hold multiple funds—Elton, Gruber, and Green (2007) assume that they do—our evidence implies that they invest in multiple fund families. This may indicate that the benefits of across-family diversification are larger than the benefits of one-stop shopping.

In its most general goals, our paper touches on the nature of the boundaries of the firm. Since Coase (1937), economists have studied the scope of multiproduct firms (classic studies include Williamson (1975) and Grossman and Hart (1986)). The empirical literature is grounded in studies of the firm's output and costs.<sup>3</sup> Our paper contributes to this literature by describing in unprecedented detail the actual consumption

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<sup>3</sup>One branch of this large literature studies R&D expenditures. For example, Henderson and Cockburn (1996) use spending and output data from the pharmaceutical industry to study research productivity. They report that firm-level economies of scope help determine how these firms organize themselves. Another branch examines the costs incurred by financial institutions that offer multiple products. For example, Kim (1986) studies credit unions; Mester (1987) studies savings and loans; and Berger, Hanweck, and Humphrey (1987) study banks. A particularly relevant study to ours is Berger, Humphrey, and Pulley (1996). They examine "revenue economies of scope" to see whether multiproduct banks successfully charge higher prices than single-product banks. Their evidence—based on contrasting revenue from single- and multiple-product banks—indicates that consumers do not pay more for one-stop banking services. As far as we know, the only studies that directly examine economies of scale and scope in the mutual fund industry are Baumol, Goldfeld, Gordon, and Koehn (1990) and Dermine and Röller

bundles consumers choose in one industry.

This paper may also shed light on important issues in the portfolio choice literature. For example, Ameriks and Zeldes (2004) report that their sample of TIAA-CREF participants have lumpy portfolios, a disproportionate number of shareholders have either 0% or 100% in equity. Our novel examination of the shareholders' portfolios at the time they establish a new relationship with a fund family hints at a possible resolution to this puzzle: shareholders with high equity joined when equity returns were high while shareholders with low equity joined when equity returns were low. Because most shareholders neither open new funds nor close existing funds in the family after family entry date, their future portfolio is largely determined by market conditions on family entry date.

There is a debate in the literature about how actively investors trade financial assets. For example, Barber and Odean (2000) suggest that shareholders trade actively while Agnew, Balduzzi, and Sundén (2003) suggest that shareholders are passive. It is difficult to know which view is more accurate because of possible selection biases: the former shareholders self-selected into a discount brokerage house and might be disproportionately likely to trade while the later shareholders are DC plan participants who have not only limited investment alternatives but also constraints on contributions and withdrawals. We inform this discussion by studying a new database of shareholders who invest through a wide variety of investment channels. We identify shareholders who are similar to those studied by Barber and Odean (2000) and shareholders who are similar to those studied by Agnew, Balduzzi, and Sundén (2003). Our contrast of portfolio choice among these and other shareholder types broadens what is known about shareholder trading.

## II. Data

Fourteen large, anonymous mutual fund families provided detailed transactions data for a random sample of their individual (not institutional) shareholders. In terms of total mutual fund family assets on December 31, 1999, each family was in the list of top 100 fund families, and at least one was in the list of top 10 fund families. Four of the fund families primarily offer funds that are sold directly to fund investors (no load) while the ten others are primarily sold through brokers and other types of financial advisors (load). Most

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(1992). They examine fund costs and fund fees.

fund families offer scores of mutual funds, and they all offer a broad range of mutual funds that arguably span the major asset classes.

#### *A. Sampling Process*

We generated a set of random four-digit numbers that were given to each fund family. We instructed the families to extract data for every shareholder whose social security number ends in any of the provided random four-digit numbers. Different sized subsets of the master list of random numbers were given to each fund family in order to draw similar sized shareholder samples.<sup>4</sup> Complete transactions data were recorded for shareholders who held shares in any of the family’s funds at any time between December 31, 1999 and December 31, 2005. No identifying information about the individual shareholders was extracted.

The database consists of two main files from each of the 14 fund families: shareholders (229,466) and shareholder transactions (15,716,183). The shareholder file includes details about the shareholder’s registration, including tax status and family entry date. The shareholder transaction file includes details about the size of each transaction (in both shares and dollars) and type of each transaction (such as exchanges and automatic transactions) in all funds the shareholder held at any time during the sample period.

The primary unit of observation in this study is the individual shareholder in one fund family. All trades made by the shareholder at any time in any fund in the fund family are linked together. The database contains no information on the shareholder’s assets outside the fund family; moreover, it may not include the shareholder’s entire portfolio inside the fund family for two reasons. First, the shareholder may have a joint account with another shareholder that is registered under the other shareholder’s social security number. These accounts cannot be linked together in our database. Second, the shareholder may invest through other intermediaries that do not pass through shareholder-level information to the fund family. This includes some, but not all, mutual fund supermarkets and DC retirement plans.

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<sup>4</sup>The sampling was conducted on shareholder social security numbers, similar to the sampling process that the IRS Statistics of Income uses when sampling for its public databases. To select randomly between 5,000 and 15,000 shareholders per fund family, each fund family was provided with a set of random four-digit numbers. All shareholders with these last four digits in their social security number were selected. Two fund families received 25 four-digit numbers; two received 50; two received 75; one received 150; and six received 300. (These sets of four-digit numbers were nested, meaning that the successively larger sets of numbers contained all numbers from the smaller sets.) For the remaining two fund families, a single random digit was generated. All shareholders whose social security number ends in that digit were sampled.

The sampling rates for each fund family were based on the number of shareholder accounts in 2003. When the 2003 sample was taken, firms also sampled shareholders in the 2000–2002 period. Firms resampled shareholders again at the end of 2004 and 2005. The same set of randomly selected numbers were used each year for each firm. This sampling design allows for tracking those shareholders that remained with a fund family from one year to the next.

### *B. Shareholder Subset*

Our database contains 229,466 shareholders, but we lack entry-date data for over half of the shareholders due to incomplete trading records. Most of these omissions are from shareholders who entered the fund family before December 31, 1999, the date our transaction database begins. Although we see these shareholders' complete portfolio holdings on December 31, 1999, we are unable to identify what they held on family entry date (the earliest entry date is 1958). The second noteworthy set of omissions stems from fund mergers. Trading records are generally unavailable for target-fund shareholders prior to the merger date. We remove from the database all shareholders with incomplete entry-date records. We also drop all non-individual shareholders that were inadvertently included in our data set. The final sample contains 90,854 shareholders for whom we have complete trading records through December 31, 2005.

### *C. Transactions*

We remove all fund distributions from the database, whether reinvested or not, because they are under the control of the fund manager. We also remove from the database automatic transactions that do not open or close funds. The automatic transactions that are initiated by the transfer agent are accurately coded in the database; however, there are some coding errors and omissions for automatic transactions that are not initiated by the transfer agent. Thus, we attempt to remove those transactions by mechanically screening out repeated transactions of the same size. This is a challenging exercise because in the retirement market, for example, the periodic transactions may change through time due to either raises or the employer match. Although we are confident that we do not incorrectly classify non-automatic transactions as automatic, we probably we make errors of the other type. This introduces a bias toward active trade.

We uniquely classify each shareholder transaction as one and only one of the following six distinct trades: entry (buy on family entry date), opening (buy in a new fund after family entry date), purchase (buy in an existing fund), redemption (sell that does not liquidate the shareholder's position in the fund), closure (sell that liquidates the shareholder's entire position in the fund), and exit (sell that liquidates the shareholder's entire position in the fund family). No single transaction is put in more than one bucket. For example, a sell that liquidates a position in a fund is called a closure, and it is not double counted as a redemption. We

do not make a distinction between exchanges and non-exchanges.

For each shareholder, we net all trades of the same type in the same fund each day. For example, consider a shareholder who, on the same day, purchases shares in fund X and fund Y in his IRA while also purchasing shares in fund X in his taxable account. This shareholder is said to make two (not three) purchases that day.

#### *D. Share Classes and Registrations*

Some fund families offer multiple share classes in the same underlying fund portfolio (for example, classes A, B, and C). Because the distinction between share classes is not germane to our research question, we net each shareholder's transactions across the share classes of each distinct fund. Thus, a shareholder who opens two share classes of a particular fund is said to open only one fund. Similarly, a conversion from one share class to another within the same fund is ignored. In practice, the bulk of multiple share class ownership stems from holdings of both class A and B in a fund, and the majority of exchanges between share classes in a given fund are automatic conversions from class B to class A.<sup>5</sup>

When a shareholder first enters a fund family, he establishes one or more registrations (for example, one joint, one IRA, and one trust registration). Through each registration, he buys shares of one or more mutual funds (for example, one bond fund and two equity funds). In each fund, he holds one or more accounts (for example, one intended for retirement needs and one intended for charity). Notice that the shareholder may invest in the same fund more than once at the same time: either through multiple registrations or in multiple accounts through one registration. However, we aggregate a shareholder's holding in one particular mutual fund within and across all of his registrations. In the following discussion, a "fund" refers to a distinct portfolio held by the shareholder.

#### *E. Account Types*

Each family assigns social codes to every registration, and we assign social codes to shareholders based on their social code with the most assets on family entry date. (Only 1.24% of the shareholders have multiple

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<sup>5</sup>Traditionally, share class A has a front-end load and a low 12b-1 fee while class B has a back-end load that declines each year and a high 12b-1 fee. When the back-end load reaches zero, class B automatically converts to class A. In most fund families, class C shares are not converted to class A.

social codes on family entry date.) A few examples of the hundreds of social codes used in our database are individual, joint tenants with rights of survivorship, Roth conversion, 457 plan, uniform gifts to minors, broker sub-account, and trust.

We group all shareholders into six account types based on their social codes for this study: Taxable, IRA, Defined Contribution, Other Tax-Deferred, Trust, and Supermarket. Taxable shareholders are individually or jointly held. IRA consists of both traditional and Roth individual retirement accounts. Defined Contribution includes 401(k), 403(b), and 457 retirement savings plans. Other Tax-Deferred is comprised of assorted tax-advantaged investments, including medical savings accounts, 529 plans, and miscellaneous retirement plans. Trust includes all accounts held in trust, including UGMA and UTMA. Supermarket consists of broker-dealer and supermarket accounts.

Some shareholders invest directly with the fund family while others invest indirectly through an intermediary. Large intermediaries frequently act as record keepers for their customers. They aggregate the trades of their customers in a given mutual fund, reporting the aggregate information to the fund each day using one “omnibus” account. Under this bookkeeping arrangement, the fund does not know who the underlying shareholders are, and it does not see their individual transactions. Other intermediaries frequently choose to have the fund maintain the shareholder data, so they pass through to the fund all of the account-level transactions. Therefore, our sample of intermediated shareholders is probably skewed away from the largest intermediaries. In particular, it is unlikely that our database contains very many shareholders in either the largest DC plans or the largest two or three mutual fund supermarkets.

#### *F. Summary Statistics*

Table 1 provides summary statistics for the fund families in the sample (Panel A) as well as comparable statistics for the overall fund industry (Panel B). Results show that the families in our database are fundamentally different from the industry’s mean fund family: they are substantially bigger. The sampled fund families had average assets of \$203 billion in 2005, nine times the mean for all mutual fund families. The mean number of funds was 74 in 2005 for the sample firms, compared with 19 funds for the industry as a whole. The sample firms also have about eight times more shareholder accounts than the industry as a

whole.

In our database, the unreported number of shareholder accounts in any given year ranges from 250,226 (2003) to 265,785 (2004). The total number of transactions in each year ranges from 2.48 million (2001) to 2.84 million (2000).

Table 2 provides annual summary statistics. Panel A tabulates market performance between 1999 and 2005. CRSP equity returns ranged from -21% (2002) to 33% (2003). Corporate bond returns ranged from -7% (1999) to 16% (2002), while Treasury bills yielded 1% (2003) to 6% (2000).

Panel B summarizes the shareholder's portfolio on family entry date for each year of the sample period. The mean shareholder brings a total of \$23,500 to the family; however, this initial investment is highly right skewed—the median total portfolio value is only \$4,100. Average portfolio size varies across asset classes. For example, equity shareholders have small portfolios while bond and money shareholders have large portfolios.

The results also show that the shareholders' portfolios vary from year to year in both composition and size, suggesting that the overall market performance affects the shareholders' desired portfolio. Shareholders chose equity when equity performed well, and they chose bonds when bonds performed well. Year by year, shareholders opened an increasing number of hybrid funds and a decreasing number of money funds. This may contribute to the yearly increase in the median portfolio size.

Table 3 provides summary statistics of various shareholder characteristics on family entry date. First, there is a considerable heterogeneity in the shareholders' total portfolios on family entry date. Approximately one-third of shareholders bring less than two times the fund's minimum, and over one-fifth bring at least 22 times the minimum. Nearly three-fifths of the shareholders are in the direct tax-deferred accounts, suggesting that neither embedded gains nor embedded losses should affect their post-entry trading. Approximately four-fifths of shareholders are in load fund families.

### **III. Portfolio Choice on Family Entry Date**

Mutual fund shareholders who value one-stop shopping may invest with just one fund family. Our database is ideally suited to test whether shareholders value this convenience because our fund families are among the largest in the industry. Each family offers a wide variety of funds that may satisfy the mutual

fund investment needs of most shareholders. Moreover, our sample period, 2000–2005, includes a wide range of market conditions.

Shareholders may value product variety when they first enter the fund family. For example, they might invest in both equity and bond funds on family entry date. Alternatively, they might value variety through time. For example, shareholders might choose a bond fund on family entry date and exchange into an equity fund the following year. In this section, we study the shareholders' portfolio choice on family entry date. In the next section, we study their subsequent portfolio adjustments.

#### *A. Main Hypotheses*

We conjecture that large family-entry-date investments are positively correlated with the number of fund openings. If wealthier shareholders are better educated about the benefits of holding well-balanced portfolios, they might be more likely to hold multiple funds and asset classes. There is also a mechanical relationship between portfolio size and fund opening: the fund families in our sample have minimum initial investment requirements for the non-institutional share classes of their funds. Shareholders need to bring at least double this minimum to the family before they can open two or more funds.

Shareholders who invest in multiple mutual funds may invest either within one fund family or across multiple fund families. We conjecture that the degree to which shareholders place all of their mutual fund assets in one fund family varies by distribution channel (see Reid and Rea (2003) for a contemporary discussion of the mutual fund distribution channels). First, load fund families may contain a larger fraction of the shareholder's assets because load families structure their sales charges to encourage the use of their funds: they provide reductions in sales charge based on the total dollar amount of the shares held in the fund family, often including the shares owned by the shareholder's entire household at the same address, and they allow load-free exchanges within the family. Additionally, some brokers that sell load funds are employees of the investment advisor and are probably comparatively unlikely to invest their clients' money in other (unaffiliated) families.

Second, shareholders who invest through an intermediary such as a mutual fund supermarket, broker-dealer, or financial planner are probably more likely than the other shareholders to invest in multiple fund

families. (In order to simplify the discussion, we refer to these as “supermarket shareholders.” However, we interpret the results in terms of the broader types of intermediated shareholders.) The intermediary reduces the supermarket shareholders’ cost of trading across fund families, it offers consolidated statements, and it provides other benefits of very broad-based one-stop shopping. We hypothesize, therefore, that supermarket shareholders are less likely than other shareholders to open multiple funds in a given fund family.<sup>6</sup>

We also expect that participants in the defined contribution (DC) retirement market are more likely than direct taxable shareholders to open multiple funds in the fund family. It is generally cheaper to buy shares through a DC plan because loads, account fees, and minimum initial investment requirements are typically waived. Retirement plans restrict the number of fund families in which the participant can invest, and small plans are especially likely to offer funds from only one fund family (see Elton, Gruber, and Blake (2006)). Also, the retirement plans’ educational materials may encourage shareholders to choose well-balanced portfolios.

There are a few studies that suggest that mutual fund flow is determined by not just fund characteristics but also family characteristics. In particular, Nanda, Wang, and Zheng (2004) show that the performance of a “star” fund can spillover to other funds in the same fund family: individual mutual funds attract additional shareholder flow whenever their family has a star fund that significantly outperforms its peers. There are two hypotheses that explain why shareholders put extra money into the non-star funds. The one-stop-shopping hypothesis posits that shareholders who buy star funds decide to invest simultaneously in the family’s other funds. This suggests that star-fund buyers are disproportionately likely to open multiple funds on family entry date. The search-cost hypothesis posits that the star fund raises the visibility of the entire fund family which causes some shareholders to buy the non-star funds when they would not have otherwise considered any fund in the family. This suggests that star-fund buyers are not more likely to invest in multiple funds on family entry date.

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<sup>6</sup>Although Jack White & Company created the first mutual fund supermarket in 1984 (Charles Schwab, the current leader in this marketplace, followed with its own supermarket later that year), the penetration of supermarkets has been fairly limited. More than twenty years later, supermarkets have captured only 5% of the industry’s assets (see Reid and Rea (2003)). Moreover, supermarkets primarily serve independent, fee-based financial advisors and not direct individual shareholders.

*B. Number of Funds and Asset Classes on Family Entry Date*

Table 4 shows that shareholders choose very concentrated portfolios on family entry date. Panel A tabulates the number of funds opened on family entry date. Over two-thirds of the shareholders open exactly one fund, one quarter open two to five funds, and one in eighteen shareholders open six or more funds. The unreported maximum number of entry-date funds is 16, a portfolio chosen by three shareholders.

We group the funds into four broad asset classes: equity, bonds, hybrid, and money market. The most common asset class, by far, is equity: 69% of the shareholders open one or more equity funds on family entry date. The least common asset class is money market, where only 11% of shareholders open at least one money fund. Bond funds are held by 17% of shareholders, and hybrid funds are selected by 23% of shareholders.

The number of funds held in each asset class parallels the fraction holding each class. Nineteen shareholders open ten or more equity funds, for example, while no shareholder opens more than three money funds. Moreover, it is uncommon to hold more than one fund in a specific non-equity asset class. For example, only 5% of hybrid shareholders open more than one hybrid fund.

Panel B reports the number of asset classes that are held by each shareholder. Because most shareholders hold exactly one fund, they are mechanically limited to holding one asset class. For this reason, the results are separately tabulated for all shareholders and for those who open multiple funds. Even these later results indicate concentrated portfolios: 48% of shareholders who open more than one fund choose all of their funds from the same asset class, and fewer than 1% choose funds in each of the four asset classes.

Figure 1, Panel A shows which asset class combinations are held by shareholders. Panel B shows the parallel results for shareholders who invest in multiple funds. The most striking result of this panel is that 45% of shareholders who buy at least two mutual funds restrict themselves to just the equity asset class. The second feature of the figure is that multiple-fund shareholders essentially always buy an equity fund: only 5% do not open an equity fund on family entry date. This is very surprising given the fact that during half of our sample period (2000–02), equity lost 11%–21% each year while bonds delivered large gains.

The overall picture that emerges from these summary statistics is that most shareholders open only one fund when they first enter large mutual fund families despite the fact that their fund families offer rich

selections of individual mutual funds. Moreover, shareholders who open more than one fund generally hold very few funds, and half of these shareholders restrict themselves to just the equity asset class.

### *C. Multiple Funds*

This subsection estimates logit regression models of multiple fund openings on family entry date. The dependent variable is zero for shareholders who choose exactly one fund, and it is one for shareholders who choose multiple funds.

Because the logit model is non-linear, estimated coefficients are hard to interpret. Thus, we report exponentiated estimated coefficients, commonly called odds ratios. It is easy to interpret odds ratios for dummy variables. For example, an estimated odds ratio of 1.3581 means that those shareholders are  $1.3581 - 1 = 35.81\%$  more likely than the other shareholders to open multiple funds, while an estimated odds ratio of 0.4314 means that those shareholders are  $1 - 0.4314 = 56.86\%$  less likely than the other shareholders to open multiple funds.

Our empirical specifications are based on the following equation:

$$\begin{aligned} y_i = & \text{(intercept)}\beta_0 + \text{(shareholder characteristics)}_i\beta_1 \\ & + \text{(family characteristics)}_i\beta_2 \\ & + \text{(market characteristics)}_i\beta_3 + \epsilon_i. \end{aligned}$$

Our first specification consists of shareholder portfolio size, account types, and the automatic investment plan. The second specification adds family fixed effects, load status, and star ratio. The third specification adds month fixed effects.

Table 5 presents the results. The reported standard errors are transformed via the delta method, and they are robust to heteroskedastic disturbances. The main results are tabulated in the third specification (“Market”).

#### *C.1. Shareholder Characteristics*

The first shareholder characteristic is the total amount invested on family entry date. We scale this number by the minimum initial investment requirement and create three disjoint dummy variables to identify

when the investment meets or exceeds 2-, 6-, and 22-times the minimum (these three values result in three equal shareholder groups; the omitted dummy variable identifies shareholders who bring less than double the minimum to the family).<sup>7</sup> Because the shareholder's entry-date investment may be endogenous to the minimum, we cannot claim that shareholders with initial balances less than two times the minimum are unable to invest in multiple funds. However, we can confidently assert that shareholders with portfolios that meet or exceed two-times the minimum are able to invest in multiple funds.

The results show that shareholders with large portfolios are more likely than shareholders with small portfolios to open multiple funds. Those with portfolios between 2- and 6-times the minimum are estimated to be 21.3% more likely than the smaller shareholders to open multiple funds; shareholders with portfolios between 6- and 22-times the minimum are estimated to be 75.5% more likely to open multiple funds; and the largest shareholders are 315% more likely to open multiple funds. These estimates are both economically and statistically significant. The fact that successively larger shareholders are successively more likely to open multiple funds suggests that the relationship between portfolio size and number of funds shareholders hold is not just mechanically related to the minimum initial investment requirements. Perhaps the larger shareholders hold multiple funds because they are more interested in holding well-balanced portfolios. Alternatively, the size of the shareholder's portfolio might proxy for whether the fund family is the shareholder's primary fund family. Under this competing hypothesis, shareholders with small portfolios open fewer funds because they concurrently invest in other fund families. They would have low search or switch costs and might be, therefore, more likely to trade; however, this alternative is inconsistent with the post-entry trading results toward the end of the next section.

The shareholders' tax status is closely related to their demand for variety on family entry date. This is especially evident in the DC market, where DC shareholders are 701% more likely than taxable shareholders to open multiple funds (they have, by far, the largest odds ratio in this table). The preference for multiple-fund openings is probably not driven by the plan's default option because defaults are usually just one fund

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<sup>7</sup>Fund minimums can vary within each fund family for three reasons. First, each fund is able to set its own minimum. Second, minimums can vary across the share classes of a given fund. Retirement share classes, for example, typically have lower minimums than the corresponding retail classes. Third, some shareholders can get the minimums reduced or even waived. The primary way this happens is by participating in the fund's automatic investment plan. To reduce endogeneity concerns, we assign one minimum to each fund family each year based on the mode of the family's retail share classes. For all fund families, the initial minimum of the (vast) majority of funds equals the family's mode.

such as a money market fund or a broadly diversified fund. Our finding is consistent with a recent study of DC plans sponsored by The Vanguard Group in 2001. Huberman and Jiang (2006) note that the median DC plan participant uses 3 or 4 funds in their cross section. (They have no information on what was selected on family entry date.)

Among the tax-advantaged accounts, the one that is most similar to taxable shareholders in terms of the investment opportunity set is probably the IRA shareholders. Yet the results show that IRA shareholders are 66.4% more likely than the taxable shareholders to choose variety. It is unlikely that this result is driven by funds that allow lower minimum initial investments for IRAs: an unreported regression that interacts portfolio size with the IRA account type dummy shows that the combined effect of being a large IRA shareholder is to increase the odds of opening multiple funds on entry date.

To test whether shareholders who invest through mutual fund supermarkets spread their investments across multiple fund families, we would ideally use shareholders sampled directly from those supermarkets. Our data were sample from fund families, however, so we are less likely to see the supermarket shareholder's entire mutual fund portfolio under the null hypothesis. Consequently, we expect to find that our supermarket shareholders are comparatively less likely to open multiple funds. Consistent with our hypothesis, the estimates show that the supermarket shareholders are 61.7% less likely than direct taxable shareholders to open multiple funds. An alternative interpretation of this result is that supermarket shareholders prefer to hold fewer funds overall than the non-supermarket hold. For example, shareholders who believe in short-term persistence in mutual fund returns (see Bollen and Busse (2005)) might restrict their investments to the single best fund each period. These shareholders might self-select into mutual fund supermarkets precisely because supermarkets make it easy to switch quickly between funds in different mutual fund families.

Shareholders may have a primary fund family in which they keep most of their mutual fund assets. We conjecture that shareholders are more likely to open multiple funds in their primary fund family than they are elsewhere. As a proxy for this relationship, we include a dummy variable that indicates the shareholders' participation in an automatic investment plan because it should signal a long-term relationship with the fund family (see Johnson (2004)). Our results are consistent with this hypothesis: automatic shareholders are 66.2% more likely than non-automatic shareholders to open multiple funds on family entry date.

Nevertheless, this result is also consistent with a binding constraint imposed by the fund’s minimum initial investment requirements because funds often waive the minimum for shareholders who establish automatic investment plans. In an unreported regression, we test whether the smallest shareholders who establish an automatic investment plan are more likely to open multiple funds. The resulting odds ratio is 0.9323—these shareholders are *less* likely to open multiple funds—but it is not statistically significant.

### *C.2. Family Characteristics*

It seems likely that the shareholder’s chosen portfolio is directly affected by the fund family. Three classes of variables are included in the model to control for systematic differences across the 14 fund families in our database. First, we allow for fund family fixed effects by including dummy variables for each of the families, but we do not report the estimated odds ratios.

Second, we test whether shareholders in load fund families are connected more strongly with the family. The results show that load shareholders are 99.1% more likely than no-load shareholders to open multiple funds. There are at least two interpretations of this result. On the one hand, it may mean that load shareholders are more likely than no-load shareholders to restrict themselves to just one fund family. This could follow from the break-point and other incentives load families provide to shareholders and their brokers. On the other hand, it may mean that load shareholders hold more varied portfolios. For example, brokers might discourage shareholders from investing their entire mutual fund portfolio in just one asset class (see Bergstresser, Chalmers, and Tufano (2004)). These competing hypotheses are pursued further below.

Third, we test whether one-stop shopping contributes to flow spillovers. We cannot directly mimic the spillover methodology of Nanda, Wang, and Zheng (2004) because each of our large fund families offers star funds essentially every month of our sample period. However, the family-level ratio of star funds to total offered funds varies considerably through time and across families. We test, therefore, whether the fraction of star funds offered each month helps explain the number of funds a shareholder chooses on family entry date.

We first identify monthly star funds using the methodology of Nanda, Wang, and Zheng (2004).<sup>8</sup> We

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<sup>8</sup>They use two methodologies to identify star funds: funds that outperform 95% of their peers on a risk-adjusted basis or funds that receive five stars from Morningstar, a firm that rates mutual funds. They find that shareholders respond more strongly to the later measure, so we use just that measure. Because CRSP does not link share classes to unique fund portfolios,

then divide each family’s number of star funds by their total number of offered funds each month. Last, we generate three dummy variables that equal one if and only if the star ratio is between the 75th–90th, the 90th–95th, or the 95th–100th percentiles. The results indicate that shareholders who enter when the family offers relatively more star funds are more likely to open multiple funds. For example, shareholders who enter the family when the star ratio is in the top 5% are 218% more likely than average to open multiple funds. This is consistent with the one-stop shopping hypothesis, and it suggests that star funds do not attract only “hot money” that frequently switches from one top fund to another top fund. In Section IV below, we further explore whether star shareholders are different from non-star shareholders.

### *C.3. Market Characteristics*

Our sample period includes a wide range of market returns and conditions that may affect not just the types of portfolios shareholders choose but also the types of shareholders that enter the mutual fund marketplace. To control for these differences, we include time dummies for each of the 72 calendar months in our sample period. We do not include returns (whether equity, corporate bond, government bond, or Treasury bills) because unreported hypothesis tests show that they do not statistically improve the model.

### *C.4. Demographic Data*

The fund families in our sample were unable to provide detailed shareholder demographic information. Because the extant portfolio choice literature has shown that shareholder characteristics are important (see, for example, Ameriks and Zeldes (2004) and Agnew, Balduzzi, and Sundén (2003)), we purchased age, gender, education, and household net worth data from Axiom, a data collection and warehousing firm that primarily serves corporate marketing and customer-relationship clients.

The unreported regression results are weak. Although this may indicate that the decision to open one or multiple funds on family entry date is unrelated to these shareholder characteristics, a more likely explanation is that the Axiom data are not reliable. Part of the concern is that we were unable to get data for every

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we calculate stars based on share classes and not funds. It is unlikely that this imparts a noteworthy bias for our star measure because the number of share classes per fund is usually the same within the fund family and star ratings are generally the same across the share classes of a given funds. We note that Morningstar changed its star-calculation methodology in summer 2002. In unreported regressions, we find qualitatively similar results in both periods. We thank Lu Zheng for help with the calculation of synthetic Morningstar stars.

year of our sample because Axiom does not maintain historical data. Another related shortcoming is that the match rate is low: only one-ninth to one-third of the shareholders were successfully matched with some Axiom data.

#### *D. Multiple Asset Classes and Single Asset Class Types*

In order to understand further the shareholders' family-entry-date portfolio choice—and how this demand might affect the fund family's decision to offer various types of funds—we estimate five new logit regression models in this subsection. The results are tabulated in Table 6. The first specification (“More Than One Fund”) is a duplicate of the main results from Table 5. It is retabulated for comparison purposes.

The second specification (“More Than One Asset Class”) models the decision to open one or multiple asset classes on family entry date. The results are very similar to those from the multiple funds regression. This is expected because the majority of shareholders open exactly one fund and are, therefore, mechanically restricted to one asset class (see Table 4). Nevertheless, there are a few noteworthy differences. The first is that shareholders who bring 2- to 6-times the minimum to the fund are not more likely to choose more than one asset class even though they are more likely to open multiple funds. This suggests that the second fund these shareholders buy is in the same asset class as their first one. Another difference is that trust shareholders are less likely than taxable shareholders to open multiple asset classes, suggesting that trust accounts tend to hold more focused portfolios.

The remaining four specifications model the decision to open at least one equity fund, at least one bond fund, at least one hybrid fund, and at least one money fund. In other words, we decompose the fund-opening decision into the four types of funds shareholders can open. The results indicate that these four decisions are different from each other, and that they are different from the original multiple-funds model.

The relationship between the size of the shareholder's initial portfolio and the probability of opening multiple funds does not carry through to the probability of opening at least one equity fund. In fact, the results indicate that shareholders with large portfolios are approximately 30% *less* likely than the shareholders with small portfolios to open at least one equity fund. Nevertheless, they are more likely to open bond funds and more likely to open money funds.

In contrast to the portfolio choice literature that has long studied how investors should allocate their wealth across bonds and stocks, a relatively new literature asks how assets should be allocated across taxable and tax-deferred accounts (see Shoven and Sialm (2003)). Because bonds are taxed more heavily than stocks, the common prescription is that bonds should be located in tax-deferred accounts while equities should be located in taxable accounts (i.e., taxable and tax-deferred portfolios should generally look very different). Our results provide mixed evidence on this point, suggesting that other factors are important in portfolio decisions. While the DC shareholders are more likely than taxable shareholders to open bond funds, the IRA shareholders are less likely to do so. Moreover, both types of tax-advantaged shareholders are more likely than taxable shareholders to open one or more equity funds. Both IRA and DC shareholders are more likely than taxable shareholders to open money accounts. The effect is especially pronounced for DC shareholders (the odds ratio is 5.93), but it may be driven by plan design since many DC plans default participants into money funds.

The supermarket shareholders are relatively unlikely to open bond funds and relatively likely to open hybrid funds. They do not open money funds (the odds ratio is 0.16, the smallest in the table). Although this may indicate that these shareholders do not hold cash, a more likely explanation is that they prefer to use the money market fund sponsored by the supermarket.

Shareholders who participate in at least one automatic investment plan are more likely than non-participants to buy funds in the first three asset classes, but they are 24.2% less likely to open a money fund. This suggests that participants are not simply engaged in dollar-cost averaging a lump sum of cash into the market. Instead, automatic investment plan contributions may come from labor income. We note that the median automatic investment plan purchase was \$100 in 2005.

There are also a number of important differences among the fund family characteristics. First, load shareholders are 134% more likely than no-load shareholders to open multiple asset classes. Additionally, they avoid both equity (0.382) and money (0.496) while seeking out bonds (1.385) and hybrid (11.522).<sup>9</sup> This is direct evidence that individual shareholders hold different portfolios when they buy broker-sold mutual funds. This complements the aggregate results offered by Bergstresser, Chalmers, and Tufano (2004).

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<sup>9</sup>The types of funds offered by each fund family are similar across no-load and load fund families. However, hybrid funds are heavily concentrated in the load fund families. This may explain the large hybrid odds ratio.

Second, the star-fund effect is strong for equities: shareholders are more likely to open at least one equity fund during periods the family offers a large number of star funds. The effect is weaker for bond funds, and it is curiously reversed for hybrid funds.

## IV. Portfolio Adjustments after Family Entry Date

Our evidence of portfolio decisions in large mutual fund families indicates that the majority of mutual fund shareholders do not value variety when they first enter the fund family—over two-thirds of shareholders choose exactly one fund. In this section, we study how shareholders trade after family entry date. We explore the likelihood of opening new funds and the likelihood of executing other types of transactions such as fund closings and family exits.

We exclude both fund distributions and automatic transactions from the database of post-entry trades. Fund distributions are under the discretion of the portfolio manager, and automatic transactions come from a one-time decision on family entry date (shareholders can subsequently change this fund-opening decision, but in practice they do not).

### A. *Main Hypotheses*

There is substantial heterogeneity in our database. We conjecture that this heterogeneity is driven by distinct trading preferences rather than random noise, so we examine how entry-date portfolio decisions are correlated with post-entry trades. First, we test whether the number of initial fund openings predicts post-entry openings. Shareholders who value variety on entry date may value it after entry as well, while those who choose a focused portfolio on family entry date may refrain from opening new funds after entry date. Alternatively, those who open only one fund on entry date might spread their mutual fund investments across multiple fund families. Shareholders who do so should be comparatively less likely to buy shares (and more likely to sell shares) after entry date because they have more outside opportunities than the single-family shareholders.

Second, we test whether the type of funds selected on entry date is related to post-entry trade. For example, shareholders might have a preferred “habitat” in which they make most of their investments

(see Barberis, Shleifer, and Wurgler (2005)). If so, shareholders who initially choose bond funds might be comparatively likely to open more bond funds in subsequent trading.

We test the “hot money” hypothesis that shareholders who buy star funds are disproportionately likely to sell shares after family entry. These shareholders may be disproportionately sensitive to fund performance, perhaps because they have low switch costs and want to chase short-term persistence in mutual fund returns (see Bollen and Busse (2005)).

#### *B. Number and Timing of Transactions after Family Entry Date*

Our database of shareholders who enter the family on or after December 31, 1999 is right censored because transactions placed after December 31, 2005 are unobserved. Thus, simple summary statistics on the number of transactions a shareholder places may be misleading. Suppose, for example, that all shareholders trade exactly one year after family entry date. If most of our shareholders enter within one year of December 31, 2005, our data would misleadingly indicate very low levels of trade. We address this complication by presenting summary trading statistics using two different methods.

Table 7 show the total number of lifetime transactions we observe shareholders make in our database. Although we are primarily interested in openings, we also report purchases, redemptions, closures, and exits (as defined in Section II). We group the shareholders into cohorts based on the year they entered their family to reduce the effects of right censoring.

Purchases and redemptions are more common than openings and closings, suggesting that shareholders prefer to make incremental adjustments to existing positions. Also, the number of purchases and redemptions are highly skewed. Shareholders either make zero, a few (one or two), or many (ten or more) transactions. This suggests that there is considerable heterogeneity in the liquidity needs of shareholders. The frequent trading could be related to the “late trading” and “market timing” scandals that broke in September 2003 (see, for example, *The New York Times*, page C1, September 4, 2003, “Big fine over trader’s mutual-fund moves.”) or, more simply, it may mean that we have not correctly identified all automatic transactions.

If shareholders uniformly trade through time, the earlier cohorts should have more observed trades than the later cohorts. The evidence suggests instead that most lifetime trades happen soon after family entry.

For example, the fraction of shareholders who purchase or redeem is remarkably constant across the 2000-2003 cohorts. However, the evidence suggests that the rate of family exit is somewhat constant from year to year. For example, 44.5% of 2000 shareholders exited within six years ( $44.5/6 = 7.4$ ) while 7.2% of 2005 shareholders exited within one year ( $7.2/1 = 7.2$ ). In both cases, the annual exit rate is about 7%.

Table 8 shows the timing of transactions over the shareholder's life cycle in the fund family. These results also show that trading, if it occurs, happens early. All types of transactions occur less often with the passage of time. For example, 36% of shareholders purchase at least once within one year of family entry, but only 14% of shareholders purchase at least once during their sixth year in the family. This drop in trade is also consistent with a selection effect whereby those who trade are quick to exit the family, implying that only non-traders have long tenures in the family.

### *C. Days to First Opening*

Our proxy for the shareholder's demand for variety after family entry date is the number of days until he opens a new fund in the family. We estimate a duration model because it sensibly controls for two types of right censoring: we do not observe any shareholder transactions after December 31, 2005, and some shareholders exit the family without opening a new fund. See Kiefer (1988) for an accessible introduction to this model from the perspective of an economist.

The duration model has two key functions. The first is the hazard function,  $\lambda(t)$ . It captures, loosely speaking, the conditional new-fund-opening rate at event time  $t$ . The other is the survival distribution function,  $S(t) = \exp\{-\int_0^t \lambda(u) du\}$ . This function shows the fraction of observations that have not yet opened a new account by event time  $t$ . Although the hazard function can be parametrically specified, there is little economic theory to suggest an appropriate specification for the fund-opening process. Erring on the side of caution, therefore, we choose the proportional hazards model developed by Cox (1975) for the analysis. (Johnson (2004) uses this model to estimate the fund-closing process.) Because the estimated coefficients are hard to interpret in this semi-parametric model, we report exponentiated estimated coefficients, commonly called hazard ratios. If the hazard ratio is greater than one, the shareholder is disproportionately likely to open a new fund. Similarly, if the hazard ratio is less than one, the shareholder is disproportionately unlikely

to open a new fund.

Five duration models of the days until the first opening of a new fund are estimated, and the key results are presented in Table 9. The first specification (“Benchmark”) uses the exact same regressors that we use in Table 6. In stages, we add regressors that capture the portfolio decision on family entry date. The second specification (“Funds”) controls for the number of funds the shareholder opened on family entry date. The third specification (“Asset Classes”) controls for the asset classes initially selected by the shareholder. The fourth specification (“Star”) adds a dummy variable that equals one if and only if the shareholder opened at least one star fund on family entry date. Last, the final specification (“All”) includes all of these new variables. This is our preferred specification.

### *C.1. Shareholder and Family Characteristics*

The regressors that significantly predict multiple fund openings in the prior logit models generally predict post-entry openings as well; however, the economic effects are not as strong. For example, the largest shareholders are 315% more likely than the smallest shareholders to open multiple funds on family entry date, but only 80.0% more likely to open a new fund after entry date.

Tax-deferred shareholders are more likely than the taxable shareholders to open new funds after entry date, but the differences between the three types of tax-deferred shareholders is smaller than in the prior models. In particular, DC shareholders are not the group with the largest demand for variety. The hazard ratios for the IRA and DC shareholders are statistically and economically identical—IRA shareholders who are not bound to a fixed plan menu do not choose more post-entry variety than the DC shareholders choose.

The automatic investment plan result continues to suggest that these shareholders are more committed to the family because, perhaps, they do not invest in other fund families.

Load shareholders are 33.8% more likely than no-load shareholders to open new funds after family entry date. There are no statistical differences between the future opening behavior of shareholders who entered when the family offered many or few star funds.

### *C.2. Entry Date Portfolio Characteristics*

We now test whether entry-date portfolio preferences are correlated with post-entry openings. First, we examine the number of chosen entry-date funds. We create three dummy variables to indicate whether the shareholder opens 1, 2–6 (the omitted variable), or more than 6 funds on family entry date. The results indicate that shareholders who open only one fund are 18.9% less likely than the 2–6 fund shareholders to open funds in the future. However, it is not simply the case that shareholders who choose variety on family entry date value variety after family entry date. This is shown by the fact that shareholders who initially opened 7 or more funds—although only 4.4% of the shareholders choose this high level of variety—are 46.2% less likely to open new funds after family entry date. For some reason, the shareholders with the highest demand for post-entry variety are those who initially selected an intermediate level of variety.

Second, we show how the types of funds chosen on family entry date relate to post-entry openings. Based on Figure 1, Panel A, we choose six variables to control for six distinct portfolio types: equity funds only, bond funds only, hybrid funds only, money funds only, exactly two asset classes (the omitted dummy), and three or more asset classes. The results show that shareholders who open only equity funds are 6.6% more likely than the two-asset-class shareholders to open a new fund. The other groupings have larger economic effects. Bond shareholders are 45.9% more likely to open while hybrid shareholders are 24.5% less likely to open. The money-only shareholders are very different from the others—they are 310% more likely to open multiple fund families (this is the largest effect in the table). This may indicate that money-only shareholders are temporarily “parking” their assets while they wait for the right time to invest. Shareholders who open three or four asset classes are 13.6% less likely to open more funds after family entry date.

The last check is to see whether star shareholders are hot. Shareholders who buy star funds may simply move from family to family in search of the fund du jour (Table 3 shows that 23.4% of shareholders buy at least one star fund on family entry date). If so, they should be less likely to open funds in the family after entry date. The results contradict this hypothesis, for star shareholders are 9.0% more likely than non-star shareholders to open new funds. Thus, consistent with the family-entry-date results, star funds attract shareholders who value one-stop shopping.

### C.3. *Survival Distribution Functions*

We also calculate the survival distribution function,  $S(t)$ , to illustrate how time affects the population of shareholders who have not yet opened a new fund after family entry date. We present this function in Figure 2, evaluating each regressor at its mean. The graph shows that approximately 25% of shareholders open at least one new fund during the first four years with the fund family ( $S(4) \approx 0.75$ ). However, the risk of opening a new fund is high soon after family entry date, and it declines rapidly through time. For example, 5% of shareholders open a new fund after just 24 days, but the second 5% take an additional 193 days. In the entire fifth year, only 1.2% of shareholders open their first new fund.

### D. *Days to First Equity, Bond, Hybrid, and Money Opening*

To parallel the results from Section III, we now estimate four duration models for the time until the first post-entry equity, bond, hybrid, and money fund opening. This shows in detail the types of products shareholders demand from their fund family, suggesting the types of funds that families should offer. The results are presented in Table 10 and include all of the regressors from Table 9's main specification. As a benchmark, that prior specification is retabulated.

#### D.1. *Shareholder and Family Characteristics*

The results show that the relationship between portfolio size on family entry date and future openings is roughly similar across the four types of funds shareholders can choose. However, the relationship is especially strong for bonds. It is also noteworthy that the equity relationship is positive because Table 6 shows that shareholders with large portfolios are less likely to open equity funds on family entry date. Perhaps shareholders with large portfolios choose bonds or money funds on entry date and later switch to equity funds.

The account type results show that the account opening process varies across fund type for two types of shareholders. First, IRA shareholders are more likely than taxable shareholders to open funds after family entry date, but this does not hold true for money funds. Second, supermarket shareholders are indistinguishable from the direct taxable shareholders when it comes to opening equity funds. However, they are more likely than taxable shareholders to open bond and hybrid funds and less likely to open money

funds (at 0.320, the hazard ratio for money funds is the smallest in the table). As before, this money effect is probably driven by the fact that most supermarkets offer to their customers a house-branded money fund as a sweep account.

The next main difference shown in the table comes from load fund families. Here, brokers show an especially strong preference for opening bond funds in the future (the hazard ratio is 2.479) and a reluctance for opening money funds (the hazard ratio is 0.459).

### *D.2. Entry Date Portfolio Characteristics*

The remaining results are based on characteristics of the shareholders' entry-date portfolios. Although the effect of the number of family-entry-date funds on post-entry openings is generally similar across the four fund types, there are differences based on the types of funds. Broadly, the results are consistent with the habitat view of investing—shareholders open after family entry date the same type of funds they opened on family entry date (see Barberis, Shleifer, and Wurgler (2005)). The effects for hybrid shareholders are particularly strong. Not only are they more likely to open hybrid in the future, they are very unlikely to open all other types of funds. The bond- and money-only shareholders are likely to open funds in their own habitat after entry date, but they are willing to open other types of funds. The equity-only shareholders are a little different. Although they have a marked distaste for bond funds, they are likely to open money funds.

The star-shareholder results are surprising. Shareholders who bought at least one star fund on family entry date are 11.1% less likely than non-star shareholders to open equity funds in the future. However, they are 22.7% more likely to open a bond fund and 87.8% more likely to open a money fund. This may indicate that star-fund spillovers have an important time component—stars produce spillovers not only today but also tomorrow. The results are inconsistent with the hot-money hypothesis that star funds only attract shareholders who leave quickly.

### *D.3. Survival Distribution Functions*

To put these effects in context and illustrate the effects of time, we plot the survival distribution function in Figure 2 from each of the five specifications reported in Table 10 (all regressors are evaluated at their means). The results show that the post-entry-date openings are largely concentrated in equity funds. For

example, after four years in the fund family, 25% of shareholders have opened at least one fund, while 17% of shareholders have opened at least one equity fund and only 5% have opened at least one bond fund.

#### *E. Days to First Purchase, Redemption, Closure, and Exit*

Most shareholders do not open new funds after family entry date. This may indicate that shareholders are content with their entry-date selection of funds. Alternatively, it may indicate that shareholders do not continue to pay attention to their portfolios or that they do not have more assets to invest. To explore these issues, we now estimate duration models of the days until the first transactions for each of the following four types of transactions: purchase, redemption, closure, and exit (as defined in Subsection II.C). Each specification includes all of the regressors from Table 9's main specification. The results are presented in Table 11, and they include Table 9's opening results as a benchmark. The results indicate that these five types of transactions are very different—factors that have a large, positive effect for one type of transaction may have a large, negative effect for another type of transaction. In particular, purchases are quite common, especially within the first year of entry.

##### *E.1. Shareholder and Family Characteristics*

The prior two tables show that shareholders with large portfolios are more likely than shareholders with small portfolios to open new funds. This is consistent with the hypothesis that shareholders with large portfolios are more connected to the fund family. For example, shareholders who want to use the family as their primary source of mutual funds may bring comparatively more of their investable assets to the fund family. However, the new results in the new table are inconsistent with this hypothesis. Shareholders with large portfolios are less likely to purchase and are uniformly more likely to redeem, close, and exit. They are active shareholders, perhaps more frequent monitors of their portfolios (as suggested by Vissing-Jorgensen (2002)). These facts notwithstanding, the investment advisor probably prefers shareholders with large portfolios to those with small portfolios: the former shareholders bring 22 times more assets than the latter shareholders to the fund family, and they are only 8.0% more likely to exit the family.

The account type groupings show that tax-deferred shareholders are more likely than taxable shareholders to buy: both their opening and purchase hazard ratios are larger than one. These shareholders are also less

likely to sell: their redemption, closure, and exit hazard ratios are less than one. However, the exit hazard ratio for DC shareholders is 1.183.

At first blush, it seems odd that DC shareholders' are more likely than taxable shareholders to exit the family. There are at least three possible drivers for this. First, when workers quit their job, they usually have the option of cashing out their retirement accounts. Hurd, Lilliard, and Panis (1998) use HRS data to estimate that 60% of workers take a lump sum distribution when they leave their employer. Second, the DC plan might contain multiple fund families. Workers can exit the family and still remain active in the plan's other fund families. Third, a change of plan sponsors could force a change. For example, Deloitte Consulting, International Foundation, and International Society of Certified Employee Benefit Specialists (2006) report that 37% of retirement plans surveyed had replaced a fund due to poor performance within the prior year.

The results also show that trust shareholders are unlikely to buy (either open or purchase) after family entry date, and they are more likely to exit the family.

The new evidence further supports the hypothesis that supermarket shareholders are short-term shareholders that may have other (mutual fund) investments outside the fund family. Although their risk of purchase is not different from that of taxable shareholders, their risk of redemption, closure, and exit is comparatively high.

It continues to look like automatic investment plan shareholders have a strong relationship with the fund family. On top of being willing to open new funds in the future, they are hesitant to close and exit; however, they are willing to redeem. It is surprising that their opening hazard ratio is larger than one while their purchase hazard ratio is smaller than one.

Load shareholders appear to be great customers for the investment advisor. The evidence shows that not only do they open new funds after family entry date, they are also significantly more likely than no-load shareholders to purchase shares in an existing fund. These shareholders are also substantially less likely to redeem, close, and exit. Again, brokers seem to make a significant difference in how shareholders use mutual funds. There are at least two interpretations of this finding. On the one hand, these differences may indicate that load shareholders are locked into their family. On the other hand, these shareholders might be

more satisfied than no-load shareholders with their investments, perhaps because they hold more diversified portfolios or receive good service from their brokers.

### *E.2. Entry Date Portfolio Characteristics*

Shareholders who choose just one fund from the fund family on entry date are unlikely to make any type of trade in the future relative to the shareholders who open 2–6 funds. It is not surprising that these shareholders are especially unlikely to close a fund—their 0.409 hazard ratio is the smallest in the table—because single-fund shareholders would have to open a new fund after family entry date in order to have a closure before family exit. Shareholders who open 7 or more funds are very likely to purchase and redeem shares in the future, but they are unlikely to open, close, or exit. These trades might be used to rebalance the portfolio.

The shareholder’s initial asset classes are strongly correlated with future trading. Bond- and money-only shareholders are more likely than the 2-asset-class shareholders to exit the family, while hybrid- and equity-only shareholders are less likely to exit. Each of these four types concentrated shareholders are otherwise less likely to trade except for bond shareholders (who are likely to redeem shares) and money shareholders (who are likely to place all types of transactions). Again, the money evidence suggests that money funds are used as a place to hold assets until the shareholder finds a good investment. Last, the evidence shows that shareholders who opened three or four asset classes are more active traders in the future even though they are unlikely to open new funds. Perhaps these shareholders trade in order to keep balanced the diversified portfolios they established on family entry date.

The results show that entry-date star shareholders are more likely to purchase and redeem. Although these shareholders are also more likely to exit, the hazard ratio is economically small (1.031). These results do not support the hypothesis that star funds primarily attract hot money that quickly leaves.

### *E.3. Survival Distribution Functions*

Figure 3 presents the estimated survival distribution functions for the number of calendar days until the first trade for each of the five types of trades studied in this subsection. Consistent with Table 8, the propensity to trade declines through time (tempered by the above-mentioned selection critique). For exits,

however, the graph is approximately linear, indicating that the exit probability is essentially constant each period.

The survival graphs also show that redemptions are uncommon (after six years, only 6% of shareholders have made at least one redemption) and closures are rare (only 3% close at least one fund in the first six years). This suggests that when shareholders decide to sell shares, they liquidate their entire position in the family. However, shareholders are likely to add new assets through either openings (18% of shareholders open in the first two years) or, especially, purchases (45% of shareholders purchase in the first two years). These results suggest that shareholders do not rebalance their portfolio within the family by moving assets from one fund to another. The lack of sells indicates that any intra-family portfolio rebalancing must come from buys with new money from outside the fund family.

Until 1.36 years after family entry date, openings and purchases are more common than exits. After that point, exits are more common than openings. Visually extrapolating the graph, it looks like closures are more common than purchases after about seven years.

Ameriks and Zeldes (2004) report that nearly half of their TIAA-CREF retirement plan participants made no change to either the flow or stock of assets over a ten-year period. Figure 3 suggests that our shareholders trade more often: approximately half of the shareholders make an active purchase within three and a half years of family entry. In an unreported regression, we fit a duration model of the time to the first transaction of any type after family entry date. The results show that 50% of the shareholders trade within eight months of family entry and that 83% trade within six years. This difference in the fraction of shareholders that trades may indicate that DC and non-DC shareholders trade differently. It may also be an artifact of the sampling process. Because the propensity to trade declines through time, shareholders sampled at entry date (our study) will show comparatively high levels of trade while a cross-section of shareholders (Ameriks and Zeldes (2004)) will show comparatively low levels of trade.

## V. Conclusion

This paper tests the hypothesis that demand-side economies of scope affect the family structure of the mutual fund industry. To test whether shareholders' demand for one-stop shopping can plausibly drive the

economics of industrial organization of this important industry, we study a new panel data set of shareholders in some of the largest mutual fund families in the United States.

First, we measure the shareholders' demand for multiple funds on the day they first enter the fund family. Our evidence shows that approximately two-thirds of shareholders choose only one fund. Second, we measure shareholders' demand for variety after family entry date by applying a duration model to the time until the first new fund opening. Again, the evidence indicates very little demand for variety: after four years, only one-quarter of shareholders have opened at least one new fund.

Taken together, our results suggest that the fund industry structure is not driven by the investment demands of the typical retail shareholder. However, our results also show that the vast majority of household assets are controlled by a minority of shareholders with large portfolios who demand variety both on and after family entry date. It is plausible that the industry responds to their preferences.

We compare shareholders in tax-deferred wrappers (for example, IRA and DC accounts) with taxable shareholders. We document a number of important differences in the portfolio choice and trading of these two important sets of households. We also compare shareholders who invest through financial intermediaries such as mutual fund supermarkets, broker-dealers, and financial planners with those who invest directly with the fund. Here, too, we document a number of important portfolio choice and trading differences. This contrast is an important contribution to the literature because prior account-level research is based on shareholders sampled at a particular intermediary such as a brokerage house (for example, Barber and Odean (2000)) or a particular retirement plan (for example, Ameriks and Zeldes (2004)). Our database was sampled at the asset level, so we see the variety of households that buy those assets through various investment channels.

Our evidence also shows that load and no-load shareholders form and trade very different portfolios, and it complements the aggregate evidence presented by Bergstresser, Chalmers, and Tufano (2004). Load shareholders prefer more variety both on and after family entry date, and they are unlikely to sell shares. We are unable to determine whether load shareholders are locked into their fund family because they are unaware of outside alternatives or because they are satisfied with their investments in the family.

In interpreting our analysis of shareholders' demand for post-entry variety, it is important to keep in

mind how we measure this: the time until the first opening of a new fund after family entry date. Future research could control for the size of post-entry transactions as well as the timing and frequency of subsequent transactions.

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**Table 1**  
**Sample Mutual Fund Families vs. Entire Fund Industry**

This table compares the size of the 14 mutual fund families in the database with the size of mutual fund families in the industry. Mean family assets, funds, and shareholder accounts are reported at the end of each year between 1999 and 2005. Panel A presents results for the fund families in the database, and Panel B present results for the entire industry.

A. Shareholder Database Fund Families							
	1999	2000	2001	2002	2003	2004	2005
Mean Family Assets (billions)	\$123.4	\$125.5	\$126.6	\$120.3	\$147.8	\$179.6	\$202.8
Equity	\$84.0	\$82.9	\$73.9	\$59.5	\$84.4	\$105.4	\$122.1
Hybrid	\$8.3	\$8.4	\$9.1	\$9.5	\$13.6	\$18.1	\$21.2
Bond	\$13.7	\$14.3	\$17.4	\$22.2	\$24.4	\$26.4	\$27.4
Money Market	\$17.3	\$19.8	\$26.2	\$29.1	\$25.4	\$29.6	\$32.0
Mean Number of Funds	62	64	67	66	66	74	74
Equity	25	28	30	30	30	34	34
Hybrid	4	4	4	4	5	7	7
Bond	24	24	24	23	23	24	24
Money Market	9	9	9	9	9	9	9
Mean Number of Accounts (thousands)	3,490	4,023	4,428	4,751	4,969	5,596	6,197
Equity	2,549	2,926	3,237	3,353	3,585	4,021	4,420
Hybrid	287	296	352	436	542	704	841
Bond	309	231	356	475	536	567	626
Money Market	346	571	484	487	307	304	310
B. Entire Mutual Fund Industry							
	1999	2000	2001	2002	2003	2004	2005
Mean Family Assets (billions)	\$14.7	\$14.9	\$15.6	\$15.2	\$17.9	\$20.3	\$23.1
Equity	\$9.3	\$8.9	\$8.0	\$6.5	\$9.1	\$11.3	\$13.0
Hybrid	\$1.8	\$1.7	\$1.9	\$2.0	\$2.7	\$3.6	\$4.6
Bond	\$3.2	\$3.3	\$4.0	\$5.0	\$5.4	\$6.0	\$6.4
Money Market	\$8.4	\$9.5	\$12.3	\$13.3	\$12.4	\$12.9	\$14.3
Mean Number of Funds	16	16	17	17	18	18	19
Equity	9	9	10	10	10	10	10
Hybrid	3	3	3	3	3	4	4
Bond	8	8	8	8	8	9	9
Money Market	5	5	5	6	6	6	6
Mean Number of Accounts (thousands)	563	601	635	672	724	767	819
Equity	406	444	458	472	514	557	582
Hybrid	93	91	109	128	153	183	218
Bond	89	81	99	124	135	144	154
Money Market	240	262	271	280	263	259	262

**Table 2**  
**Summary Statistics by Year**

This table presents calendar-year summary statistics. Panel A presents statistics on the performance of the market. Equity returns are from the S&P 500 index and the CRSP value-weighted index, both with reinvested dividends. Bond returns are long-term corporate and government bond returns from Ibbotson. Money market returns are from monthly Treasury bills. Panel B presents entry-date shareholder portfolio statistics grouped by the year the shareholder enters the fund family. In each cell, the number of shareholders is reported, the row percentage of that count, and both means and medians (in thousands of dollars) of the shareholder's total portfolio value on family entry date.

A. Market Performance								
	1999	2000	2001	2002	2003	2004	2005	Geo. Avg.
Equity								
S&P 500 Index	21.0%	-9.1%	-11.9%	-22.1%	28.7%	10.9%	4.9%	1.8%
CRSP Index	25.3%	-11.1%	-11.3%	-20.8%	33.1%	13.0%	7.3%	3.4%
Bond								
Corporate Index	-7.5%	12.9%	10.6%	16.3%	5.3%	8.7%	5.9%	7.2%
Government Index	-9.0%	21.5%	3.7%	17.8%	1.4%	8.5%	7.8%	6.9%
Money Market								
Treasury Bills	4.7%	5.9%	3.9%	1.6%	1.0%	1.2%	3.0%	3.0%
B. Shareholder Portfolios on Family Entry Date								
	2000	2001	2003	2004	2005	2,005	All Years	
All Shareholders								
Count	19,394	13,945	12,989	12,658	15,520	16,348		90,854
Percent	21.3%	15.3%	14.3%	13.9%	17.1%	18.0%		100.0%
Mean Portfolio	\$24.7	\$25.4	\$21.1	\$23.1	\$22.9	\$23.5		\$23.5
Median Portfolio	\$3.0	\$3.0	\$3.3	\$4.9	\$5.0	\$5.9		\$4.1
Equity Shareholders								
Count	16,447	10,841	9,106	7,412	9,601	9,195		62,602
Percent	26.3%	17.3%	14.5%	11.8%	15.3%	14.7%		100.0%
Mean Portfolio	\$20.7	\$20.9	\$17.7	\$16.9	\$21.3	\$19.7		\$19.8
Median Portfolio	\$2.5	\$2.3	\$2.7	\$3.5	\$3.9	\$4.6		\$3.0
Bond Shareholders								
Count	1,663	2,411	3,151	3,247	2,896	2,355		15,723
Percent	10.6%	15.3%	20.0%	20.7%	18.4%	15.0%		100.0%
Mean Portfolio	\$67.2	\$47.9	\$35.9	\$36.8	\$39.3	\$37.8		\$42.2
Median Portfolio	\$21.8	\$16.7	\$10.0	\$9.1	\$10.6	\$9.0		\$10.8
Hybrid Shareholders								
Count	1,390	1,998	2,442	3,592	5,276	6,499		21,197
Percent	6.6%	9.4%	11.5%	16.9%	24.9%	30.7%		100.0%
Mean Portfolio	\$37.9	\$22.5	\$14.9	\$20.2	\$20.7	\$23.0		\$22.0
Median Portfolio	\$4.0	\$3.0	\$2.4	\$4.9	\$5.6	\$7.6		\$5.0
Money Shareholders								
Count	2,299	1,939	1,602	1,583	1,391	1,324		10,138
Percent	22.7%	19.1%	15.8%	15.6%	13.7%	13.1%		100.0%
Mean Portfolio	\$66.9	\$64.5	\$45.1	\$50.1	\$48.8	\$53.1		\$56.1
Median Portfolio	\$9.8	\$10.0	\$6.5	\$11.6	\$10.3	\$6.3		\$9.8

Table 3

**Shareholder Characteristics and Portfolio Choice on Family Entry Date**

This table presents summary statistics of the individual (not institutional) shareholders who entered their fund family between December 31, 1999 and December 31, 2005. The data are based on the shareholder's portfolio on family entry date. The portfolio size is the total dollars invested scaled by the minimum initial investment requirement. The automatic investment shareholders participate in the fund's automatic investment plan. The star ratio is the ratio of the family's number of star funds offered to the total number of offered funds in the month prior to the shareholder's entry date. Three dummy variables are created for the 75–90th, 90–95th, and 95–100th percentiles. The star-fund shareholders open at least one star fund.

Variable	Obs.	Mean	Std. Dev.
Portfolio Size			
Less than 2 Times Minimum	90,854	0.349	0.477
Between 2 & 6 Times Minimum	90,854	0.213	0.409
Between 6 & 22 Times Minimum	90,854	0.218	0.413
At Least 22 Times Minimum	90,854	0.221	0.415
Account Types			
Taxable	90,854	0.217	0.412
IRA	90,854	0.383	0.486
Defined Contribution	90,854	0.069	0.254
Other Tax-Deferred	90,854	0.126	0.332
Trust	90,854	0.023	0.149
Supermarket	90,854	0.181	0.385
Automatic Investments			
True	90,854	0.153	0.360
Load Family			
True	90,854	0.805	0.396
Star Ratio			
75–90th Percentile	90,854	0.153	0.360
90–95th Percentile	90,854	0.050	0.218
95–100th Percentile	90,854	0.049	0.216
Entry Date Funds			
Exactly 1 Fund	90,854	0.685	0.465
Between 2 and 6 Funds	90,854	0.271	0.445
At Least 7 Funds	90,854	0.044	0.206
Entry Date Fund Types			
Equity Funds Only	90,854	0.533	0.499
Bonds Funds Only	90,854	0.071	0.258
Hybrid Funds Only	90,854	0.157	0.364
Money Funds Only	90,854	0.075	0.264
Exactly 2 Asset Classes	90,854	0.122	0.328
At Least 3 Asset Classes	90,854	0.041	0.198
Entry Date Star Shareholder			
True	90,854	0.234	0.424

**Table 4**

**Number of Funds and Asset Classes per Shareholder on Family Entry Date**

This table presents the number of funds and asset classes shareholders open on family entry date for a random sample of 90,854 individual (not institutional) shareholders in 14 large mutual fund families who entered the fund family between December 31, 1999 and December 31, 2005. Holdings of the same fund in multiple accounts or share classes are not double counted. Each fund is assigned to one of four possible asset classes: equity, bond, hybrid, and money market. Panel A reports the number of funds held overall and in each of the four asset classes. Panel B reports the number of asset classes held for all shareholders and for those who open at least two funds on family entry date. In each cell, the number of shareholders is reported and the row percentage of that count.

A. Funds on Family Entry Date											
Funds	0	1	2	3	4	5	6	7	8	9	10+
All											
Count		62,196	10,333	6,106	4,319	2,385	1,495	1,590	1,397	850	183
Percent		68.5%	11.4%	6.7%	4.8%	2.6%	1.6%	1.8%	1.5%	0.9%	0.2%
Equity Funds											
Count	28,252	38,884	9,623	5,425	3,252	1,694	2,794	798	80	33	19
Percent	31.1%	42.8%	10.6%	6.0%	3.6%	1.9%	3.1%	0.9%	0.1%	0.0%	0.0%
Bond Funds											
Count	75,131	12,485	2,939	234	53	8	4				
Percent	82.7%	13.7%	3.2%	0.3%	0.1%	0.0%	0.0%				
Hybrid Funds											
Count	69,657	20,120	998	61	15	3					
Percent	76.7%	22.1%	1.1%	0.1%	0.0%	0.0%					
Money Funds											
Count	80,716	10,095	39	4							
Percent	88.8%	11.1%	0.0%	0.0%							
B. Asset Classes on Family Entry Date											
Shareholders	1	2	3	4							
All											
Count	76,032	11,102	3,456	264							
Percent	83.7%	12.2%	3.8%	0.3%							
Multiple Funds											
Count	13,836	11,102	3,456	264							
Percent	48.3%	38.7%	12.1%	0.9%							

Table 5

## Odds of Opening Multiple Funds on Family Entry Date

This table presents odds ratios and standard errors from logistic regressions of multiple fund openings on family entry date for a random sample of 90,854 individual (not institutional) shareholders in 14 large mutual fund families between December 31, 1999 and December 31, 2005. The dependent variable is one for shareholders who open multiple funds on family entry date, and it is zero otherwise. The omitted dummy variables are less than two times the minimum (portfolio size); taxable (account types); and less than the 50% percentile (star ratio). The standard errors are robust to heteroskedastic disturbances.

Regressors	Shareholder	Family	Market
Portfolio Size			
Between 2 & 6 Times Minimum	0.9783	1.1484***	1.2132***
	0.0227	0.0285	0.0304
Between 6 & 22 Times Minimum	1.3514***	1.5877***	1.7552***
	0.0308	0.0396	0.0443
At Least 22 Times Minimum	3.4235***	3.8584***	4.1459***
	0.0751	0.0974	0.1054
Account Types			
IRA	1.4004***	1.4623***	1.6640***
	0.0279	0.0305	0.0357
Defined Contribution	6.9982***	6.8128***	8.0097***
	0.2343	0.2472	0.3041
Other Tax-Deferred	1.8421***	4.3925***	4.9383***
	0.0473	0.1636	0.1878
Trust	1.0159	1.0596	1.0738
	0.0492	0.0528	0.0539
Supermarket	0.3353***	0.3589***	0.3834***
	0.0099	0.0111	0.0123
Automatic Investments			
True	1.7572***	1.6397***	1.6621***
	0.0384	0.0374	0.0384
Load Family			
True		1.6929***	1.9910***
		0.1208	0.1458
Star Ratio			
75–90th Percentile		1.0613**	1.3053***
		0.0268	0.0372
90–95th Percentile		1.4395***	3.3178***
		0.0587	0.1585
95–100th Percentile		1.6983***	3.1785***
		0.0867	0.1877
Family Fixed Effects	NO	YES	YES
Month Fixed Effects	NO	NO	YES
Observations	90,854	90,854	90,854
Log Pseudo-Likelihood	-50,615.9	-48,450.2	-47,506.2
Pseudo- $R^2$	0.1063	0.1445	0.1612

**Table 6**  
**Odds of Opening Multiple Asset Classes and Single Asset Class Types on Family Entry Date**

This table presents odds ratios and standard errors from logistic regressions of the number and type of asset classes opened on family entry date for a random sample of 90,854 individual (not institutional) shareholders in 14 large mutual fund families between December 31, 1999 and December 31, 2005. In the Funds and Asset Class regressions, the dependent variable is one if there is more than one fund or asset class opened, respectively, and it is zero otherwise. In the other four regressions, the dependent variable is one if there is at least one fund opened of the given type, and it is zero otherwise. The omitted dummy variables are less than two times the minimum (portfolio size); taxable (account types); and less than the 50% percentile (star ratio). The standard errors are robust to heteroskedastic disturbances.

Regressors	More Than One Fund	More Than One Asset Class	At Least One Equity	At Least One Bond	At Least One Hybrid	At Least One Money
Portfolio Size						
Between 2 & 6	1.2132*** 0.0304	0.9438* 0.0322	0.9438** 0.0224	1.0807** 0.0346	1.0533* 0.0281	0.8871*** 0.0344
Between 6 & 22	1.7552*** 0.0443	1.5915*** 0.0511	0.6912*** 0.0162	1.8420*** 0.0547	1.2624*** 0.0336	1.3021*** 0.0479
At Least 22	4.1459*** 0.1054	4.1079*** 0.1243	0.7095*** 0.0175	4.0576*** 0.1187	0.9898 0.0280	3.3345*** 0.1104
Account Types						
IRA	1.6640*** 0.0357	1.5879*** 0.0438	1.1791*** 0.0270	0.7693*** 0.0215	1.5208*** 0.0384	1.2729*** 0.0442
Defined Contribution	8.0097*** 0.3041	6.3836*** 0.2501	1.1364*** 0.0462	2.4041*** 0.0969	2.2973*** 0.0965	5.9328*** 0.2774
Other Tax-Deferred	4.9383*** 0.1878	4.4962*** 0.1817	1.3337*** 0.0494	1.9230*** 0.0834	1.2901*** 0.0538	4.8313*** 0.2193
Trust	1.0738 0.0539	0.8526** 0.0566	1.5099*** 0.0878	1.0816 0.0634	0.5503*** 0.0399	0.5609*** 0.0480
Supermarket	0.3834*** 0.0123	0.2944*** 0.0131	0.9902 0.0265	0.6796*** 0.0210	1.1148*** 0.0342	0.1560*** 0.0111
Automatic Investments						
True	1.6621*** 0.0384	1.3753*** 0.0393	1.2010*** 0.0304	1.0596* 0.0327	1.1893*** 0.0318	0.7584*** 0.0283
Load Family						
Load	1.9910*** 0.1458	2.3404*** 0.2314	0.3822*** 0.0266	1.3853*** 0.1223	11.5224*** 1.2130	0.4955*** 0.0386
Star Ratio						
75–90th Percentile	1.3053*** 0.0372	1.2788*** 0.0437	1.2477*** 0.0344	1.1972*** 0.0371	0.9051*** 0.0297	1.1097*** 0.0435
90–95th Percentile	3.3178*** 0.1585	2.9813*** 0.1770	2.9147*** 0.1461	2.1202*** 0.1280	0.5695*** 0.0310	0.9535 0.0658
95–100th Percentile	3.1785*** 0.1877	2.6384*** 0.2661	4.6885*** 0.3161	1.7305*** 0.1839	0.5857*** 0.0733	0.7960*** 0.0542
Fund Family Dummies	YES	YES	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES	YES	YES
Observations	90,854	90,854	90,854	90,854	90,854	90,854
Log Pseudo-Likelihood	-47,506.18	-33,250.14	-48,468.70	-36,097.09	-38,473.47	-26,566.47
Pseudo- $R^2$	0.16120	0.17730	0.13940	0.13760	0.22050	0.16410





**Table 9**  
**Risk of Opening a New Fund after Family Entry Date**

This table presents hazard ratios and standard errors from Cox semiparametric duration regressions of the number of calendar days until the first fund opening after family entry date for a random sample of 90,854 individual (not institutional) shareholders in 14 large mutual fund families between December 31, 1999 and December 31, 2005. The omitted dummy variables are less than two times the minimum (portfolio size); taxable (account types); less than the 50% percentile (star ratio); between 2 and 6 funds (entry date funds); and exactly two asset classes (entry date fund types). The standard errors are robust to heteroskedastic disturbances.

Regressors	Benchmark	Funds	Asset Classes	Stars	All
<b>Portfolio Size</b>					
Between 2 & 6 Times Minimum	1.1549*** 0.0271	1.1593*** 0.0272	1.1608*** 0.0274	1.1560*** 0.0271	1.1443*** 0.0270
Between 6 & 22 Times Minimum	1.3234*** 0.0315	1.3447*** 0.0322	1.3092*** 0.0318	1.3257*** 0.0316	1.2804*** 0.0312
At Least 22 Times Minimum	1.8950*** 0.0440	2.0629*** 0.0499	1.7883*** 0.0437	1.8983*** 0.0441	1.7995*** 0.0446
<b>Account Types</b>					
IRA	1.1725*** 0.0257	1.1780*** 0.0259	1.2325*** 0.0277	1.1741*** 0.0258	1.2006*** 0.0270
Defined Contribution	1.3979*** 0.0507	1.4658*** 0.0546	1.2790*** 0.0496	1.4023*** 0.0510	1.2100*** 0.0470
Other Tax-Deferred	1.4039*** 0.0485	1.5277*** 0.0558	1.4424*** 0.0534	1.4020*** 0.0484	1.4322*** 0.0541
Trust	0.6489*** 0.0392	0.6659*** 0.0403	0.6842*** 0.0409	0.6483*** 0.0392	0.7051*** 0.0423
Supermarket	0.8906*** 0.0270	0.8552*** 0.0260	0.9989 0.0312	0.8913*** 0.0270	0.9956 0.0312
<b>Automatic Investments</b>					
True	1.1507*** 0.0257	1.1560*** 0.0258	1.1951*** 0.0269	1.1519*** 0.0257	1.1770*** 0.0265
<b>Load Family</b>					
True	0.8776** 0.0576	0.9818 0.0647	1.2177*** 0.0829	0.8732** 0.0574	1.3375*** 0.0917
<b>Star Ratio</b>					
75–90th Percentile	1.0714*** 0.0279	1.0750*** 0.0280	1.0398 0.0277	1.0742*** 0.0281	1.0261 0.0276
90–95th Percentile	0.9385 0.0465	0.9825 0.0489	0.9454 0.0481	0.9419 0.0468	0.9312 0.0475
95–100th Percentile	0.9912 0.0476	1.0290 0.0498	1.0676 0.0533	0.9966 0.0480	1.0447 0.0525
<b>Entry Date Funds</b>					
Exactly 1 Fund		1.0357* 0.0193			0.8106*** 0.0190
At Least 7 Funds		0.5263*** 0.0247			0.5376*** 0.0273
<b>Entry Date Fund Types</b>					
Equity Funds Only			0.9876 0.0257		1.0658** 0.0307
Bonds Funds Only			1.3047*** 0.0524		1.4589*** 0.0642
Hybrid Funds Only			0.6894*** 0.0241		0.7547*** 0.0312
Money Funds Only			3.5131*** 0.1184		4.1001*** 0.1662
At Least 3 Asset Classes			0.7281*** 0.0331		0.8640*** 0.0410
<b>Entry Date Star Shareholder</b>					
True				0.9746 0.0191	1.0896*** 0.0230
<b>Family Fixed Effects</b>					
Month Fixed Effects	YES	YES	YES	YES	YES
<b>Observations</b>					
Log Likelihood	90,854 -193,975	90,854 -193,848	90,854 -192,442	90,854 -193,974	90,854 -192,298

Table 10

**Risk of Opening a New Equity, Bond, Hybrid, and Money Fund after Family Entry Date**

This table presents hazard ratios and standard errors from Cox semiparametric duration regressions of the number of calendar days until the first fund opening after family entry date for a random sample of 90,854 individual (not institutional) shareholders in 14 large mutual fund families between December 31, 1999 and December 31, 2005. The estimates are made across all types of funds and separately for each of the four asset classes. The omitted dummy variables are less than two times the minimum (portfolio size); taxable (account types); less than the 50% percentile (star ratio); between 2 and 6 funds (entry date funds); and exactly two asset classes (entry date fund types). The standard errors are robust to heteroskedastic disturbances.

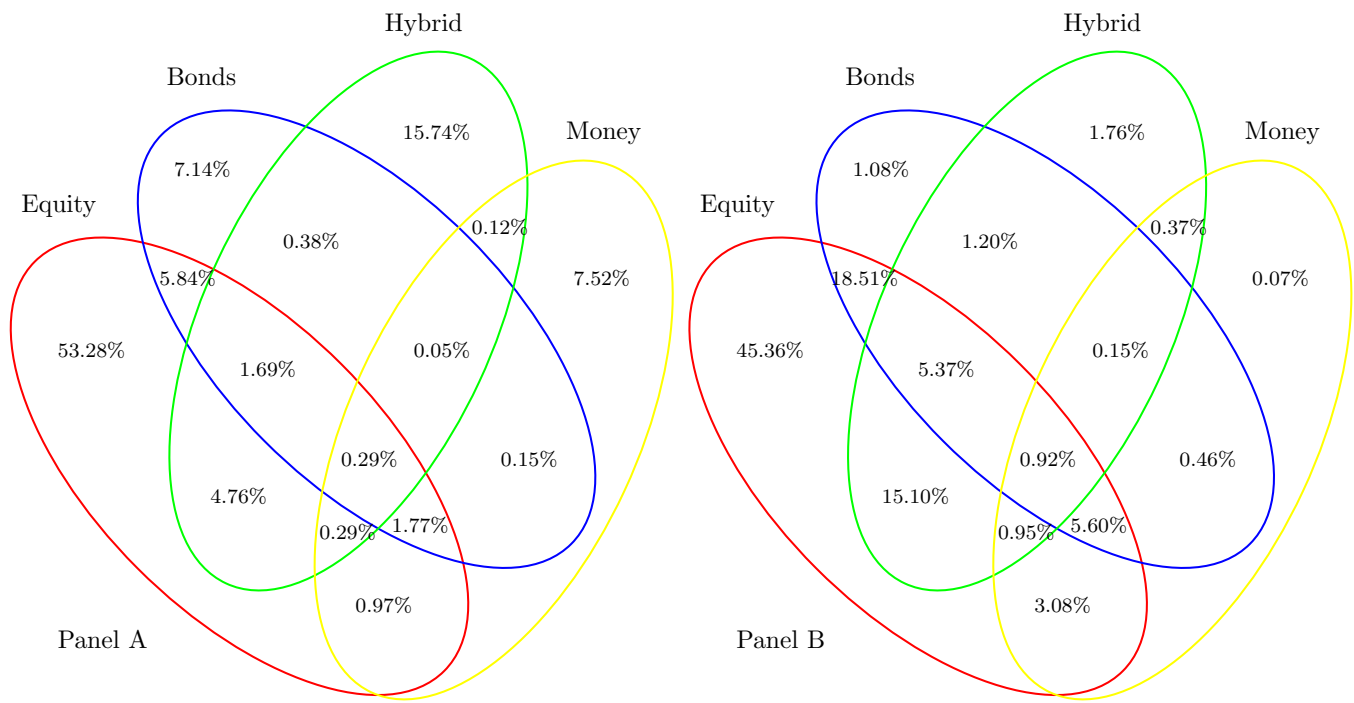
Regressors	Any Fund Type	Equity	Bond	Hybrid	Money
<b>Portfolio Size</b>					
Between 2 & 6 Times Minimum	1.1443*** 0.0270	1.1372*** 0.0312	1.2651*** 0.0655	1.1563*** 0.0577	1.0808 0.0565
Between 6 & 22 Times Minimum	1.2804*** 0.0312	1.2378*** 0.0349	1.5878*** 0.0790	1.4609*** 0.0711	1.3141*** 0.0696
At Least 22 Times Minimum	1.7995*** 0.0446	1.8617*** 0.0523	3.2576*** 0.1428	1.6944*** 0.0854	1.5832*** 0.0913
<b>Account Types</b>					
IRA	1.2006*** 0.0270	1.2704*** 0.0328	1.4095*** 0.0634	1.3339*** 0.0620	0.9214 0.0477
Defined Contribution	1.2100*** 0.0470	1.2959*** 0.0571	1.8080*** 0.1347	1.5096*** 0.1183	1.2578** 0.1124
Other Tax-Deferred	1.4322*** 0.0541	1.5714*** 0.0706	2.5316*** 0.1739	1.2917*** 0.0867	1.4741*** 0.1494
Trust	0.7051*** 0.0423	0.6591*** 0.0495	0.7431*** 0.0812	0.6557*** 0.0898	0.7868** 0.0857
Supermarket	0.9956 0.0312	0.9818 0.0377	1.1643** 0.0694	1.1222* 0.0712	0.3204*** 0.0376
<b>Automatic Investments</b>					
True	1.1770*** 0.0265	1.1807*** 0.0306	1.2467*** 0.0591	1.1844*** 0.0561	1.1653*** 0.0592
<b>Load Family</b>					
True	1.3375*** 0.0917	1.3873*** 0.1134	2.4793*** 0.3373	1.9810*** 0.3410	0.4586*** 0.0645
<b>Star Ratio</b>					
75–90th Percentile	1.0261 0.0276	1.0757** 0.0327	0.9346 0.0491	1.1570*** 0.0646	0.9961 0.0578
90–95th Percentile	0.9312 0.0475	0.8936** 0.0510	0.5198*** 0.0648	1.0957 0.1444	1.5371*** 0.1829
95–100th Percentile	1.0447 0.0525	1.0527 0.0576	0.8758 0.1047	1.1017 0.2204	1.1417 0.1302
<b>Entry Date Funds</b>					
Exactly 1 Fund	0.8106*** 0.0190	0.8418*** 0.0224	0.8368*** 0.0423	0.8080*** 0.0402	0.7652*** 0.0412
At Least 7 Funds	0.5376*** 0.0273	0.3353*** 0.0230	0.4672*** 0.0375	0.4922*** 0.0596	0.9376 0.1169
<b>Entry Date Fund Types</b>					
Equity Funds Only	1.0658** 0.0307	1.0985*** 0.0366	0.8162*** 0.0463	1.0218 0.0616	1.1359* 0.0775
Bonds Funds Only	1.4589*** 0.0642	1.1960*** 0.0642	2.1807*** 0.1720	1.7994*** 0.1597	1.2694** 0.1320
Hybrid Funds Only	0.7547*** 0.0312	0.4442*** 0.0238	0.3243*** 0.0288	1.7774*** 0.1358	0.8333* 0.0881
Money Funds Only	4.1001*** 0.1662	3.1942*** 0.1455	4.4758*** 0.3323	2.6438*** 0.2182	4.3354*** 0.3710
At Least 3 Asset Classes	0.8640*** 0.0410	0.9918 0.0541	0.8556** 0.0676	0.7473*** 0.0780	0.7885** 0.0896
<b>Entry Date Star Shareholder</b>					
True	1.0896*** 0.0230	0.8891*** 0.0216	1.2267*** 0.0512	1.0605 0.0440	1.8777*** 0.0808
<b>Family Fixed Effects</b>					
Month Fixed Effects	YES	YES	YES	YES	YES
<b>Observations</b>					
Log Likelihood	90,854 -192,298.1	90,854 -136,712.3	90,854 -47,749.9	90,854 -41,732.2	90,854 -34,644.3

Table 11

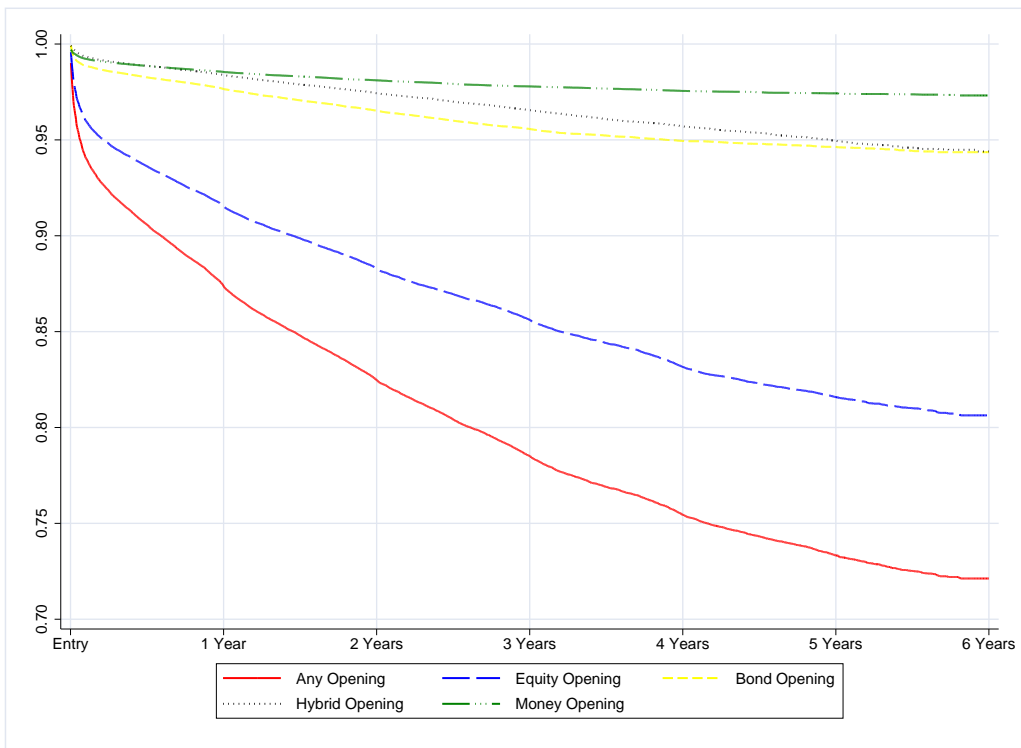
**Risk of Opening, Purchase, Redemption, Closure, and Exit after Family Entry Date**

This table presents hazard ratios and standard errors from Cox semiparametric duration regressions of the number of calendar days until the first fund opening (buy in a new fund), purchase (buy in an old fund), redemption (partial liquidation of a fund), closure (complete liquidation of a fund), and exit (termination of the relationship with the fund family) for a random sample of 90,854 individual (not institutional) shareholders in 14 large mutual fund families between December 31, 1999 and December 31, 2005. The omitted dummy variables are less than two times the minimum (portfolio size); taxable (account types); less than the 50% percentile (star ratio); between 2 and 6 funds (entry date funds); and exactly two asset classes (entry date fund types). The standard errors are robust to heteroskedastic disturbances.

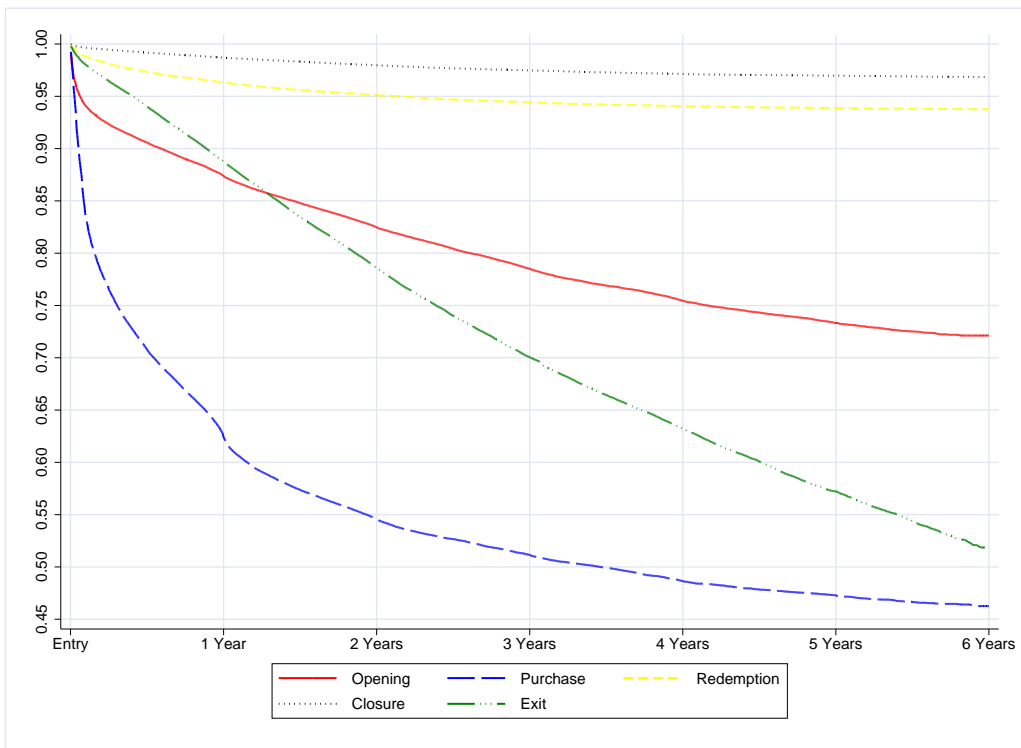
Regressors	Opening	Purchase	Redemption	Closure	Exit
<b>Portfolio Size</b>					
Between 2 & 6 Times Minimum	1.1443*** 0.0270	0.6409*** 0.0101	1.2522*** 0.0493	1.0623 0.0598	0.9153*** 0.0164
Between 6 & 22 Times Minimum	1.2804*** 0.0312	0.5716*** 0.0096	1.7181*** 0.0662	1.4698*** 0.0788	1.0278 0.0188
At Least 22 Times Minimum	1.7995*** 0.0446	0.5766*** 0.0101	2.3616*** 0.0930	1.9330*** 0.1070	1.0796*** 0.0218
<b>Account Types</b>					
IRA	1.2006*** 0.0270	1.0820*** 0.0166	0.7381*** 0.0266	0.7416*** 0.0374	0.6239*** 0.0118
Defined Contribution	1.2100*** 0.0470	2.8143*** 0.0653	0.4078*** 0.0347	0.8297** 0.0740	1.1834*** 0.0344
Other Tax-Deferred	1.4322*** 0.0541	2.6492*** 0.0599	0.5174*** 0.0329	0.6780*** 0.0530	0.8428*** 0.0244
Trust	0.7051*** 0.0423	0.9158** 0.0353	1.0366 0.0784	0.9768 0.1119	1.2806*** 0.0551
Supermarket	0.9956 0.0312	0.9927 0.0198	1.8004*** 0.0700	1.5032*** 0.0955	1.6046*** 0.0319
<b>Automatic Investments</b>					
True	1.1770*** 0.0265	0.5302*** 0.0092	1.2838*** 0.0495	0.8512*** 0.0479	0.7827*** 0.0153
<b>Load Family</b>					
True	1.3375*** 0.0917	1.7035*** 0.0746	0.8247* 0.0842	0.5173*** 0.0682	0.6254*** 0.0298
<b>Star Ratio</b>					
75–90th Percentile	1.0261 0.0276	1.0380** 0.0185	1.0435 0.0465	1.0203 0.0726	1.0310 0.0234
90–95th Percentile	0.9312 0.0475	1.1213*** 0.0375	1.5235*** 0.1327	1.1863 0.1599	0.9628 0.0479
95–100th Percentile	1.0447 0.0525	1.0579 0.0380	1.1117 0.0925	1.2391* 0.1481	0.8969** 0.0417
<b>Entry Date Funds</b>					
Exactly 1 Fund	0.8106*** 0.0190	0.7060*** 0.0111	0.7124*** 0.0267	0.4089*** 0.0218	0.9744 0.0184
At Least 7 Funds	0.5376*** 0.0273	1.3399*** 0.0329	1.5521*** 0.0924	0.7963*** 0.0690	0.8701*** 0.0343
<b>Entry Date Fund Types</b>					
Equity Funds Only	1.0658** 0.0307	0.8472*** 0.0156	0.7322*** 0.0347	0.5525*** 0.0310	0.9209*** 0.0227
Bonds Funds Only	1.4589*** 0.0642	0.8798*** 0.0268	1.8854*** 0.1149	0.9520 0.0912	1.2381*** 0.0410
Hybrid Funds Only	0.7547*** 0.0312	0.9178*** 0.0234	0.9651 0.0666	0.5141*** 0.0567	0.9322** 0.0317
Money Funds Only	4.1001*** 0.1662	1.5748*** 0.0423	3.7948*** 0.2330	2.2942*** 0.2021	1.4855*** 0.0507
At Least 3 Asset Classes	0.8640*** 0.0410	1.3953*** 0.0331	1.3667*** 0.0866	1.1702** 0.0898	1.0451 0.0403
<b>Entry Date Star Shareholder</b>					
True	1.0896*** 0.0230	1.0617*** 0.0139	1.1716*** 0.0383	0.9913 0.0480	1.0307* 0.0163
Family Fixed Effects	YES	YES	YES	YES	YES
Month Fixed Effects	YES	YES	YES	YES	YES
Observations	90,854	90,854	90,851	90,854	90,854
Log Likelihood	-192,298.1	-418,671.0	-79,168.0	-36,203.7	-292,115.8



**Figure 1. Asset Classes Held on Family Entry Date.** These 4-Venn diagrams show the overlap between the shareholders' chosen asset classes on family entry date for a random sample of 90,854 individual (not institutional) shareholders in 14 large mutual fund families who entered the fund family between December 31, 1999 and December 31, 2005. Panel A presents results for all shareholders while Panel B presents results for shareholders who open at least two funds on family entry date.



**Figure 2. Survival Distribution Functions by Asset Class.** This figure presents the estimated survival distribution functions from the five duration regressions presented in Table 10. Each graph shows the estimated fraction of shareholders who have not yet opened a new fund of the given type during the first six years after family entry date. All regressors are evaluated at their means.



**Figure 3. Survival Distribution Functions by Trade Type.** This figure presents the estimated survival distribution functions from the five duration regressions presented in Table 11. Each graph shows the estimated fraction of shareholders who have not yet placed the given type of trade during the first six years after family entry date. All regressors are evaluated at their means.