Conflicts of Interest and Mutual Fund Portfolio Choice: Attracting Flows by Attracting 401(k) Plans[1]

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Abstract

We explore a new channel through which mutual fund families can attract substantial inflows: securing trusteeships of 401(k) plans. Using a unique dataset of hand matched 401(k) plans and their trustees, we find that mutual fund families significantly overweight the 401(k) sponsor firms stock in order to secure and retain a trusteeship. Mutual fund trustees increase their sponsor stock holdings when becoming a trustee and decrease sponsor ownership when terminating the trustee relationship. This overweighting is not explained by superior information. Trustee overweighting is significantly more pronounced when the conflict of interest of the trustees is more severe and when other mutual funds are selling the sponsor firms stock. We quantify a potentially large benefit to the 401(k) sponsor firm of having its price propped up by its trustee fund's increased overweighting precisely when other firms sell its stock. We also estimate the resulting loss to mutual fund investors, which for some fund family-sponsor firm pairs can be large.

JEL classification: G11, G23, J26

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Introduction

Nearly 40 percent of all mutual fund assets are held between Defined Contribution Plans and Individual Retirement Accounts. This percentage has been steadily increasing, largely because these retirement accounts represent the majority of new flows into non-money market mutual funds (60% in 2004)[1]. With such a large and growing percentage of their assets coming from retirement accounts, mutual funds are likely to be interested in securing these assets. Previous literature on the agency problems associated with increasing funds under management has concentrated on the flow-performance relationship[2]. In this paper we suggest and find evidence for a new channel through which mutual fund families can attract assets: their ability to become a 401(k) plan's trustee. We provide evidence that fund families make specific portfolio choice decisions to secure this trustee relationship, thereby attracting and retaining a large portion of these retirement assets. These actions, however, are likely to be in conflict with the fiduciary responsibility mutual funds have with their investors, and can impose potentially large costs.

The trustee position in 401(k) plans plays a fundamental role in our analysis. Under the United States Code, 401(k) plans must appoint a trustee, who holds fiduciary responsibility over the plan assets[3]. Included in the duties of fiduciary responsibility are the obligation to act in a "prudent" manner regarding employee contributions, and to make sure that the plan offers a diversified and suitable set of investment options to plan participants[4]. Thus, it is the *trustee* along with the other fiduciaries (usually company affiliates) that decide which investment options will be available to the company employees.

Many plans employ large mutual fund families (often with pension management divisions) as their trustee. Perhaps not surprisingly, in most plans the majority, and in some cases all, of the fund

[1]These numbers reflect 2004 and are taken from the Investment Company Institute (2005), Federal Reserve Flow of Funds, and Department of Labor. These non-money market funds are termed "long term" mutual funds by the Investment Company Institute. Individual Retirement Accounts (IRA) and Defined Contribution Plans (DC) together held 3.1 trillion dollars in mutual funds (DC held 1.6, IRA held 1.5) out of a total 8.1 trillion dollars in the entire universe.

[2]Chevalier and Ellison (1997), Sirri and Tufano (1998), Goetzmann and Peles (1997), and Brown et al. (1996) are a few of the papers that document a convexity in the flow-performance relationship, and how it can affect mutual fund incentives and portfolio decisions.

[3]This requirement is outlined in the Employee Retirement Income Security Act of 1974 (ERISA) and Title 29 Ch.18 of the United States Code.

[4]Title 29, Ch. 18, SUBCHAPTER I, Subtitle B, part 4, Section 1104.

options are those of the trustee (Huberman and Jiang (2005), Elton et al. (2005)). For example, in 2000, Putnam was the trustee of Wm. Wrigley Jr. Co.'s 401(k) plan. This plan offered 9 investment options. One was Wrigley Co. stock. The other 8, including the money market fund, were Putnam mutual funds[5].

From the family's perspective, 401(k) plans are attractive clients for several reasons. First, by becoming the trustee of a large 401(k) plan, the family guarantees a large inflow of money in the form of plan assets invested in family funds. In our sample, the average 401(k) plan has over $ 640,000,000 in assets, which corresponds to about 5.2% of the total assets held by the average family. Second, the employees become captive investors in the plan options. A typical 401(k) plan in our sample will have approximately 13 options, one of which is company stock and one a money market funds. The majority, if not all, of the remaining options are mutual funds to be chosen (at least in part) by the trustee. Employees are only able to invest, and move their 401(k) retirement assets, between these plan options. Thus in addition to the initial large inflow, the trustee fund family will receive additional flows in retirement contributions as the employees save each year. Third, 401(k) plans do not change trustees often. In our sample, the unconditional probability that a company will change trustees in a given year is around 3.4%. This could be because of search costs, administrative costs, the cost to employees of rebalancing, etc. Thus, the expected future benefits of the relationship are relatively long lived. Fourth, we empirically observe employees tilting their portfolios in 401(k) plans to higher fee funds. Of the nearly 1.1 trillion dollars invested by defined contribution plans in mutual funds, only about 250 billion is invested in money market and index funds (Investment Company Institute (2005a))[6]. The remaining 76% of these assets are in higher fee alternatives, which generate a higher relative fee revenue for families.

For these reasons, mutual fund families may find it valuable to secure trusteeships of 401(k) plans, even if at expense of other investors. As there are gains to be made by a mutual fund increasing assets under management (Brown et al. (1996), Chevalier and Ellison (1997, 1999)), families may engage in actions to attract the large, stagnant, and captive assets of 401(k) plans. In this paper,

[5]From telephone conversations with a number of our largest trustee fund families, the accounting for the 401(k) plan assets is essentially as follows: the company stock account in the plan is held by the firm itself, while the assets in the mutual funds are held by the respective mutual funds.

[6]401(k) plan assets make up the vast majority of all defined contribution assets in mutual funds, 73%.

we focus specifically on the observable distortions in the families' equity holdings[7]. This presents a conflict of interest within the fund families: by distorting its portfolio, the family violates its fiduciary duty to provide the best investment opportunities to its entire set of investors.

Our main hypothesis of fund families distorting their portfolio allocations to secure a trustee relationship leads to several testable implications: First, trustee families will hold disproportionately more of the 401(k) sponsor firm's stock, which we will term "overweighting"[8]. This allows the family to better influence the price of the sponsor stock. Second, securing the trustee relationship will be more valuable for (i) relatively smaller fund families and (ii) relatively larger 401(k) plans. Larger 401(k) plans imply larger benefits for the family (in the form of inflow and fees) and these benefits are relatively more important to smaller families. Third, families should increase their position in the stock once they become trustee and decrease it when this relationship ends. Fourth, families will try to mitigate price variations in the company's stock, for instance by buying or holding the sponsor stock when all other families are selling large quantities. In this paper, we find supporting evidence for these predictions.

We find that families acting as trustees do systematically overweight the sponsor firms. One measure we use is the proportion of the firm held by the family. Controlling for other firm, family, and plan characteristics, trustee families hold significantly more in sponsor firms (over 53% more on average). This translates into holding on average about $ 64,000,000 more in each one of the sponsor firms, which implies a total distortion over the entire industry of more than 25 billion dollars[9]. It could be that upon becoming trustee, the mutual fund family is privileged to superior information about the firm. We find, though, that trustees are no better at predicting the future return of the

[7]There are a number of potential ways a family could be "purchasing" a trusteeship. If the fund family pays through trips to Europe or expensive automobiles, we will not observe this. However, one disadvantage of these payment methods is they are more easily identifiable as illegal, which may discourage their use. Davis and Kim (2005) find some evidence of ties with pension funds affecting voting, which we discuss further in Section II.

[8]"Sponsor" firm refers to the firm that sponsors the 401(k) plan to which the trustee has been hired. We will be using this terminology throughout the paper.

[9]These numbers were calculated using the estimated increases in holdings attributed to the trustee relationship (using the estimates in Column2 of Table IV). For each observation, we first compute the fitted value implied by our regression, $\log(\widehat{PctSharesOut})$. From these estimates, we calculate the fitted dollar value of each holding as $\widehat{Holding} = \exp(\log(\widehat{PctSharesOut})) \times ME$, where ME stands for the market value of the given company. We then average the estimated holdings for trustees and non-trustees separately to get 83.47 billion and 19.46 billion dollars respectively. The estimated increase due to trustee relation (i.e. implied by the $Trustee$ coefficient) is the difference of these averages. The total distortion is then found by multiplying this difference by the average number of sponsor firms per year in our sample (392 from Table I).

sponsor firm than other mutual fund families.

Our hypothesis predicts that overweighting will be more severe for larger 401(k) plans and smaller families, *ceteris paribus*. Consistent with this we find that trustees of larger 401(k) plans overweight significantly more. Controlling for firm and family characteristics, a one standard deviation increase in plan assets results in the average trustee overweighting by over $ 86,000,000 more in the sponsor firm. In addition, smaller mutual fund families overweight significantly more than larger families, all else equal. A trustee family that is one standard deviation smaller than average overweights by about $ 32,000,000 more in the sponsor's stock[10].

As a more precise test of this conflict of interest effect on overweighting, we then look at distortions in allocations when the trustee of a given firm's 401(k) plan changes. We find that the fund families significantly increase the amount invested in the stock during its first two years as a trustee (6.5% increase in the purchases), and then decrease the amount invested in trustee stock in the year after it stops being trustee (6.0% decrease in the purchases on average).

We then look at a specific benefit that the trustee can give to the sponsor firm: holding or even buying shares of the sponsor firm when other funds are selling large amounts. These are the times when the company is most concerned about downward price pressures, and when the trustee can be most useful by buying or holding the sponsor's stock. To test this hypothesis, we identify these times in a number of ways. The first is by looking at the aggregate amount of selling by other families. We find that when other fund families are (on aggregate) selling more than 1% of the total shares outstanding of the sponsor firm, the trustee takes the opposite position by significantly increasing its holdings. While non-trustees significantly decrease their holdings by 2.6% on average, the trustee significantly *increases* its position on the stock by 11.67%. Similar conclusions follow from defining bad times using negative Cumulative Abnormal Returns (CAR) around earnings news.

We quantify the benefit of trustee increased overweighting around bad times, by looking at the price impact that the significant share purchasing of the trustee can have on the sponsor firm's stock price. Using estimates of demand elasticities from previous literature, we find the trustee props up the 401(k) sponsor firm's price by 154 basis points by buying large amounts of shares when other

[10]These numbers were computed in a way similar to that described in footnote 9. We repeated those calculations after increasing the size of the plan by one standard deviation and then again after decreasing the size of the plan by one-standard deviation.

funds are selling. This implies over an 11% propping up of price, a real and potentially large benefit to the 401(k) sponsor firm.

Lastly we examine and quantify the welfare effects of this conflict of interest on investors in the mutual fund families. We use loss in risk adjusted returns, and find that although the average losses tend to be small over the length of the trustee-sponsor firm relationship (ranging from 1-8%); the losses for investors in smaller fund families with larger 401(k) plans can be substantial (ranging from 3-37%).

The paper is organized as follows. Section I provides a description of the data. Section II presents our initial empirical design and results on trustee allocation. Section III provides additional evidence and specific benefits to the firm of the trustee relationship. Section IV provides estimates of the costs to fund family investors and also price impact of their purchasing when other funds are selling large amounts. Section V concludes.

I Data

The main dataset we use in the paper is a hand-matched dataset of (i) retirement plans sponsored by publicly traded firms and (ii) the stock holdings of mutual fund families. In this section we describe how we collected information on 401(k) plans, the mutual fund family holdings data we use, and how we matched these two datasets.

I.A 401(k) data

We gather information on 401(k) plans from Form 11-K documents filed by firms to the SEC and Form 5500 Filings filed to the Department of Labor (DOL)[11]. The 11-K data (SEC) is available from 1994-2004 (which corresponds to fiscal years 1993-2003). Over this sample period, we hand collect all documents. Thus, our initial sample represents the entire universe of firms filing 11-K's with the SEC. In the 11-K document, both total plan assets invested in the 401(k) plan and trustee of the 401(k) plan are generally available. Our Form 5500 sample is from 1995-2004. The Form 5500 also

[11]The specific plans that need to file 11-K documents are those 401(k) plans that have company stock as an option, and issue new shares for the plan. This encompasses almost all of the largest 401(k) plans, and makes up 60% of the universe of total 401(k) assets. Regarding Form 5500, any firm that sponsors an employee benefit plan that qualifies under the Employee Retirement Income Security Act of 1974 must file a Form 5500 with the Department of Labor.

has information on plan assets and trustees, although it is not nearly as complete as 11-K data for our sample of firms. One data item we do collect from the Form 5500 are the fees paid to the trustee for trustee services.

The initial dataset contains over 2500 companies. To be included in our sample, however, the company has to meet the following requirements. First, we need to be able to identify the company in the CRSP database. Companies in our 401(k) dataset are identified by their IRS Employer Identification Number (EIN). We use the CRSP/Compustat Merged Database to map the EIN's into PERMNO's, CRSP's primary stock identifier. We then checked each match by looking at the company's name. The CRSP/Compustat database doesn't have historical EIN's and so we couldn't always find a PERMNO match for each company in our initial dataset. Once the company is identified, we exclude financial companies (SIC codes between 6000-6999). We do this as they are usually the trustee of their own plan, and there are likely other incentives and restrictions for holding their own stock. This gives us 1537 companies. The final requirement is that we can identify the trustee of the company as a mutual fund family. Not all companies report their trustee and not all trustees are mutual fund families. Keeping only those plans that reported one of the mutual fund families in our sample as their trustee leaves us with a total of 899 companies.

Companies often have more than one 401(k) plan. In the vast majority of cases, all plans from a given company belong to the same trustee. Whenever this happens, we sum the plan assets of the plans. In the few cases where the company had two different trustees, we kept only the largest plan. This ensures that, at a given point in time, there is only one trustee for each one of the companies in our sample. Finally, we start our sample in 1993 (reported in 1994), as this is the first date available on SEC's EDGAR electronic filing system.

Table I lists summary statistics for the 401(k) plans. The average size of a retirement plan in our 1993-2003 sample is roughly 640 million dollars. Plan sizes are in general increasing over the sample, and the aggregate size of our sample peaked in 2003 at 421 billion dollars. In 2003, the largest plan in our sample had plan assets of nearly 22.6 billion dollars. The second and third largest plans that same year had plan assets of roughly 21.5 billion and 20.8 billion dollars, respectively. Our sample size averages 414 firms per year, and the total sum of all plans' assets averages about 235 billion dollars per year. To put this into perspective, this represents on average over 2.58% of annual GDP,

and about 3.2% of the entire market capitalization (NYSE+NASDAQ+AMEX).

I.B Mutual fund holdings

Our data on mutual fund holdings comes from the CDA/Spectrum Institutional database. This database contains the quarterly holdings of virtually all US investment companies[12].

We focus on large mutual fund families since they better represent potential trustees for 401(k) plans. Specifically, in each quarter, families are sorted by the market value of their holdings of CRSP stocks and the largest 100 families identified. Our sample includes all families that, at some point in time, are among those top 100 (i.e. if a family happens to be among the largest 100 families in the second quarter of 1999, it will be included in our sample in *every* quarter from 1993 to 2003). Our final sample consists of 219 mutual fund families. Over 95% of the trustees identified as a mutual fund family are among the families in our final sample. In addition, these families represent over 80% of the total mutual fund industry, as measured by the market value of equity holdings.

We are mainly interested in comparing the holdings of the trustee family in the sponsor firm with those of a similar family. Our identifying variation is thus across-family holdings and so we consider only families' holdings of companies in our 401(k) dataset. However, as explained below, all equity holdings are included in the computation of aggregate measures, such as the total assets under management[13]. We present summary statistics of the mutual fund families in our sample in Table II. In Panel A, the average fund family in our sample has approximately 12.2 billion dollars in Total Net Assets (TNA)[14]. Comparing the TNA of trustee and non-trustee fund families, we see that 401(k) plan trustees are on average the larger families.

[12]The primary source of holdings data is the 13f forms that investment companies with more than 100 million dollars under management are required to file with the SEC on a quarterly basis (Securities Exchange Act Section 3(a)(9) and Section 13(f)(5)(A)). Smaller companies are permitted to file as well, and many actually do. Thus, data on smaller families may be inconsistent and have a selection bias. However, as explained below, we will only focus on large mutual fund families.

[13]Another reason why only holdings of companies in our 401(k) dataset are included is for homogeneity of sample across tests. Some of our tests (e.g. changes in trustees) necessarily include only such companies.

[14]Throughout the paper, we refer to TNA as being the sum of the market value of the *equity* holdings of a family. The averages in Table II are taken over all families and all quarters

I.C Matching Retirement Data To Other Sources

The final step is to identify the trustees in the mutual fund dataset. We used the family name to match each company's trustee to its corresponding family in the CDA database. In sum, our final sample spans from 1993 to 2003 and contains the number of shares each one of the 251 families in our sample owns of each of the 899 publicly traded companies whose 401(k) plan's trustee we matched as a mutual fund family.

I.D Variable Construction

We will focus on two measures of holdings as dependent variables, (i) how much of the family's assets are invested in a given stock ($PctTNA$), and (ii) what fraction of the total company the family's holdings represent ($PctSharesOut$). Our first measure, $PctTNA$, for a given firm-family pair is measured as the market value of shares of the firm held by the specific family, divided by the family's total TNA. So if family f owns 10 billion dollars worth of firm s, and has TNA of 100 billion dollars, $PctTNA$ for this observation will be 0.10. As such, it is a holdings measure from the point of view of the family. The company, however, is interested in the proportion of its shares the family currently holds. From the company's point of view, the more relevant variable is our second measure, $PctSharesOut$, which measures the percent of shares outstanding of the company held by a given family. For the same family f-firm s pair as above, if the total market value firm s were 40 billion dollars, then $PctSharesOut$ for the same observation will be 0.25. For some tests we will also use a measure of time series changes in holdings, $Change$. $Change$ is measured as the number of shares held this period divided by the number of shares held last period, adjusted for splits[15].

Throughout the paper, we will use a number of variables as controls for company and family characteristics. Size (ME), is the company's market value at the last day of the most recent quarter. Book-to-market (BM) is the ratio of the book-value at the end of the firm's fiscal year during the calendar year preceding the formation date to the market value at the end of the preceding December. *Past Returns* are computed as the cumulative past returns of the firm over the previous 11 months

[15]There are several reasons why we didn't use the market value of stocks held by the family as a measure of holdings. First, larger families hold disproportionably more of all companies than smaller families. Second, price movements generate changes in the market value of holdings even when the number of shares held by the company doesn't change.

(not including the last month of the quarter). Future Returns are computed as the cumulative future returns of the firm over the next 11 months. *Market Weight* is measured as the weight of the stock in CRSP's value weighted market index. Finally, the total net assets (TNA) of a family is measured as the sum of the value of all equity holdings of that family in a given quarter.

We then compute two variables to measure the investment focus of the family, percentage invested in style ($PctInvStyle$) and percentage invested in industry ($PctInvInd$). To construct $PctInvStyle$, following Daniel et al. (1997), we create 27 style portfolios based on a triple sort on size, book-to-market and momentum[16]. On each July, stocks are first sorted into 3 groups based on each firm's market equity on the last day of June. Then, the firms within each size group are further sorted into 3 groups based on their book-to-market ratio. Finally, the firms in each of the 9 size-BM portfolios are then sorted into 3 groups based on their preceding twelve-month return. Once these portfolios are constructed and each stock is assigned a particular style, $PctInvStyle$ is compute as the proportion of the family's TNA in a given style. We construct $PctInvInd$ in a similar manner, but across industries. So, for each industry, defined by 2-digit SIC code, we calculate the proportion of the family invested in this industry. To give an example, if at a given point in time firms s and h are in the same style category and industry, and are both held by the same family f, then they will have identical values of $PctInvStyle$ and $PctInvInd$.

In our time series tests, we will make use of changes over time in these explanatory variables. In addition, we will be using the following two independent variables: cumulative abnormal return (CAR) and percentage of company sold ($PctCompSold$). CAR is measured as the cumulative return from 2 days prior to 2 days after the earnings announcement date from CRSP, minus the CRSP value weighted index return. $PctCompSold$ is measured as minus the change in total number of shares held by all families in the CDA database from time $t-1$ to time t. So if fund families held an aggregate of 10% of the shares of firm s last quarter, and hold 11% this quarter, $PctCompSold$ for firm s would be -1.

[16]The construction of these portfolios and the criteria used for the inclusion of the stocks is very similar to those in Daniel et al. (1997). The main difference is that Daniel et al. (1997) constructed 125 style portfolios, as opposed to our 27. We only give a brief description of the construction of these portfolios and the reader is referred to their paper for further details.

II Conflicts of Interest

In this section we document the initial empirical evidence regarding the conflict of interest in the market for 401(k) plans. Specifically, we show that controlling for other firm, fund, and plan characteristics, the trustee of a 401(k) plan significantly overweights that 401(k)'s sponsor stock in its portfolio. Davis and Kim (2005) also examine how pension fund ties affect mutual fund companies, focusing mainly on effects on the funds' proxy voting. They also look at overweighting for their six largest pension tie firms and find no significant effect. The differences between our results and those of Davis and Kim (2005) are driven by (i) our focus solely on the trustee relationship while they examine all ties to 401(k) plans, whereas the ties they examine are any relationship of the pension fund to the mutual fund, including administrative services and custodial services (which are the day to day services of the plan), and (ii) our use of an eleven year panel while Davis and Kim (2005) examine a one year cross section.

We focus on the trustee relationship as the trustee is involved with the choosing of investment options. We expect this to be the strongest tie, as the potential gains from syphoning funds far outweighs that of the direct trustee fees. In fact, a study done by the Department of Labor in 1998 (DOL (1998)), found that 90% of total fees paid by a 401(k) plan are investment management fees. In our sample, we estimate this using trustee fees and an estimate of investment management expenses paid by 401(k) plan investors. We calculate trustee fees from the Form 5500 filings, and use the average mutual fund management expenses (loads, expense ratios, and 12b-1 fees) from CRSP as an estimate for investment management expenses[17]. Both are in Panel B of Table II. We estimate the average annual expense revenue from attracting a 401(k) plan to be close to 10 million dollars (average size of the plan, 640 million, times 1.56%). This is almost 67 times the trustee average fee revenue of 150 thousand dollars, indicating that investment management expenses far outweigh the relatively small trustee fees received by the families[18]. Given this we expect fund families to be more

[17]We were concerned that perhaps 401(k) participants get some kind of discount on fees through their plans. However, in telephoning representatives from three of our largest trustee families, they indicated that none of them gave discounted fees on funds in the 401(k) plans. Thus, we believe the expenses in CRSP should be a reasonable estimate for the investment management expenses paid in the plans.

[18]As explained above, not all investment options necessarily belong to the trustee. However, even if only a fraction of the plan assets is invested in the trustee family, the benefits from management fees far exceed those from the trustee fees

interested in becoming (and remaining) trustees in order to benefit from the investment management revenues it brings.

On the issue of the difference in samples between Davis and Kim (2005) and our paper, we restrict our sample to the six families they consider. Focusing *only* on the trustee relationship and using our 11 year panel, we find, consistent with our results on other trustees, a significant overweighting of these trustees in their sponsor firm's stocks[19].

II.A Conflicts of Interest: Univariate Results

The specific action we test for in this section is the overweighting of the 401(k) sponsor firm's stock in the trustees' fund portfolios. According to our hypothesis, a firm may value overweighting of its shares by a fund because (i) it pushes up the price of the firm's shares while the fund purchases and (ii) it decreases the response to negative shocks, as the firm has a block of shares which are not sold by the trustee. We show in this section and Section III that firms both overweight the sponsor firm stock and increase this overweighting around times of negative shocks.

We will first show the fund overweighting in a univariate setting, and then use a regression framework to separate out other factors driving mutual fund portfolio choices. As overweighting can be measured using different metrics (each with shortcomings), we test for a variety of holdings measures of the trustee firm in Table III. The first is the market value of the sponsor firm in the fund family's portfolio. In Table III, for each sponsor firm, we compare the average holdings of its trustee family relative to all other mutual fund families. The trustee holds on average 188 million dollars worth of the sponsor firm's stock in his portfolio, while all other fund families hold only an average of 24 million dollars of the same firm ($t = 11.25$ for the difference). As a percentage of shares outstanding of the trustee firm ($PctSharesOut$), the trustee holds on average 2.19% while all other fund families hold on average only 0.78% ($t = 20.72$ for the difference)[20]. This is about 3 times larger of a holding by trustees in the sponsor firm than other fund families, and is a roughly $ 87,000,000 difference. The difference, though, may be driven by the fact that trustees are larger fund families on average (from Table II), so hold more in absolute terms of every stock than non-

[19]These results are available upon request.

[20]The t-statistics in this section are calculated using a Newey-West adjusted standard error with four lags.

trustee fund families. To control for this difference in family size, we look at the average holding of the trustee stock as a percentage of the total net assets of the fund family. Again, we see the trustee significantly overweighting the trustee relative to all other fund families in terms of $PctTNA$. Although the difference between the two 0.168% and 0.092% looks small in magnitude, it implies a much larger dollar difference. The trustees are much larger funds, and so the dollar difference implied by this is still $ 42,000,000.

II.B Conflict of Interest: Regression Results

In the regressions of Table IV, we separate out the effect of other characteristics determining mutual fund portfolio choice. Each dependent variable observation can be thought of as a triple (f, s, t), where f is the family, s represents the stock and t is the quarter. So, for example, the holdings of family f in firm s in the first quarter of 1995 would be one observation. Our main variable of interest is *Trustee*, which is a categorical variable that identifies the times when a trustee mutual fund family is holding stocks of it's sponsor 401(k) plan firm. Thus, $Trustee(f, s, t)$ is 1 if, at time t, family f is the trustee of company s, and it is 0 otherwise. The control variables, and their construction, were described in Section I. We include firm characteristics of $\log(ME)$, $\log(BM)$, and past year returns (*Past Returns*), to control for firm specific reasons a fund may be weighting in a security. For fund family controls, we include $\log(TNA)$ to control for the size of the family, and the two variables to proxy for the investment focus of the family discussed above, $PctInvStyle$ and $PctInvInd$. We include these as it might be that a fund family overweights in the trustee, but decreases the weight in a similar stock (same style or industry) to keep total style or industry exposure the same. *Market Weight* is also included, and is the weight the stock would receive if the fund simply invested in line with the (CRSP) value weighted market portfolio, which helps control for index fund weightings' in the various stocks. We also include family and quarter fixed effects as they control for family and time specific variability.

We use two dependent variables in Table IV. The first is $\log(PctSharesOut)$, and measures the percentage of firm's shares outstanding the family holds (Columns 1 to 4). The second is $\log(PctTNA)$, which measures the percentage of TNA that the firm makes up for the given family (Column 5). We focus mainly on $\log(PctSharesOut)$ throughout the paper, as from the sponsor

firm's perspective of the benefits of trustee overweighting, this is the more relevant measure. All our conclusions hold irrespective of the measure used.

Column 1 of Table IV shows the regression run with all of the above controls, excluding the fixed effects, and with unadjusted standard errors. We do this to show that the magnitudes we'll see in future regressions are not dependent on the inclusion of the fixed effects. Column 2 has the same specification but with family and quarter fixed effects, and clustering the standard errors at the firm level. We will use these fixed effects and the clustering of the standard errors by firm in all future OLS regressions[21]. From Column 2, the coefficient on the variable of interest, *Trustee*, indicates that, controlling for other firm and family characteristics, a trustee invests $e^{0.4267} - 1 = 53.2\%$ ($t = 7.41$) more in the sponsor firm than other families. This translates into an overweighting of about \$ 64,010,720 more in each one of the sponsor firms[22] Other coefficients affecting the holdings decision are size, (the larger the firm, the smaller percentage of entire shares outstanding the average family holds) and TNA (larger fund families hold larger amounts of stock as a percentage of shares outstanding). Both coefficients are highly significant. In addition, families seem to prefer stocks with higher past returns (as in Carhart (1997)).

Column 3 adds the log of the size of the 401(k) plan to the regression. The number of observations decrease here because we only look at those firm years where we have a reported level of 401(k) plan assets. From Column 3, conditioning on size of the firm, the size of the 401(k) plan is not significant (the correlation between the two is 0.56). However, the effect of *Trustee* remains the same. Controlling now for firm, family and plan characteristics, the trustee overweights their holding of the sponsor stock by 53.4% ($t = 7.27$). The last column of Table IV uses the dependent variable $\log(PctTNA)$. The magnitudes and signs of some explanatory variables change, however the effect of *Trustee* is nearly the same, implying an overweighting in terms of percentage of TNA in the sponsor stock of 57.4% ($t = 24.01$).

[21] We have used a number of alternative specifications including firm fixed effects, and clustering the standard errors at the fund family and the quarter level. All our conclusions remain the same.

[22] These numbers were computed as explained in footnote 9.

II.C Additional Evidence: Small Funds and Large 401(k) Plans

In this section we test another implication of this conflict of interest driven overweighting. Specifically, we look at the effect of the size of the mutual fund and size of the 401(k) plan on the tendency of trustees to overweight the sponsor firm's stock. According to our hypothesis, the overweighting documented in the previous section should be more severe for those cases when the bargaining power of the company is higher. That is, in those cases when the company's 401(k) plan is relatively larger and the family is relatively smaller. We create two interaction terms to measure these two implications. The first is $Trustee * log(TNA)$. Our hypothesis predicts that this interaction term should be significantly negative. As the mutual fund trustee gets smaller, it should find a given 401(k) plan more attractive, as it will represent a larger percentage increase in TNA for the smaller fund. The second interaction term is $Trustee * \log(401(k)Size)$. We expect this interaction term to have a significantly positive coefficient. The larger the plan, the larger of a benefit that a given mutual fund will receive for attracting it, so the higher the bargaining power of the company.

The tests for both of these interaction terms are in the first column of Table V. Consistent with the fund family conflict of interest driving the overweighting in sponsor firm stock, we find evidence for a more severe conflict of interest (significantly more overweighting) in both mechanisms mentioned above. First, controlling for other firm, fund, and plan characteristics (including size of 401(k) plan), smaller fund families overweight significantly more to retain trusteeships than larger fund families. A one standard deviation decrease in fund size implies an increased overweighting of $ 32,179,140. In addition, controlling for other characteristics (including fund size), a given fund family will overweight significantly more to retain larger 401(k) plans. A one standard deviation increase in the size of the 401(k) plan increases overweighting by the family by $ 86,338,000. We have also used size of 401(k) plan as a percentage of TNA, and find similar magnitudes and significance. Both of these results are consistent with the overweighting being driven by the family's desire to secure the trusteeship.

II.D Alternative Explanation: Superior Information

It could be that the investment patterns we see are driven by superior information. Upon securing a trusteeship, the mutual fund family may have access to information about the company that other

funds do not have. This may then cause the trustee to invest differently in the sponsor firm than other funds [23]. If the trustee were getting superior information, we would expect it to get both positive and negative signals, and thus it is not clear that this would induce a positive overweighting in holdings[24]. To test for this explanation, we simply check whether or not the trustee is better at predicting the future returns of the sponsor firm than other stocks, and than other mutual fund families holding the sponsor stock.

Column 2 of Table V tests the ability of fund families in general to predict future returns. The mutual fund families in our sample don't seem to be able to consistently predict which firms will have higher future returns[25]. In Column 3, we include the interaction term *Trustee*Future Returns*. This should measure the extent to which the trustee has superior ability to predict future returns of the sponsor firm, relative to other firms and other fund families. If the trustee does trade on superior information upon securing the trusteeship, this coefficient should be positive and significant. From Column 3, it is not significant, and the point estimate is even slightly negative, suggesting that superior information cannot explain the overweighting of sponsor firm's stock that we observe.

III Changes In Trustee

The changing of trustee gives a more precise experiment to test the effect of being trustee on portfolio choice. It also provides a more direct test of the result in Section II that families tend to overweight the sponsor company's stock. The idea is to test whether upon becoming (end being) the trustee the family increases (decreases) its position in the sponsor stock.

Figure I plots the change in the family holdings of the sponsor firm before and after the trustee change. For each company that changed trustee in our sample, we followed the change in holdings of both the old and the new trustee from one year before the change to two years after the change[26].

[23]Massa and Rehman (2005) show how mutual funds benefit from information spillovers within financial conglomerates. The idea is that once a bank starts a lending relationship with a firm, it acquires superior information about this borrowing firm; information which is passed over to affiliated mutual funds. In our paper, sponsor firms have all the bargaining power and heavily influence the holdings of their trustees. Thus, even if trustee families were endowed with superior information, our hypothesis predicts that they would not be free to use it.

[24]Even if the company only reveals good information to the trustee, it is not clear why the trustee wouldn't anticipate this behavior.

[25]This is consistent with the view that managers don't have stock picking ability. See Carhart (1997), Pastor and Stambaugh (2002), Jones and Shanken (2005), and references therein for a discussion.

[26]Our measure of holdings here is the percentage of the family's TNA the stock accounts for. The same pattern

If we set the date of change to be 0, this corresponds to looking at the interval $[-4, 7]$. Because we don't know in which quarter the change took place (we only know the year of the change), we computed a moving average of 4 quarters. The pattern that emerges is that families strongly decrease their position on the stock after they end being the trustee, while they progressively increase their position on the stock when they become the trustee. We are not controlling for stock and family characteristics in the figure, and so we move to a regression framework where we can do so.

Only 3.4% of firms switch trustees each year. Thus, the total number of trustee changes we can match with CDA holdings the year before and after the change are only 58. The rarity of the event thus reduces the power of the test to identification from these 58 cases.

In Table VI, we break up the overweighting effect to separately estimate responses to beginning and ending trusteeship. The dependent variable here is $\log(shares(f,s,t)/shares(f,s,t-1))$ and measures the percentage change in family f's holdings of stock s from quarter $t-1$ to t. In addition to the usual controls for firm and family characteristics, we present two additional explanatory variables: $Beginning1Year(f,s,t)$ is a categorical variable that is 1 if family f began being the trustee of company s in the year to which quarter t belongs, and is 0 otherwise. Similarly, $Ending1Year(f,s,t)$ is 1 for the quarters in the year when the trustee relationship between f and s ended, and is 0 otherwise. The variables $Beginning2Years$ and $Ending2Years$ are constructed in a similar manner except that they are 1 for the year the trustee changed and the year after. Thus, $Ending2Years(f,s,t) = 1$ if family f ended being the trustee of company s in t is a quarter belonging to the year of the change or the year after.

From Columns 1 and 2, the effects go in the directions predicted by our hypothesis. In Column 1, where the dummies represent the year of the change, the signs go in the right direction but the estimates are not significant. In Column 2, we allow the period dummy to be the year of trustee change and the following year. *Beginning* implies that the new trustee significantly increases percentage of shares held in the sponsor firm by roughly 6.5% ($t = 2.52$), and *Ending* suggests that the opposite occurs, firms ending trustee decrease the amount invested in the sponsor firm by 3.4% in the two years around the trustee change. This last coefficient is not, however, significant. These

emerges if we use changes in the percentage of the company instead. The reason we chose the percentage of the TNA is that we abstract from size of fund family issues when sponsors change trustees.

results combined suggest that families steadily increase their position on the sponsor stock in the year and year after they become the trustee but revert this position more rapidly (within the year) when they end being the trustee.

III.A Trustee Behavior Around Negative Shocks

The sponsor firm may find its relationship with the trustee more valuable at certain times; specifically, times when there is widespread selling of the sponsor firm, causing downward price pressure. This is when there may be more pressure on the trustee to overweight in the sponsor, and thus when the consequences of the conflict of interest are more apparent. Our hypothesis predicts that we should observe the biggest deviations from all other fund families at precisely these times. We test this response of the trustee using two measures. The first, and most direct measure, is when there is widespread selling of the sponsor stock by other fund families. Instead, these times of likely negative price pressure and attenuated liquidity are identified through fund families selling a large percentage of the company. We define periods of large selling as those when more than 1 percent of the shares outstanding of a firm are being sold in aggregate by all funds in a quarter[27] This allows us to examine the trustee's behavior (i) relative to when all other funds are on average selling and (ii) when the sponsor firm is likely in need of the most propping up. The second measure we use is the cumulative abnormal return (CAR) around earnings announcements as a measure of the response of the market to earnings news. The construction of this measure follows Baker et al. (2004), however we use the [-2,2] day abnormal return (as opposed to [-1,1]) around an earnings announcement, controlling for the return on the CRSP value weighted market index. A negative shock will be an event where the $CAR < 0$ at the closest earnings announcement of the firm before quarterly holdings are reported. The benefit of using CAR is that it measures the market reaction to an earnings announcement, which is free of a structural model of earnings (e.g. seasonal random walk), and from any systematic bias in analyst forecasts. In a sense, however, this is not an ideal measure for severe liquidity shocks, as it fails to separate "small" negative abnormal returns from "big" abnormal negative returns. It is in the latter case that the family can be most useful to the sponsor firm[28].

[27] In our sample, this event happens about 10% of the time.

[28] We have also define a bad event as a time when the CAR measure is below a certain percentile. The problem with this approach is that the results are sensitive to the choice of the breakpoint used.

Table VI contains the regressions. The dependent variable in the regressions is $\log(Change)$, defined in Section I as $\log(shares(t)/(shares(t-1))$. Column 1 to Column 3 contain the regressions for periods of large selling by fund families. $PctCompSold$ measures the percentage of the company sold in aggregate by all fund families, while $PctCompSold > 1$ is a categorical variables equal to 1 when $PctCompSold$ is greater than one, and zero otherwise. We then interact this categorical variable with the *Trustee* categorical variable. $(Trustee * PctCompSold > 1)$ measures how trustees behave relative to other fund families in situations where there is selling off of the sponsor firm by the average family. If the trustee is propping up the firm especially in times all other funds are selling, we expect this interaction term to be positive and significant. From Column 1, the coefficient on the categorical variable $PctCompSold > 1$ is negative and significant, indicating that when a large percentage of a given firm is sold in aggregate by fund families, the average family that is not the trustee is selling that firm's shares. From the interaction term $(Trustee * PctCompSold > 1)$, though, consistent with the sponsor firm having some ability to exert pressure on the trustee, the trustee does the exact opposite of the other firms. When other firms are selling on average a large amount of the sponsor, the trustee is significantly buying the sponsor firm's shares. The positive and significant coefficient on $(Trustee * PctCompSold > 1)$ of 0.1425 ($t = 3.98$) implies that trustee increases it's already overweighted stake in the sponsor firm by 11.67% (0.1425-0.0258) at exactly those times when the sponsor firm may find it most valuable. Column 2 and Column 3 run the same regression as Column 1, but separately for trustees and non-trustees. As in Column 1, while fund families as an aggregate are selling over 1 percent of the sponsor firm, trustees are significantly increasing their holdings of the sponsor firm (Column 2).

Column 4 - Column 6 of Table VII contain the regressions for the negative CAR measure of a negative shock to the firm. The categorical variable $CAR < 0$ is equal to 1 when CAR is negative and 0 otherwise. The interaction term $(Trustee * CAR < 0)$ then tests how trustees behave differently toward sponsor firms following a sponsor firm's negative CAR. From Column 4, the coefficient on CAR is positive, indicating that fund families do increase (decrease) their holdings in firms following positive (negative) abnormal returns around earnings announcements[29]. The coefficient on $CAR < 0$ is negative but also not significant. Funds do slightly decrease their holdings following negative

[29] As in other regressions, this is controlling for past year returns of the firm.

earning's surprises as measured by CAR, but not significantly. The positive and significant coefficient on the interaction term ($Trustee * CAR < 0$) also suggests, consistent with the trustee's conflict of interest being more severe when the sponsor firm has had a negative shock, that the trustee invests more in the sponsor firm following negative earnings surprises. Column 5 and Column 6 reproduce the regression of Column 4 separately for trustees and non-trustees. The coefficients on the CAR variables are not significant in either case, but the signs go in the direction our hypothesis predicts.

Another way to examine the effect of the conflict of interest on portfolio choice at times of negative shocks is to look at the probability of selling a firm's stock. In Column 7 and Column 8 of Table VII we compare the probability of other fund families selling, and the trustee selling, the sponsor firm. We do this using probit regressions where the dependent variable *Sell* is equal to 1 if the mutual fund sold the firm's stock, and 0 otherwise. We run these probit regressions using an approach similar to the one used by Fama and MacBeth (1973): after running probit regressions for each quarter in our sample, we use the time series of estimates to calculate the coefficients in Table VII[30]. The t-statistics in Column 7 and Column 8 are estimated using a Newey-West correction with 4 lags. Again the main variables of interest are the interaction terms ($Trustee * PctCompSold > 1$) and ($Trustee * CAR < 0$). The negative and significant coefficient of -0.1941 ($t = -3.33$) on ($Trustee * PctCompSold > 1$) implies the trustee actually has a 19.41% smaller probability of selling the sponsor's firm stock when all other fund families are on average doing so. As before, we were unable to find a significant effect using the interaction $Trustee * CAR < 0$).

The evidence in Table VII further supports the idea that the conflict of interest is affecting trustee portfolio choice. During times of aggregate selling of the sponsor firm, causing negative price pressure, the trustee is acting in an opposite manner to other fund families, and helping to prop up the fund's price. Thus, at times when other funds are heavily selling sponsor firm shares, the trustee actually significantly increases it's already overweighted position in the sponsor.

III.B Returns to Liquidity

Coval and Stafford (2005) examines the price implications of mutual fund fire sales of securities.

[30]We use Fama-Macbeth to avoid some statistical problems associated with the use of fixed effects in probit regressions in our framework. See Greene (2002) for a discussion.

The paper finds that when constrained funds are forced to liquidate shares, this depresses the prices of the firms that they sell. On the opposite side, those that provide liquidity to constrained funds during these times earn significantly positive returns[31]. We want to rule out the possibility that the results in Table VII are driven by this effect, namely that trustees provide liquidity to the sponsor firms' stocks in order to capture future positive returns.

Specifically, we test whether the trustee is able to obtain positive future returns by buying even more in the sponsor firm at times when fund families on average are selling a large amount of the sponsor. In Table VIII, we replicate their experiment using our measure of liquidity instead. We use the quarter in which $PctCompSold > 1$ as our event quarter and set the last month of this quarter as our event date, $t = 0$. We then look at returns in the 12 months preceding and 12 months subsequent to the event (from $t = -12$ to $t = 12$). We use their two measures of returns, average abnormal return (AAR) and cumulative average abnormal returns (CAAR). Abnormal returns in both measures are defined as the firm's return minus the return on CRSP value weighted market index. From Table VIII, the trustee earns significantly negative returns on its overweighted position leading up to and including the event date. For example, the CAAR for the quarter in which the mutual fund industry is selling the sponsor firm (months -2, -1, and 0), is -5.14% ($t = -5.95$). Further, although the estimated abnormal returns are positive following the mass selling, they are not statistically different form zero, and the magnitudes are smaller than the negative returns surrounding the event. It therefore does not appear that the trustee is compensated for the liquidity it provides by buying significant amounts of shares in the sponsor firm, increasing its already overweighted position at times when the mutual fund industry on aggregate is selling large amounts of the firm. We see this as evidence that the liquidity provision in order to capture positive returns explanation may not be able to account for the contrarian buying behavior of the trustee in Table VII.

[31] See Panel A of Table 4 in Coval and Stafford (2005). Note, however, that mutual funds are only able to earn high abnormal returns from providing liquidity in the case of fire sales by *constrained* funds. As these sells are not driven by new information, liquidity providers earn positive returns once prices revert to their "fundamental" values. When mass sales include those driven by information updates, future returns from providing liquidity are smaller (Panel B of Table 4 in their paper).

IV Costs To Investors and Price Impact

IV.A Costs to Investors

In Sections II and III, we present evidence of overweighting by fund families of their 401(k) client firms, consistent with the desire of fund families to attract 401(k) clients. We now turn to a cost of this overweighting for the current fund's investors. Investors within a mutual fund family want the mutual fund to maximize a risk adjusted expected return[32]. The fund family, on the other hand, has the incentive to maximize assets under management, maximizing fee revenues (Brown et al. (1996), Chevalier and Ellison (1997, 1999)). As one way to do this is to attract the large inflows from 401(k) plans, this creates a conflict of interest if the method used to attract funds is not maximizing risk adjusted returns.

We have shown evidence that fund families do overweight 401(k) client firms, and buy their shares when other funds are selling, consistent with this conflict of interest affecting the fund's portfolio decisions. There are a number of possible ways to quantify the effects to fund investors of this overweighting. The methodology we use is that of the loss in risk adjusted returns[33]. From the regressions in Table IV, we find that controlling for other determinants of holdings, trustees overweight the sponsor firm stock by around 64 million dollars. To determine the effect this has on an individual, we need a measure of the average effect this has on an individual's portfolio. This is difficult, as we don't know in which funds the family is putting the overweighting. It is reasonable to think that for many families, certain of their funds (e.g. index funds) will not contain the overweighting. In addition a family may not want to invest in a large 401(k) plan sponsor firm's stock (large cap) within its small cap fund. Therefore, the overweighting may be concentrated into a subset of the family's fund offerings. We thus present a range of results allowing the overweighting to be spread over different numbers of the family's funds.

The results are in Table IX. We first estimate the Sharpe ratio of the trustee fund had it not overweighted the plan sponsor's stock. We call this the untilted Sharpe ratio, free from the trustee-

[32]There are certainly other goals, such as tax considerations and current income, that some investors have. The conflict of interest would still develop in that overweighting in the 401(k) client is likely in conflict with these goals, as well.

[33]This ignores their loss in returns because of the increased overweighting around negative shocks. We therefore expect losses to be greater when taking this behavior into account.

tilted overweighting. We then calculate the Sharpe ratio, and corresponding loss in Sharpe ratio, for the overweighting varying by number of funds. In our sample, the average number of equity funds per family increases from 6 in 1993 to 13 in 2003 (from CRSP). We use the time series average of the medians, 10 funds per firm in our calculations. We then calculate the risk adjusted loss per year, and over the average estimated life of a trustee relationship in our sample (29 years). Table IX Panel A shows how these losses vary by the number of funds to which the family applies the overweighting. As expected, the investor loses more the more concentrated is the overweighting by the fund family. From Panel A, the effect of the average trustee overweighting on investors is small. Even if the fund concentrates all of the overweighting into one fund the annualized loss in returns is 23 basis points, while the total return loss over the entire estimated trustee firm-sponsor firm relationship is 7.73%.

Panel B then addresses the question of which fund families impose the largest cost on investors. From Table V, the trustee overweighting is significantly more severe in small fund families and for large 401(k) plans, consistent with a more severe conflict of interest. So, in Panel B, we calculate the loss to an investor in a fund who is a trustee of a 401(k) plan one standard deviation larger than the average plan, and who itself is one standard deviation smaller than the average fund family. As can be seen, the cost to investors increases substantially, now being 96 basis points in lost returns per year if the family concentrates the overweighting in one fund. This then translates to over a 37% loss in return over the entire life of the relationship. In net, although the average effect may be small, for investors in smaller fund families who are trustees of larger plans, the cost can be a sizeable return loss over the average trustee-401(k) sponsor relationship.

IV.B Quantifying a Benefit: Price Impact

From Section III, trustee firms buy sponsor firm shares precisely when all other fund families are selling a significant amount. From the sponsor firm's perspective, this may help to dampen adverse price movements of its stock. In this section, we quantify this benefit by estimating to what extent the trustees' increased overweighting specifically in these bad times can have a tangible price impact on the sponsor firm. To do this, we first need an estimate of the demand elasticity of the sponsor firms. We rely on the previous literature, which has estimated demand elasticities of firm stock in the range of roughly 1 to 11 (Shleifer (1986), Loderer et al. (1991), Petajisto (2005)). We will use

the average of this range, 6, for our tests. From Column 1 of Table VII, trustees actually increase their purchases in the sponsor firm by roughly 11 percent (0.1425-0.0258), when all other firms are selling a significant portion of the firm. This translates into the trustees buying roughly .26% more of the shares outstanding of the sponsor firm[34]. To give a further idea of what this means to the sponsor firm, the median amount of its shares sold by all other firms when $PctCompSold > 1$, is 2.28%. Thus, using the elasticity estimate of 6, the estimated price response of the firm is a -13.70 percent return. However, because the trustee buys shares at exactly these times, the returns are 154 basis points higher. Therefore, the trustee provides an 11.22% (1.54/13.70) propping up of sponsor firm's stock price. This suggests a tangible benefit to the 401(k) sponsor firm of having the trustee conflict of interest.

V Conclusion

There are several ways mutual fund families attract assets under management. We document a new economically large and growing channel, through the 401(k) market, and find evidence that mutual fund families systematically distort their portfolios to attract these 401(k) clients. This presents a cost from the conflict of interest, as their fiduciary responsibility to outside investors is to maximize return subject to a given risk or benchmark. Specifically, we find that mutual fund families who become trustees significantly overweight 401(k) sponsor firm's stock in their fund families. This overweighting is significantly more pronounced for smaller fund families and for larger 401(k) plans. As well, we find that the trustee family performs a valuable service to the trusted company by buying or holding its stocks around times of substantial selling of the sponsor firm by all other funds. We quantify this sponsor firm benefit of increased buying of sponsor firm shares by its trustee around bad times, and find that it can have substantial price impact by propping up the sponsor firm's price. Further, this overweighting cannot be explained by information, as trustees do not do any better, actually a bit worse, on their sponsor firm holdings than other fund families. We find that although the average cost to fund investors of this overweighting is small, for those investors in smaller fund families who are trustees of larger 401(k) plans (those we expect to have the most severe conflict of

[34]This figure comes from multiplying the 9 percent increase by the average holdings of the trustee in the sponsor firm of 2.11% of shares outstanding.

interest), the cost can be large.

With the percentage of mutual fund assets being held by defined contribution retirement plans steadily increasing, we expect fund families to expend more effort in attracting these 401(k) plans in the future. We therefore predict the magnitude of the distortion in portfolio allocations we find in the paper may even increase, rather than decrease, in the future. In addition, more evidence is arising of potential problems in the defined benefit plan structure. Cocco and Volpin (2005) find that when defined benefit plans assign members of the board of directors to have fiduciary responsibility over the plan, the plan tilts more toward equities and have a higher dividend payout ratio. Bergstresser et al. (2005) find additional evidence that defined benefit plans make investment decisions in response to suspect incentives, while Goyal and Wahal (2005) find that defined benefit plans choose investments in a sub-optimal way over time.

We thus believe the need to address this trustee portfolio distortion is increasing. Future research should address policy implications that could lessen the conflict of interest. One possible remedy is to require the trustee to be independent of the mutual fund providers in the plan. This could greatly reduce the overweighting behavior currently seen by ostensibly ridding this growing industry's structure of its embedded, and unneeded, conflict of interest.

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Table I:
401(k) Plan Summary Statistics

Panel A: This panel is a summary of of the 401(k) plan data used, collected from SEC Form 11-k filings. All numbers are in millions of dollars. When a firm has more than one 401(k) plan, as long as the plans have the same trustee (which happens the vast majority of times), we aggregate them by company. Otherwise we choose the largest plan. Number of Plans is the total number of plans in our sample.

Panel B: This panel contains data on the aggregate of all plans in the sample. Number of plans is the average number of plans each year. Sum of Plans is in millions of dollars. GDP numbers are taken from the Federal Reserve (2005), while the mutual fund data was taken from CDA/Spectrum Institutional database. % of Family Assets is the average ratio of the sum of plan assets by the market value of all equity holdings of families in our sample. Total Market Cap is defined as the sum of the market capitalizations of (NYSE+NASDAQ+AMEX). All numbers are annual averages.

Panel A: Average 401(k) Plan Size

Year	Number of plans	Mean	STD	Max	Min
Full Sample	**899**	**640.02**	**1,992.18**	**25,508.58**	**0.0480**
1993-1998	560	570.89	1,783.68	19,201.35	0.0480
1999-2003	741	683.66	2,129.05	25508.58	0.1571

Panel B: Sample Summary (annual averages)

Year	Number of plans	Sum of Plans (Millions)	% of GDP	% of Family Assets	% of Total Market Cap
Full Sample	392	**235,545**	**2.58%**	**11.96%**	**3.20%**
1993-1998	304	168,266	2.13%	12.18%	3.22%
1999-2003	497	316,280	3.12%	11.71%	3.18%

Table II:
Mutual Fund Family Summary Statistics

Panel A: This panel is a summary of of the mutual fund family data we use in the paper (top 100 families), and is taken from taken from CDA/Spectrum Institutional database. All numbers are in millions of dollars. We then separate by trustee families and non-trustee families.

Panel B: This panel contains data on mutual fund fees and fees paid to companies by defined contribution plans. The mutual fund expense data is taken from the CRSP Mutual Fund database. The trustee fees and total salaries data come from a database on Form 5500 filings to the Department of Labor. These fees are in millions of dollars.

Panel A: Mutual Fund Summary Statistics

Year	Number of Families			Mean			STD		
	Full Sample	Non-Trustee	Trustee	Full Sample	Non-Trustee	Trustee	Full Sample	Non-Trustee	Trustee
Full Sample	251	197	54	12,199.47	8,856.51	29,940.18	22,820.55	15,585.60	40,280.47
1993-1998	228	184	44	8,184.97	6,025.40	20,737.88	14,638.97	8,338.10	29,535.92
1999-2003	208	165	43	17,375.13	12,625.54	39,963.82	29,470.56	21,188.89	47,430.29

Panel B: Mutual Fund Expenses and Trustee Fees

Year	Total Load		Expenses (% TNA)		12b-1 Fee		Trustee Fees	
	Mean	STD	Mean	STD	Mean	STD	Mean	STD
Full Sample	2.35%	2.37%	1.56%	0.78%	0.37%	0.40%	0.15	0.41
1993-1998	2.36%	2.36%	1.54%	0.73%	0.35%	0.40%	0.14	0.39
1999-2003	2.33%	2.37%	1.58%	0.82%	0.40%	0.41%	0.16	0.42

Table III - Univariate Measures

This table presents the univariate statistics for some measures of holdings. "MV Hold" is the market value of the family's holdings of the stock at each quarter. "% TNA" is the market value of the holdings divided by the Total Net Assets of the family (equity positions only). "% Company" is the number of shares held as a percentage of the number of shares outstanding. In each case, for each quarter and each stock we average the measure across families separately for trustees and non-trustees. Then, on each quarter, we average the measure across stocks. The table presents the statistics of this time series of averages. The T-stat is the t-statistic for the difference between trustees and non-trustees. Newey-West T-stat is the t-statistic for the difference adjusted using the Newey-West procedure with a 4-period lag.

Variable	Trustees	Non-Trustees	Difference	T-Stat	Newey-West T-stat
MV Hold (millions)	188	24	164	22.05	11.25
% TNA	0.168	0.092	0.076	7.01	3.57
% Company	2.19	0.78	1.41	37.40	20.72

Table IV: Trustee Effect on Portfolio Choice

The dependent variables in the regressions are log(PctSharesOut) (Column 1 - Column 3), the natural logarithm of the percentage of shares outstanding of a firm owned by a given mutual fund family and log(PctTNA) (Column 4), the natural logarithm of the percentage of TNA of the mutual fund family invested in the given firm. The independent variable of interest in the regressions is Trustee, a categorical variable equal to 1 if the given mutual fund is the trustee for the given firm, and 0 otherwise. Also included in the regressions are the firm characteristics of natural logarithm of market equity and book-to-market equity, log(ME) and log(BM), and the firm's weight in the CRSP value-weighted market portfolio, Market Weight. Past Returns are also included, which are the previous 11 months of returns for the firm (excluding last month). The mutual fund family characteristic of the logarithm of total net assets, log(TNA), is included. Additional fund family characteristics of percentage invested in the industry of the stock being considered, PctInvInd, and percentage invested in the style of the stock being considered (computed following Daniel et al. (1997)), PctInvStyle, are included. log(401(k) Size) is the natural logarithm of the size of the 401(k) plan of the firm being considered. The sample period is 1994-2003, and quarter and mutual fund family fixed effects are included where indicated. All regressions include an intercept (not reported). Standard errors (in parentheses) are robust and clustered at the firm level (Column 2 - Column 4).

	$\log(PctSharesOut)$			$\log(PctTNA)$
	Column 1	Column 2	Column 3	Column 4
Trustee	0.4632***	0.4267***	0.4284***	0.4538***
	(0.0188)	(0.0576)	(0.0589)	(0.0189)
log(ME)	-0.2623***	-0.1915***	-0.1742***	0.7288***
	(0.0012)	(0.0109)	(0.0142)	(0.0012)
log(BM)	0.0511***	0.0253	0.0593***	0.1181***
	(0.0020)	(0.0258)	(0.0175)	(0.0020)
log(TNA)	0.7086***	0.8088***	0.8174***	-0.2954***
	(0.0011)	(0.0072)	(0.0093)	(0.0011)
Past Returns	0.0005***	0.0006***	0.0006***	0.0017***
	(0.0000)	(0.0001)	(0.0002)	(0.0000)
PctInvStyle	0.0271***	0.0230***	0.0223***	0.0288***
	(0.0002)	(0.0013)	(0.0013)	(0.0002)
PctInvInd	0.0282***	0.0243***	0.0272***	0.0308***
	(0.0003)	(0.0028)	(0.0030)	(0.0003)
Market Weight	0.5369***	0.1428**	0.1392***	0.6495***
	(0.0083)	(0.0607)	(0.0531)	(0.0084)
log(401(k) Size)			0.0155	
			(0.0095)	
Family Fixed Effects	No	Yes	Yes	Yes
Quarter Fixed Effects	No	Yes	Yes	Yes
Cluster By Firm	No	Yes	Yes	Yes
Observations	1707880	1707880	1010718	1710036
R-Squared	0.23	0.34	0.35	0.41

*,**,*** denote significance at the 90%, 95% and 99% level, respectively.

Table V: Severity of Conflict of Interest and Superior Information

The dependent variable in the regressions is log(PctSharesOut), the natural logarithm of the percentage of shares outstanding of a firm owned by a given mutual fund family. The independent variable of interest in the regressions is Trustee, a categorical variable equal to 1 if the given mutual fund is the trustee for the given firm, and 0 otherwise. Also included in the regressions are the firm characteristics of natural logarithm of market equity and book-to-market equity, log(ME) and log(BM), and the firm's weight in the CRSP value-weighted market portfolio, Market Weight. Past Returns are also included, which are the previous 11 months of returns for the firm (excluding last month). The mutual fund family characteristic of the logarithm of total net assets, log(TNA), is included. Additional fund family characteristics of percentage invested in the industry of the stock being considered, PctInvInd, and percentage invested in the style of the stock being considered (computed following Daniel et al. (1997)), PctInvStyle, are included. log(401(k) Size) is the natural logarithm of the size of the 401(k) plan of the firm being considered. Trustee*log(401(k) Size) is the interaction of the Trustee categorical variable and log(401(k) Size). Trustee*log(TNA) is the interaction of the Trustee categorical variable and log(TNA). Future Returns are measured as the next 11 months of returns for the firm being considered, with Trustee*Future Returns being the interaction of the Trustee categorical variable and Future Returns. The sample period is 1994-2003, and quarter and mutual fund family fixed effects are included where indicated. All regressions include an intercept (not reported). Standard errors (in parentheses) are robust and clustered at the firm level.

	$\log(PctSharesOut)$		
	Column 1	Column 2	Column 3
Trustee	2.1711***	0.4285***	0.4281***
	(0.5277)	(0.0580)	(0.0598)
log(ME)	-0.1743***	-0.1943***	-0.1943***
	(0.0142)	(0.0110)	(0.0110)
log(BM)	0.0592***	0.0256	0.0256
	(0.0175)	(0.0264)	(0.0264)
log(TNA)	0.8177***	0.8091***	0.8091***
	(0.0093)	(0.0072)	(0.0072)
Past Returns	0.0006***	0.0005***	0.0005***
	(0.0002)	(0.0001)	(0.0001)
PctInvStyle	0.0223***	0.0230***	0.0230***
	(0.0013)	(0.0013)	(0.0013)
PctInvInd	0.0272***	0.0246***	0.0246***
	(0.0030)	(0.0028)	(0.0028)
Market Weight	0.1394***	0.1524**	0.1524**
	(0.0530)	(0.0612)	(0.0612)
log(401(k) Size)	0.0149		
	(0.0095)		
Trustee*log(TNA)	-0.1995***		
	(0.0453)		
Trustee*log(401(k) Size)	0.1036***		
	(0.0304)		
Future Returns		-0.0004***	-0.0004***
		(0.0001)	(0.0001)
Trustee*Future Returns			0.0000
			(0.0006)
Family Fixed Effects	Yes	Yes	Yes
Quarter Fixed Effects	Yes	Yes	Yes
Cluster By Firm	Yes	Yes	Yes
Observations	1010718	1687750	1687750
R-Squared	0.35	0.34	0.34

*,**,*** denote significance at the 90%, 95% and 99% level, respectively.

Table VI: Changes In Trustee

The dependent variable in the regressions is log(Changes), defined as the natural logarithm of the fraction (shares(t)/shares(t-1)) held by the given firm. The independent variables of interest in the regressions is Beginning (1 Year), Ending (1 Year), Beginning (2 Year), and Ending (2 Year). Beginning (1 Year) is a categorical variable equal to 1 if the mutual fund family began as a trustee of the given firm within the past year, and 0 otherwise. Ending (1 Year) is a categorical variable similarly defined to be equal to 1 if the mutual fund family ended as a trustee of the given firm within the past year, and 0 otherwise. Beginning (2 Year) and Ending (2 Year) are similarly defined, but for periods of two years instead of 1 year. Trustee is a categorical variable equal to 1 if the given mutual fund is the trustee for the given firm, and 0 otherwise. Also included in the regressions are the firm characteristics of natural logarithm of market equity and book-to-market equity, log(ME) and log(BM), and the natural logarithm of the firm's change in weight in the CRSP value-weighted market portfolio over the previous quarter, defined as log(Mkt Weight(t)/Mkt Weight(t-1)). Past Returns are also included, which are the previous 11 months of returns for the firm (excluding last month). The mutual fund family characteristic of the logarithm of total net assets, log(TNA), is included. Additional fund family characteristics of percentage invested in the industry of the stock being considered, PctInvInd, and percentage invested in the style of the stock being considered (computed following Daniel et al. (1997)), PctInvStyle, are included. The sample period is 1994-2003, and quarter and mutual fund family fixed effects are included where indicated. All regressions include an intercept (not reported). Standard errors (in parentheses) are robust and clustered at the firm level.

	log(shares(t)/shares(t-1))	
	Column 1	Column 2
Trustee	-0.0132*	-0.0139**
	(0.0069)	(0.0070)
log(ME)	0.0018**	0.0018**
	(0.0008)	(0.0008)
log(BM)	0.0065***	0.0065***
	(0.0018)	(0.0018)
log(TNA)	0.0564***	0.0564***
	(0.0022)	(0.0022)
Past Returns	0.0004***	0.0004***
	(0.0000)	(0.0000)
PctInvStyle	0.0006***	0.0006***
	(0.0002)	(0.0002)
PctInvInd	0.0006***	0.0006***
	(0.0002)	(0.0002)
$\log\frac{\text{Mkt Weight(t)}}{\text{Mkt Weight(t-1)}}$	0.1322***	0.1322***
	(0.0096)	(0.0096)
Beginning (1 Year)	0.0779	
	(0.0527)	
Ending (1 Year)	-0.0592	
	(0.0411)	
Beginning (2 Years)		0.0630**
		(0.0250)
Ending (2 Years)		-0.0337
		(0.0293)
Family Fixed Effects	Yes	Yes
Quarter Fixed Effects	Yes	Yes
Cluster By Firm	Yes	Yes
Observations	586537	586537
R-Squared	0.01	0.01

*,**,*** denote significance at the 90%, 95% and 99% level, respectively.

Table VII: Trustee Behavior Around Negative Shocks

The dependent variable in the regressions in Column 1 - Column is the logarithm of the ratio (shares(t)/shares(t-1)) held by the given firm. Column 7 and Column 8 run Probit regressions with the specification listed every quarter, and calculate time series averages and standard errors of the regressions using a Fama-MacBeth approach. The dependent variable in these regressions, Sell, is equal to 1 if the given family sold the given firm over the last quarter, and 0 otherwise. The independent variables of interest are $Trustee * (PctCompSold > 1)$ and $Trustee * (CAR < 0)$. These measure the differential behavior of the trustee around negative events for the firm. Trustee is a categorical variable equal to 1 if the given family is the trustee for the given firm, and 0 otherwise. *PctCompSold* is the percentage of the given firm that is sold by the aggregate mutual fund industry *excluding* the trustee in a given quarter. $PctCompSold > 1$ is a categorical variable equal to 1 if the percentage sold of the company is greater than 1% of shares outstanding, and 0 otherwise. $Trustee * (PctCompSold > 1)$ is the interaction of $Trustee$ and $PctCompSold > 1$. CAR measures the abnormal return in the [-2,2] day window around earnings announcement, controlling for the return on the CRSP value weighted market index. $CAR < 0$ is a categorical variable equal to 1 if the CAR is negative, and 0 otherwise. $Trustee * (CAR < 0)$ is then an interaction of $Trustee$ and $CAR < 0$. Also included in the regressions are the firm characteristics of the logarithm of market equity and book-to-market equity, log(ME) and log(BM). *PastReturns* are the previous 11 months of returns for the firm (excluding last month). The mutual fund family characteristic of the logarithm of total net assets, log(TNA), is included. Column 2 and Column 5 are run for trustees only, while Column 3 and Column 6 are run for only non-trustees. The sample period is 1994-2003, and quarter and mutual fund family fixed effects are included in all panel regressions. All regressions include an intercept (not reported). Standard errors (in parentheses) are robust and clustered at the firm level (Column 1 - Column6). In Column 7 and Column 8, standard errors are calculated using the Newey-West procedure with a 4 period lag.

	Log(shares(t)/shares(t-1))						FM Probit (Sell)	
	Column 1 (Full)	Column 2 (Trustees)	Column 3 (Non-Trustees)	Column 4 (Full)	Column 5 (Trustees)	Column 6 (Non-Trustees)	Column 7	Column 8
Trustee	-0.0246***			-0.0300			0.0131	-0.0232
	(0.0078)			(0.0190)			(0.0342)	(0.0544)
log(ME)	0.0074***	0.0006	0.0074***	0.0025**	-0.0119	0.0026**	0.0605***	0.0535***
	(0.0008)	(0.0055)	(0.0009)	(0.0012)	(0.0095)	(0.0012)	(0.0066)	(0.0066)
log(BM)	0.0073***	0.0227	0.0071***	0.0088***	0.0111	0.0088***	-0.0100	-0.0127
	(0.0018)	(0.0149)	(0.0018)	(0.0023)	(0.0177)	(0.0022)	(0.0067)	(0.0088)
log(TNA)	0.0562***	0.1835***	0.0560***	0.0583***	0.1143	0.0583***	0.0132	0.0073
	(0.0022)	(0.0551)	(0.0022)	(0.0028)	(0.0910)	(0.0028)	(0.0079)	(0.0086)
Past Returns	0.0004***	0.0003	0.0004***	0.0004***	-0.0002	0.0004***	-0.0007***	-0.0013***
	(0.0000)	(0.0002)	(0.0000)	(0.0001)	(0.0003)	(0.0001)	(0.0001)	(0.0002)
PctInvStyle	0.0005***	0.0006	0.0005***	0.0006***	-0.0002	0.0007***	0.0012***	0.0021***
	(0.0002)	(0.0014)	(0.0002)	(0.0002)	(0.0025)	(0.0002)	(0.0004)	(0.0006)
PctInvInd	0.0006***	0.0025	0.0006***	0.0010***	0.0036	0.0010**	-0.0010	-0.0002
	(0.0002)	(0.0018)	(0.0002)	(0.0004)	(0.0030)	(0.0004)	(0.0007)	(0.0011)
$\log\frac{\textbf{Mkt Weight(t)}}{\textbf{Mkt Weight(t-1)}}$	0.1098***	0.2212***	0.1078***	0.1207***	0.3545***	0.1178***	-0.0236	-0.0611*
	(0.0090)	(0.0739)	(0.0090)	(0.0151)	(0.0911)	(0.0154)	(0.0252)	(0.0340)
(PctCompSold > 1)	-0.0258***	0.0853**	-0.0253***				0.0775***	
	(0.0049)	(0.0389)	(0.0050)				(0.0108)	
Pct Comp Sold	-0.0077***	-0.0003	-0.0079***				0.0078***	
	(0.0007)	(0.0050)	(0.0007)				(0.0008)	
Trustee * (PctCompSold > 1)	0.1425***						-0.1941***	
	(0.0358)						(0.0583)	
(CAR < 0)				-0.0030	0.0461	-0.0031		0.0157**
				(0.0051)	(0.0475)	(0.0051)		(0.0058)
CAR				0.0007	-0.0025	0.0007		0.0015
				(0.0005)	(0.0034)	(0.0005)		(0.0009)
Trustee * (CAR < 0)				0.0520*				0.0284
				(0.0279)				(0.0542)
Observations	586170	8123	578047	261811	3049	258762		
R-Squared	0.01	0.02	0.01	0.01	0.05	0.01		

*,**,*** denote significance at the 90%, 95% and 99% level, respectively.

Table VIII: Returns for Providing Liquidity

For each stock, we first define the event date as the quarter in which families sold more than 1% of the shares outstanding of this stock. This corresponds to months $t = -2, -1, 0$. We then compute, for each event month from $t = -12$ to $t = 12$, the abnormal return on this stock. This abnormal return is defined as the difference between the stock's return and the return on the value-weighted CRSP index. For each stock, the cumulative abnormal return is also calculated. We then compute the average abnormal return (AAR) and the cumulative average abnormal return (CAAR) for each event month. The t-statistics are computes across stocks. The CAAR for different event periods is the average of the cumulative return (across stocks) over the period defined. The number of observations each month is denoted by N

t	AAR (%)	t-stat	CAAR (%)	t-stat	N
-12	0.50	0.95	0.50	0.95	515
-11	0.20	0.38	0.67	0.95	540
-10	1.91	3.89	2.57	2.88	541
-9	0.50	0.97	3.07	2.85	543
-8	-0.57	-1.01	2.35	2.01	570
-7	0.83	1.66	3.18	2.47	570
-6	0.04	0.08	3.21	2.27	572
-5	-0.53	-0.97	2.47	1.71	610
-4	-0.09	-0.21	2.38	1.52	611
-3	0.01	0.02	2.38	1.42	612
-2	-1.57	-3.02	0.78	0.44	620
-1	-0.43	-0.83	0.36	0.18	621
0	-3.06	-6.15	-2.71	-1.36	623
1	0.75	1.28	-2.36	-1.15	605
2	0.85	1.80	-1.51	-0.72	605
3	0.42	0.78	-1.09	-0.49	605
4	0.38	0.71	-1.46	-0.63	582
5	0.59	1.17	-1.00	-0.41	580
6	0.28	0.51	-0.72	-0.29	580
7	-0.07	-0.11	-1.67	-0.67	561
8	1.10	2.15	-0.76	-0.30	560
9	-0.22	-0.36	-0.94	-0.35	559
10	1.11	1.62	-0.74	-0.27	541
11	0.53	0.88	-0.21	-0.07	541
12	-0.55	-1.09	0.24	0.09	537
	Event Period $[-2, 0]$		-5.14	-5.95	
	Event Period $[-2, +3]$		-3.17	-2.37	
	Event Period $[+4, +12]$		2.88	1.60	
	Event Period $[+7, +12]$		1.90	1.27	

Table IX:
Trustee-Overweighting Cost to Fund Investors

We present estimates of the cost to fund investors of the trustee overweighting. We use loss in risk adjusted returns using Sharpe ratios. The first panel presents summary statistics for the firm and sample. Mean Ret and Std Ret measure the quarterly mean and standard deviation respectively. Rf is the quarterly risk free rate measured as the average 90-day T-bill rate over the sample. W(sponsor) and W(family) are the weight of the mutual fund family has invested in the sponsor firm's stock and in the remainder of its assets, respectively. Panel A presents the calculation for loss to fund investors, assuming the mutual fund spreads the sponsor firm overweighting over different numbers of its funds. Risk adjusted return loss over the life of the life of the relationship is calculated using the average estimated length of trustee fund-sponsor firm relationship of roughly 29 years. Panel B measures the cost of the trustee overweighting, but now for the subset of trustees who are 1 standard deviation smaller than the average fund family, and have attracted a 401(k) plan 1 standard deviation larger than the average plan.

Firm and Family Statistics

	Mean Ret	Std Ret
Sponsor Family	0.038	0.216
Fund Family	0.035	0.089
Cov(Sponsor, Family)	0.011	
Rf	0.010	
	Optimal Weighting	
W(sponsor)	0.016	
W(family)	0.984	
Optimal Sharpe ratio	0.281	

Panel A: Cost of Average Trustee Overweighting

# Funds Spread Overweighting	1	2	3	4	All
W(sponsor)	**0.085**	**0.051**	**0.039**	**0.033**	**0.028**
W(family)	0.915	0.949	0.961	0.967	0.972
Overweighted Sharpe ratio	0.273	0.278	0.279	0.280	0.280
SR Deviation	0.008	0.003	0.002	0.002	0.001
Std of Portfolio	0.093	0.091	0.091	0.091	0.090
Loss In Annual Returns	0.29%	0.12%	0.08%	0.06%	0.04%
Loss Over Life of Relationship	**8.85%**	**3.64%**	**2.26%**	**1.63%**	**1.08%**

Panel B: Cost of Overweighting of Small Family with Large Plan

# Funds Spread Overweighting	1	2	3	4	All
W(sponsor)	**0.158**	**0.087**	**0.063**	**0.051**	**0.040**
W(family)	0.842	0.913	0.937	0.949	0.960
Overweighted Sharpe ratio	0.261	0.273	0.276	0.278	0.279
SR Deviation	0.020	0.008	0.005	0.003	0.002
Std of Portfolio	0.098	0.093	0.092	0.091	0.091
Loss In Annual Returns	0.78%	0.30%	0.18%	0.13%	0.08%
Loss Over Life of Relationship	**25.36%**	**9.10%**	**5.34%**	**3.73%**	**2.40%**

Figure I: Changes in Trustee

This figure plots the holdings of mutual fund family trustees around the event of a change in trustee. It compares the holdings of firms that begin being trustee (solid line) with those that end being trustee (dotted line). The holdings in the sponsor firm are calculated as the percentage of the trustee family's TNA ($PctTNA$). The y-axis in the figure is in percentages (from 0.09 percent to 0.16 percent). The x-axis measures time, with Time 0 being the time of the trustee change. Holdings are measured as the average past 4 quarters of holdings. So, [-4,-1] refers to the average holdings in the sponsor firm in the 1 year period from the quarter directly prior to the trustee change to four quarters before the trustee change. The figure represents the average over the 58 cases of trustee changes we observe and can match to CDA holdings data.