Why Do Money Fund Managers Voluntarily Waive Their Fees?

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Abstract

Over half of money fund managers voluntarily waive fees they have a contractual right to claim. Accordingly, the effective fee charged may be substantially less than indicated in expense ratios and may vary over the year despite a constant contractual fee. Retail fund managers use fee waivers to strategically adjust net advisory fees to current realizations in performance and expected fund flows. This paper documents differences in fee waiving practices between retail and institutional funds and relates these findings to differences in the effectiveness of fee waivers in terms of enhancing fund performance and thereby attracting additional funds.

This paper investigates the optimal management fee under the assumption that it is not fixed but variable throughout the year. We argue that fee waivers are an indirect method of setting flexible performance-based fees in an industry that has historically adopted a fee structure that is nominally flat. To circumvent a suboptimal fixed structure, managers nominally charge higher contractual fees and then selectively waive these fees. The number of money market funds that waive fees has increased over time from 40 percent in 1980 to 63 percent by 1995. In 1995, the gross contractual expense for a typical money market mutual fund was approximately 45 basis points of net assets. For a fund that waived fees, the average waiver was approximately 23 basis points of net assets, or over half a million dollars.

The choice of an optimal fee structure in the mutual fund industry has been discussed extensively in recent years. In particular, Chordia (1996) and Ferris and Chance (1987) explore the optimal choice of load fees and distribution fees. Dermine and Röller (1992) and Baumol et al. (1990) empirically estimate management fees given the economies of scale and scope in the mutual fund industry. These papers assume the management fee is a fixed percent of assets and is paid in equal installments over the year. Although the fee contracted with the Board is constant during the year, the competitive fee charged to the investor might vary because fund managers often voluntarily and unilaterally waive the fees they are contractually allowed to claim.

Chevalier and Ellison (1997) and Brown, Harlow, and Starks (1996) show that a non-linear relation between flows and relative performance in equity funds encourages risk-taking on the part of managers because of the incentive to build asset size. Just as managers adjust risk in equity funds, money market managers adjust fees in response to performance.

We document a statistically significant negative relation between waivers and performance for the bottom 20 percent of institutional funds. However, for retail funds, we find that both low-performing and high-performing funds waive more than funds with average

performance. It seems intuitive that low-performing retail and institutional funds waive more than the average to boost their performance. The interesting question is why do top-performing retail managers waive more while top-performing institutional managers do not.

We find a significant convex relation between lagged performance and fund flows and relate this to the manager's decision to waive. Hence, managers for high-performing retail funds appear to be waiving fees to exploit investor price sensitivity. However, we also find that institutional fund flows are convex. Yet, managers of high-performing institutional funds do not appear to be exploiting the increased price sensitivity. We argue that the effectiveness of waivers to improve rank differs between retail and institutional funds and causes managers to respond differently to fund flow incentives. Institutional funds compete aggressively for price sensitive investors and in equilibrium, a high-performing institutional fund is unlikely to improve relative performance by waiving since almost 80 percent of institutional funds waive fees. By way of comparison, only 55 percent of retail funds waive. We find that waiving among top-performing retail funds successfully advances their relative position and attracts investors.

The remainder of the paper is divided as follows. The first section describes the institutional framework of the waiver decision. The second section describes the practice of fee waiving and summarizes the descriptive evidence. The third section develops a fund flow hypothesis of fee waiving. Sections IV and V present empirical evidence on the relation between waivers and performance and the effect of waiving in competition. The last section provides some alternative explanations of waivers.

I. The Practice of Fee Waiving

The Investment Company Act of 1940 allocates oversight responsibilities of the mutual fund to its Board of Directors. As such, the Board has a fiduciary responsibility to the shareholders for the appropriate operation of the fund. Their responsibilities include reviewing

portfolio performance, adherence to regulation standards, and the annual selection and authorization of payment for all outside contractors. The Board hires several contracted services including a manager, a distribution channel, an administrator or custodian, and a transfer agent. The services usually are paid a contracted fixed percent of the average net assets of the fund, which is fixed over a period of time ranging from one year to three years. Changing the manager's contractual fee is very difficult because any increase in contractual fees has to be approved by the Board and by shareholders while decreasing contractual fees requires only the approval of the Board. Tufano and Sevick (1997) find evidence that Board structure and salary can influence the fees charged and suggest that the Board's legal liability make it difficult for managers to change contractual fees.

Neither the Securities Exchange Commission (SEC) nor the Board directly regulates or oversees fee waivers. Although the manager is entitled to the full amount of the contracted fee, managers voluntarily and unilaterally choose to waive fees.[1] The waiver is sometimes discussed with Board members during the quarterly meetings, but the manager need not receive Board approval to change the waiver. Although the manager will generally notify the Board of any changes, this notification can be made ex-post or not at all.

Managers can either choose to waive the upfront costs or the ongoing costs. The upfront costs include any kind of load fee incurred by the investor entering or exiting the fund. The ongoing fees are automatically deducted from gross returns such as contractual management fees. The fee waiver discussed in this paper is the latter type where managers adjust the ongoing expenses to change the net returns. If the manager lowers the contracted fee by waiving 20 bp, this increases each investor's net return by 20 bp.

Because the SEC prohibits funds from charging different ongoing expenses to different investors within the same fund, some funds have established several classes within the same fund

type. For instance, a fund complex may have Class A, B, C, and Y of its money fund. Although each class is a money fund, the different fund classes can charge different contracted fees, waivers, and loads and offer slightly different services or different initial investment levels. Because the data separates funds by classes and only considers waivers made on ongoing expenses, the waiver affects all investors in the fund class in the same manner.

II. Data Description

Fund managers have used fee waivers since the late 1970s although they have only recently received attention in the financial press. Our data on money market fund performance, fees, and fee waivers comes from two sources: Lipper Analytical Services and the IBC Donoghue Quarterly Report on Mutual Fund Performance. In the Lipper Data, the sample contains annual data and includes all money market funds from 1990 to1995. The Lipper Data contains over 1,000 mutual funds in 1995 and the total number of year/fund observations is approximately 3,500. The Lipper Data is a rich data source in terms of the types of funds and variables it has available; however, it suffers from the inherent problem of survivorship bias discussed in several papers including Carhart (1997) and Brown, Goetzmann, Ibbotson, and Ross (1992). The short time horizon, 1990 to 1995, minimizes the survivorship bias by reducing the number of funds dropped from the sample. Also, 1995 contains no survivorship bias since all funds are included, so the cross-sectional test results can be verified in this sample. The IBC Donoghue Data reports quarterly waivers from 1993 to 1994 and is not survivorship biased.

A. Descriptive Statistics

Figure 1 plots the increase in the percent of money market funds that waive. Figure 2 graphs fee waivers as a percent of total net assets for the industry between 1980 to 1994 and shows a marked increase. Throughout the period, a larger fraction of institutional funds waived fees compared to retail funds and waivers as a percent of net asset size have remained larger for

institutional funds. Growth in the industry seems to have sparked the use of fee waivers as a competitive tool. From 1990 to 1995, fees waived nearly doubled, from $181 million to $348 million.

The increase in waivers has not been paralleled by an equal increase in contracted advisory fees. Figure 3 shows that waivers as a percent of gross advisory fees have on average increased over time. Although not shown, gross advisory fees have remained constant.

[Insert Figures 1, 2, and 3]

The reported statistics in Table I are equally weighted averages from 1990 to 1995 of waiving and non-waiving funds in retail and institutional funds. Panel A defines waiving funds as funds that waived during a given year, regardless of history and future. In contrast, Panel B differentiates between funds with a long history of waiving, so a waiving fund is one that waived continuously for six years and a non-waiving fund is one that never waived for six years. A number of characteristics in the waiving patterns of institutional and retail funds are evident.

[Insert Table I]

- A larger percent of institutional funds (79 percent) waive fees compared to retail funds (55 percent). The size of waivers is much smaller in institutional funds (18.9 bp) than retail funds (32.8 bp). Still, institutional funds waive almost half their contracted advisory fee and retail funds waive about two-thirds of their contracted fee. The net expenses in institutional funds are also much lower than retail funds. The lower net expenses and the larger percent of waiving funds suggest institutional funds face more price competition than retail funds.
- Contracted fees are higher for both retail and institutional waiving funds. In institutional funds, contracted advisory fees are 40.9 bp for waiving funds compared to 32.5 bp for non-waiving funds. Similarly, retail waiving funds have average contracted fees of 49 bp

compared to 44.5 bp among non-waiving funds. In both cases, one expects larger contracted fees among waiving funds since higher contracted fees provide a larger margin to waive and greater flexibility. However, it is not clear whether high contracted fees cause high waivers or vice versa. The analysis below addresses this issue.

- Skeptics may argue that waiving is simply a new fund phenomenon where new funds change fees initially because of fluctuating start-up costs and uncertain operating expenses. While it is true that new funds waive more often than old funds, waiving is not strictly a new fund phenomenon, the average age of waiving funds is 5.3 years for institutional funds and 5.1 years for retail funds.

The statistics in Panel B are very similar to those in Panel A suggesting that the long-term decision to waive is similar to the short-term decision.

B. Flexibility in Waiving

Table II provides some evidence of waiver flexibility. As expected, the standard deviation of changes in annual contracted fees (13.7 bp) is small compared to changes in annual waivers (48.4 bp). The standard deviation of changes in waivers for funds not waiving the previous year (5.1 bp) is significantly lower than for waiving funds (48.4 bp), suggesting that non-waiving funds maintain a zero waiver decision. This may arise because non-waiving funds lower contracted fees to levels leaving little margin to waive. These statistics are similar across retail and institutional funds.

[Insert Table II]

Despite the evidence of flexibility in waivers between years, there is still some question whether waivers change during the year. Discussions with money fund managers reveal a wide range of responses. Some managers indicate waivers change annually whereas others indicate waivers change weekly. Panel B of Table II summarizes annualized quarterly data from IBC

Donoghue between 1993 to 1994, showing waivers change frequently throughout the year. Given the fund waives, the standard deviation of annualized quarterly changes in waivers is approximately 12.9 bp where the average waiver is 20 to 25 bp. Almost 64 percent of retail and institutional funds that waive change their waiver the next quarter compared to five percent of non-waiving funds. The fact that waivers are changed so frequently throughout the year suggests that flexibility in waiving is exercised by managers of both retail and institutional funds.

Although funds change waivers from one quarter to the next, waivers are fairly persistent with an overall annual autocorrelation of 0.56 for waiving funds. The high annual autocorrelation of waivers is not at odds with the flexibility of waiving. Instead, it reflects the persistence of contracted fees that are contractually fixed for one to three years. Although a fund charging high contracted fees gains flexibility through waiving, it is still likely to have relatively high waivers because the level of contracted fees is high and persistent. Even so, the annual autocorrelation of contracted fees is higher (0.76) than that of waivers reflecting the flexibility in waiving compared to contractual fees.

Given the evidence of flexibility, we want to determine whether managers waive in response to fund flows and their relative performance. The next section estimates fund flows as a function of relative performance to determine whether changes in investor price sensitivity are reflected in the manager's waiver decision.

III. The Fund Flow Hypothesis for Fee Waiving

Sirri and Tufano (1998), Chevalier and Ellison (1997), and Ippolito (1992) document that equity fund flows are more responsive to lagged net returns in high performance regions than in low performance regions. The results for money market fund flows are similar. Fund flows are more responsive to lagged net returns for funds in the top 20 percent than in the bottom 80 percent of funds. The effect is especially pronounced for institutional money market funds.

[Insert Figure 4]

Figure 4 illustrates the relation between lagged net performance rank and flows for money funds. It plots the average fund flow for 10 performance bins. A rank of 10 indicates the fund performed in the top 10 percent of funds whereas a fund with a rank of one performed in the bottom 10 percent of funds. As found for equity funds, there appears to be a strong increase in flows if net performance is in the top 20 percent of institutional funds and top 10 percent of retail funds.

[Insert Table III]

Table III provides estimates of the percentage change in assets as a function of lagged ranked performance.[2] As in Sirri and Tufano (1998), we estimate a piecewise linear fund flow function allowing for kinks at the 20 percent rank cut-off and 80 percent rank cut-off. We find institutional investors to be more price-sensitive in the top 20 percent of funds while retail investors are only significantly price-sensitive in the top 10 percent of funds. Musto (1999) shows that it is costly to actively track money fund performance, which may lower the price-sensitivity of retail investors. For the bottom 20 percent of funds, there is not a significant relation between fund flows and performance for either retail or institutional funds. If we re-estimate the flow function using the 1995 data without survivorship bias, we do not observe a significant relationship among the bottom performers.

The key point for our discussion on waivers is the large payoff to both institutional and retail funds in performing in the top 10 percent of funds. In the next section, we test whether managers waive to exploit the increased price sensitivity among top-performers by analyzing the relationship between gross performance and waivers.

IV. Gross Performance and Waivers

Figure 5 plots the average waiver (for waiving funds) by gross performance where gross performance is ranked from one to ten separating retail, institutional, tax-free, and taxable funds.[3] For retail funds the relation between waivers and performance is u-shaped while for institutional funds the relation is convex and negative. The fact that poor-performing retail and institutional managers waive more of their fees is an intuitive defense tactic to prevent investors from leaving or to keep their jobs. The more surprising result is that top-performing retail managers appear to exploit increased price sensitivity while institutional managers do not. The difference between retail and institutional managers is addressed in Section V.

[Insert Figure 5]

A. A Simultaneous Estimation Model

The non-linear relation between gross performance and waivers shown in Figure 5 is tested statistically in Tables IV and V. Unfortunately, the potential endogeneity problems between contracted fees and waivers complicates the empirics. The empirical estimation of simultaneous equations ensures any changes in waivers are not simply resulting from changes in contracted fees. The simultaneous equation model is written as

$$\begin{aligned} F_{kt} &= a_{1F} * W_{kt} + a_{2F} * RkGrRt_{kt} + a_{3F} * Medium_{kt} + a_{4F} * High_{kt} + a_{F} * X_{F,kt} + u_{F} \\ W_{kt} &= a_{1W} * F_{kt} + a_{2W} * RkGrRt_{kt} + a_{3W} * Medium_{kt} + a_{4W} * High_{kt} + a_{W} * X_{W,kt} + u_{W} \end{aligned} \quad (1)$$

where F represents the annual contracted advisory fee of the manager, W is the annual waiver, *k* is the fund, and *t* is the year. The underlying error term, u_F, is assumed to be normally distributed with a zero mean, while u_W is assumed to behave as a disturbance censored at zero in a tobit model. The covariance between u_W and u_F is allowed to be non-zero and the model is estimated using a technique developed by Nelson and Olson (1978) and Amemiya (1979). Because contracted fees and waivers are components of net fees, X_F and X_W include exogenous variables

modeled in previous estimations of net fees in mutual funds, such as Baumol et al. (1990), Dermine and Röller (1992), and Ferris and Chance (1987). The variables include gross returns, lagged assets, size, and fund type. Lagged contracted fees and the lagged dummy variable for waivers are used as instruments for contracted fees and waivers respectively.

Since there are strict regulations placed on the risk and duration of money market fund portfolios, returns are not risk adjusted.[4] A piecewise linear function allows for possible kinks between waivers and gross performance for funds in the bottom 20 percent, middle 60 percent, and top 20 percent. $RkGrRt_{kt}$ is the fund's gross return rank ranging from zero to one for each fund-type broken into retail, institutional, tax-free, and taxable funds; *Medium* is the maximum of zero and $RkGrRt_{kt} - 0.2$; and *High* is the maximum of zero and $RkGrRt_{kt} - 0.8$. Notice that the estimated slope relating gross performance and waivers in the bottom 20 percent of funds is characterized by a_{2W}. The slope for the middle 60 percent of funds is $a_{2W} + a_{3W}$, while the slope for the top 20 percent is $a_{2W} + a_{3W} + a_{4W}$.

Despite the less frequent changes in contracted fees compared to waivers, there is still simultaneity between waivers and contracted fees. For example, suppose a manager presents two fee scenarios to the Board: (1) a contracted fee of 70 bp with an expected waiver of 30 bp and (2) a contracted fee of 40 bp with an expected waiver of zero. Although waivers can vary throughout the year in both scenarios, realized waivers are likely to be higher in the first scenario versus the second. By instrumenting for waivers, we are essentially making contracted fees a function of expected waivers at the beginning of the year.

B. Controlling for High Non-Advisory Fees

Some of the funds have excessively high non-advisory fees.[5] Examples of these funds include new funds that start late in the year but are still responsible for paying the initial costs or small funds with large fixed or unexpected costs. In some cases, these funds have negative net

returns before waiving. For instance, Weitz Government Money Market fund reported non-advisory fees of 12.82 percent in 1992. With an average gross return of 3.89 percent for its money fund in 1992, Weitz in turn waived 13.056 percent to keep net returns positive.

Recognizing that high non-advisory fees explain waiving in the extreme cases, the natural question is whether excessive non-advisory costs are the sole reason for fee waiving. In the overall sample, approximately 63 percent of the funds waive fees. Even after limiting the sample to funds below the median non-advisory fee (16.5 bp), 60 percent waive fees. This suggests waivers are not simply adjusting for excessive non-advisory fees.

The empirical model removes funds with non-advisory fees larger than the average non-advisory fee in their respective fund classification: bank/institutional, bank/retail, non-bank/ institutional, and non-bank/retail. Robustness checks show the results do not depend on this method of censoring the data.

C. Results for Retail Funds

Table IV shows the results from the simultaneous regression for retail funds. As suggested by Figure 5, the u-shaped relation between waivers and gross performance is confirmed in the statistical analysis. For low performing funds, the estimated slope of a_{2W} is –0.38 so a 10 percent increase in rank reduces waivers by 3.8 basis points. For funds with gross performance in the middle 60 percent of funds, there is no statistical relation between waivers and performance since the estimate of $a_{2W}+ a_{3W}$ is not statistically different from zero. For high performing funds, the slope is 0.452 and statistically significant implying that a 10 percent increase in rank results in a 4.52 basis point increase in waivers. In testing the relation between gross returns and waivers in the top 20 percent of funds, a Wald statistic testing the significance of $a_{2W}+ a_{3W} + a_{4W}$, equal to 8.12, rejects the null that the slope is zero. This result is even stronger if we exclude tax-free funds that only compete within the state for investors.

[Insert Table IV]

The evidence for retail funds suggests managers choose high contracted fees, retaining the possibility of waiving some of the contracted fee later. The equation for contracted advisory fees has a significant and positive coefficient on waivers, $a_{1F} = 0.048$, suggesting retail managers increase contracted fees by 4.8 bp for a one percent increase in waivers. However, the increase in contracted fees is more than offset by the expected waiver since the coefficient on contracted fees in the waiver equation is significantly larger, $a_{1W} = 0.2206$. Together, these empirical results suggest contracted fees increase by less than the intended waiver, resulting in an overall decrease in net expenses to the investor from waiving.

In addition to the significance of returns and contracted fees in determining waivers, age seems to be a significant component of the waiver decision. Young funds view waiving as a good strategy since it provides an opportunity for young funds to build a stable asset base. However, waiving is not strictly a new fund phenomenon since the average age of a waiving fund is over five years. Although 80 percent of bank funds waive fees compared to 53 percent of non-bank funds, this seems to be explained by a bank fund's small size and young age rather than a special characteristic of banks.

D. Results for Institutional Funds

As expected from Figure 5, the relation between gross returns and waivers is different than found in retail funds. The estimation in Table V suggests only low-performing institutional funds waive more than the average since the coefficient $a_{2F} = -0.452$ is negative and significant. Even though high-performing institutional funds also benefit from high fund flows, there is no evidence institutional funds respond by waiving to attract high fund flows.

[Insert Table V]

The coefficient on contracted fees in the waiver equation, is positive and significant, $a_{1W} = 0.265$. Therefore, funds with comparatively high contracted fees waive to remain competitive. In contrast to retail funds, the insignificant coefficient on waivers in the contracted fee equation suggests managers do not set higher contracted fees when they plan to waive. Some descriptive evidence supports this result. Once a retail fund stops waiving, it decreases its contracted advisory fee by two basis points, which is statistically different from zero. On the other hand, institutional funds make an insignificant change in their contracted fee (0.23 bp) once waiving stops.

In Table IV, the positive coefficient on the 1994 dummy suggests that waivers increased significantly in 1994 for retail funds. This could be explained by the rise in interest rates in 1994 where funds increased waivers to compensate for current assets earning lower returns. In comparison, there is not a significant increase in waiving among institutional funds in 1994. Although institutional funds faced an increasing interest rate, they did not have as much margin to increase waivers given their expense ratios are almost half those of retail funds.[6] Also, if one looks at Figure 3, institutional waivers had been steadily increasing in the early 1990s so an increase in waivers owing to a change in interest rates may not show up significantly.

To summarize, the results of Tables IV and V suggest two main differences in waiving between retail and institutional funds. First, retail funds waive large amounts amongst top-performing funds to attract performance-sensitive investors; institutional funds do not despite their incentive to attract investors. Second, retail funds adjust for waivers by setting high contracted fees, while institutional funds do not. Both these results are consistent with greater price competition amongst institutional funds. Greater price competition suggests there is less ability to set high contracted fees to allow for waivers and it also suggests a larger percent of

funds waive making it difficult for institutional funds to move ahead by waiving. This last point is discussed in Section V.

E. Robustness Checks

In addition to controlling for the simultaneous and censored nature of waivers, the estimation in Tables IV and V controls for fixed year effects. The difficulty in controlling for panel data problems and survivorship bias motivated a year-by-year estimation. The results in the individual yearly estimations are similar to those using the entire panel, even in 1995 when there is no survivorship bias.

A second robustness check removes funds with non-advisory fees above the highest net expense reported for any fund type, 2.13 percent for institutional funds and 2.47 percent for retail funds. By using this method of removing high non-advisory fee funds, eight retail and three institutional observations are removed from the sample. The only notable difference between this second method of sorting high non-advisory fee funds and that used in Tables IV and V is the significance of asset size in determining waivers for retail funds. With fewer small funds eliminated from the sample, asset size becomes a significant, negative determinant of waivers in retail funds. The relation between waivers and performance is the same as in Tables IV and V.

V. Effectiveness of Waiving in Competition

The question still remains why high-performing institutional funds do not waive large amounts when the non-linearities of fund flows suggest high payoffs to waiving. For waiving to be effective in attracting investors, it has to be effective in adjusting the relative net performance of the fund. High cross-sectional return variability and waiving by competing funds undermines the effectiveness of fee waiving. Given the cross-sectional standard deviation of gross performance is approximately 15 bp, average waivers (20 to 30 bp) appear to be large enough to

significantly move the fund within the distribution. However, if every fund waived 30 bp, it is obvious a fund's relative position would not change, rendering the waiver ineffective.

[Insert Figure 6]

Figure 6 shows the effectiveness of waivers in affecting the net performance of a fund. Figure 6 plots the average waiver by net performance rank ranging from one to ten. For retail funds, there is a positive relation between the relative performance of a fund and the amount it waives. This coincides with a larger waiver successfully moving a retail fund ahead in the return distribution. On the other hand, there is a relatively flat relation between net performance and the waiver in institutional funds, suggesting waivers are not successful in moving institutional funds ahead in the net return distribution.

We support Figure 6 with further descriptive evidence on the effectiveness of waiving in moving both retail and institutional funds within the return distribution. Institutional funds that waived and ranked in the top 50 percent of funds (before their waiver) dropped on average 1.9 percent of the distribution even after waiving. This compares to the top 50 percent of retail funds that on average moved ahead 2.7 percent of the distribution by waiving. Although institutional funds moved ahead 8.4 percent of the distribution by waiving in the bottom 50 percent of funds, this is not as high as retail funds which moved ahead 16.2 percent of the distribution by waiving in the bottom 50 percent of funds. Using a difference in means test, all of these changes in rank are significantly different than zero and significantly different across fund type at the five percent level. In addition, a majority of institutional funds that waive, 615 of 1,172, fall in rank even after their waiver. This compares to a majority of retail funds which increase rank after waiving, 1,008 of 1,576. These results support Figure 6 in suggesting that waivers in institutional funds are not successful in improving relative performance and deter institutional managers from waiving to exploit increased price-sensitivities.

VII. Alternative Explanations

In addition to the fund flow hypothesis of waivers, there are three alternative explanations why managers may waive fees and for completeness they are briefly outlined here. Only descriptive evidence is provided regarding the alternatives and although the analysis is not conclusive, it provides some insight into whether these alternatives coexist with our hypothesis.

A. Loss Leader

In running a large fund family (complex), managers may be willing to run one of the funds within the complex at a loss, by charging extremely low contractual fees and/or by waiving fees. Their incentive is to keep investors in the complex and potentially attract new ones. Once investors hold funds within the complex, it may be easier for the manager to redirect their funds to profit centers within the complex. As a result, the testable implication of this hypothesis is that funds in large complexes waive more often and/or charge lower gross fees in order to attract as many investors as possible and enjoy potential spillover effects.[7] Interestingly, complex size is insignificant in determining waivers and contracted fees for retail funds in Table IV, but it is significant for institutional funds in determining waivers in Table V. As found in Section V, there seems to be different motives for waiving in institutional versus retail funds. The significance of complex size in Table V suggests that waiving in institutional funds could be a method to keep investors within the complex and potentially benefit from spillover effects. With an average initial investment of $2.5 million for an institutional investor compared to $5,000 for a retail investor, there is greater incentive to keep the institutional investor within the complex and potentially run the institutional money fund as a loss leader.

B. Breaking-the-Buck

The second hypothesis is motivated by the reporting requirements of the SEC. For those money market mutual funds choosing to use the amortized method of accounting, the SEC

requires they maintain net asset value at $1 per share. In the case that the share value drops below $0.995, the fund is forced to mark-to-market and to realize losses. The fund manager wants to avoid this at all costs since it is a negative signal to investors. It may be the case that managers waive fees to avoid "breaking-the-buck", or falling below a net asset value of $0.995. The fact that 37 percent of equity funds waive fees suggests that fee waivers do not result from this reporting requirement because equity funds are not required to maintain net asset value at $1 per share. Also, if a fund is about to break-the-buck, it needs 50 bp for every asset dollar to maintain the $1 net asset value. This is almost twice the size of the average annual waiver.

C. The Option Value of Waiving

The strategy of setting high contracted fees with the intention of waiving makes sense if funds can increase their potential size or if funds believe they can recapture higher fees later. We have discussed the first hypothesis in this paper, but not the second. There is only evidence that retail funds exercise the option of charging higher fees after waiving. Using the subsample of retail funds that have a full six-year history of data and waived in 1990, the average net advisory fee increased from 13 bp in 1990 to 22 bp in 1995 while average asset size increased from $222 million to $514 million. In contrast, institutional funds show no change in net advisory fees since they charged 20 bp in both 1990 and 1995.

Although more research on the option value of waiving is necessary, these descriptive statistics suggest there is potentially another dimension of flexibility offered by waiving to retail funds. Not only can retail funds adjust fees in response to relative performance as we found earlier, but retail funds can potentially charge higher fees over time by gradually eliminating waivers. However, only six percent of our sample stopped waiving compared to almost 50 percent that continued waiving from one year to the next. This suggests that the option of removing the waiver is not exercised in general.

VIII. Summary

Over half of money market funds waive fees. The amount funds are willing to waive is substantial since almost half of the total expenses on average are being waived by funds. Therefore, excluding waivers as a factor in net performance for money funds can significantly understate net returns.

Changing fees throughout the year is beneficial to managers because they can react to changes in relative performance that affect the assets under management. A two-tiered fee structure with contracted fees and waivers achieves this flexibility and allows managers to optimally set fees throughout the year. With 64 percent of funds changing their waiver decision each quarter, waivers provide greater flexibility than contracted fees that only change every one to three years. Interestingly, there is a difference between waiver patterns for institutional and retail funds. Although institutional funds stand to gain the most by waiving to attract investors, they do not waive. Institutional funds, facing price sensitive investors, cannot significantly affect their relative position through waiving since competition for price sensitive investors is fierce.

Three key points are made in this paper: (i) fee waivers are economically significant; (ii) waivers provide flexibility in fees compared to fixed contracted fees; and (iii) retail and institutional funds have different waiver patterns resulting from differences in the potential for waivers to improve relative fund performance.

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ENDNOTES

[1] Other service fees, including distribution, administrative, and shareholder service fees, may be waived. This usually occurs when the Board contracts with a single entity, the manager, for numerous services. Therefore, waivers are still the unilateral decision of the manager.

[2] Defining fund flows as $FLOW_{i,t} = \frac{Assets_t - Assets_{t-1} * (1 + NetReturns_t)}{Assets_{t-1}}$ does not change the results.

[3] Funds are ranked against funds of their own type: institutional/taxable, institutional/tax-free, retail/taxable, and retail/tax-free. The reason for ranking funds within each of the different fund types is the large discrepancy in performance.

[4] Musto (1999) does not adjust money market returns for risk. There is also strong evidence in Domian and Reichenstein (1998) that one does not need to risk-adjust money market returns. They show that 84 percent of the variation in money market returns is explained by fees, not risk.

[5] Non-advisory fees include costs of the transfer agent, custodian, accounting, legal assistance, postage, and printing.

[6] Future research on the relation between waivers and the interest rate is worthwhile investigating with a longer time-series. We investigated the relation on our annual and quarterly data set and could not find any significant relation aside from the significant 1994 dummy variable in Table IV.

[7] Complex size is only a proxy for the loss leader hypothesis and does not consider whether waivers arise when performance is poor in other funds within the complex. Further research is necessary to determine the incentives to waive as a loss leader. Still, evidence for or against the loss leader hypothesis does not undermine our results linking fund flows, performance, and fee waiving.

Figure 1. Percent of Funds Waiving

This graph shows the total number of funds waiving fees as a percent of the total number of money market funds from 1980 to 1994. The sample is divided into retail and institutional funds defined by the investors in each fund. Large initial investments prevent retail investors from investing in institutional funds. Source: Lipper Analytical Services.

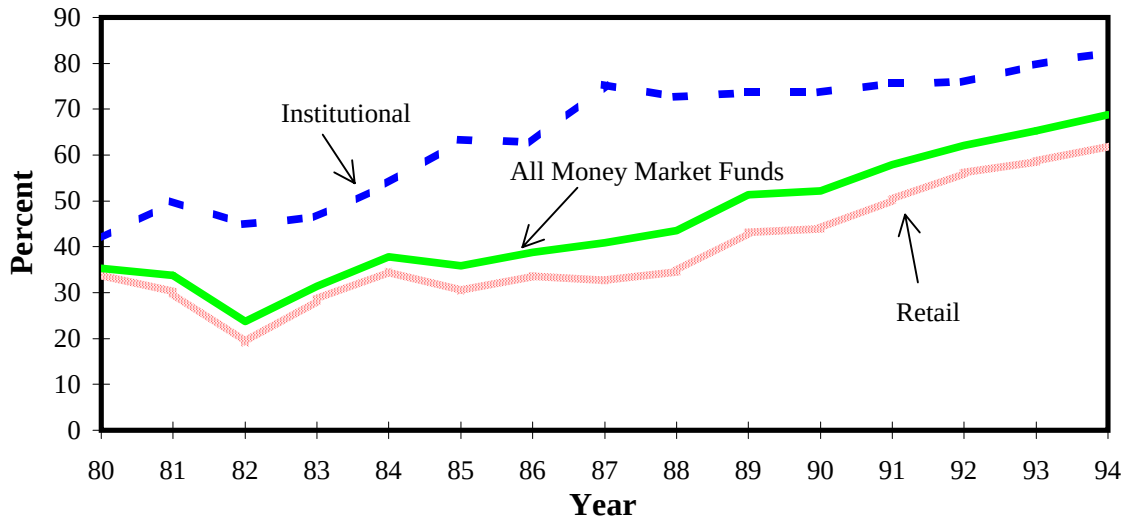

Figure 2. Waivers as a Percent of Total Assets

This graph shows the total dollar amount waived over the total net assets for all money market funds from 1980 to 1994. The sample is divided into institutional and retail funds defined by investors in the fund. Large initial investments prevent retail investors from investing in institutional funds. Source: Lipper Analytical Services.

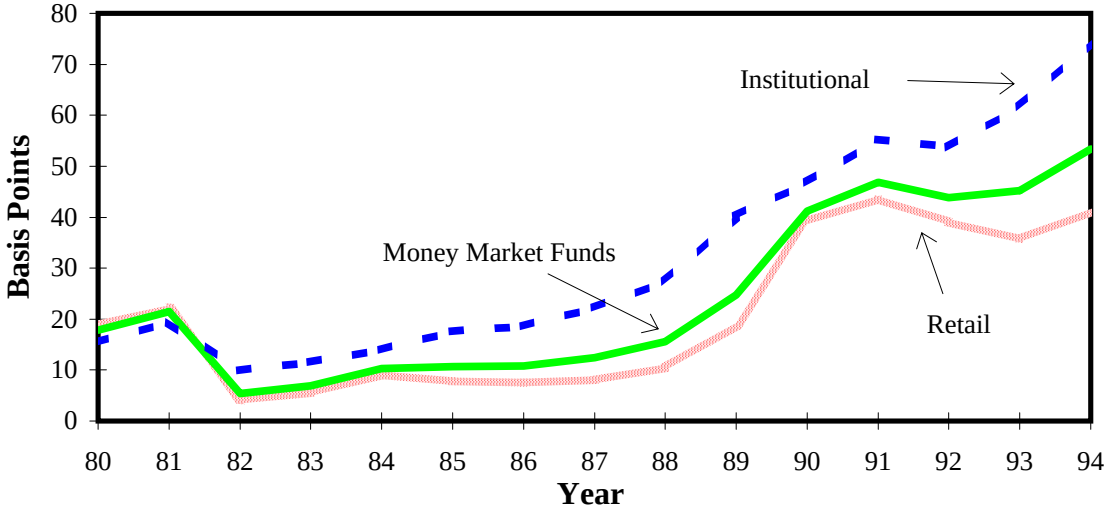

Figure 3. Waivers as a Percent of Contracted Fees

This graph provides the total dollar amount of waivers as a percent of the contracted fees for all money funds from 1980 to 1994 including funds not waiving. The sample is divided into retail and institutional funds defined by the investors in each fund. Large initial investments prevent retail investors from investing in institutional funds. Source: Lipper Analytical Services.

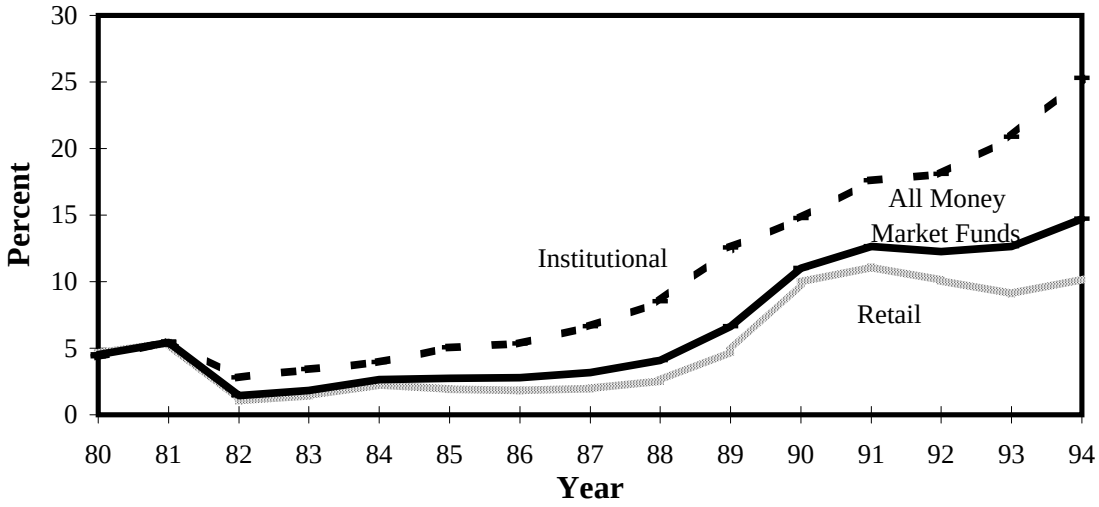

Figure 4. Average Fund Flow by Lagged Net Performance 1990-1995

This graph plots fund flows, or the percentage change in assets, by lagged net performance. Lagged net performance is ranked between one and 10 where one represents the bottom decile of funds and 10 represents the top decile of funds. Funds are ranked separately by year. Funds are also ranked against funds of their own type. Four different fund-types are used to rank funds: institutional/taxable, institutional/tax-free, retail/taxable, and retail/tax-free. For example, an instituional/taxable fund only includes institutional funds with taxable dividends. The average fund flow is measured by taking the mean percentage change in assets across all fund types and years in each net performance decile.

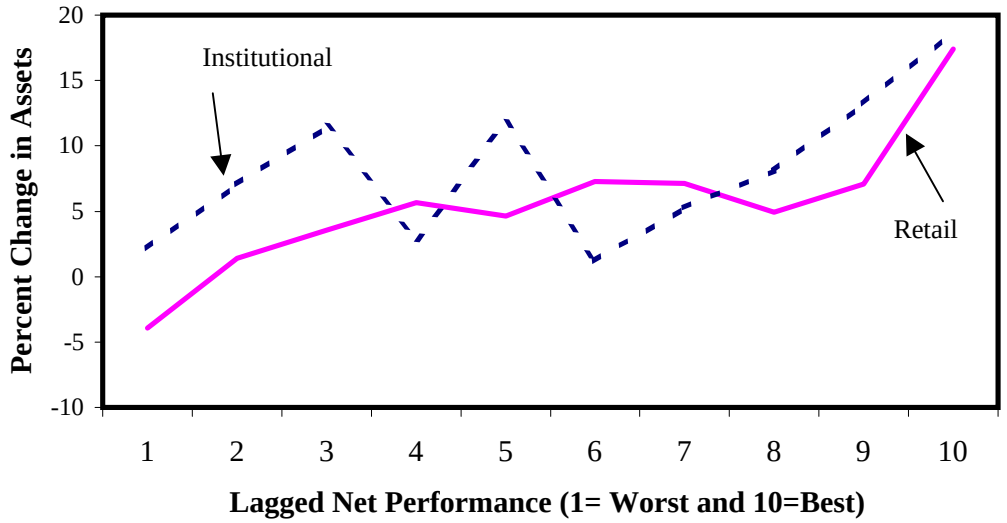

Figure 5. Median Waivers by Gross Performance 1990-1995

This graph plots the median waiver by current gross performance. Gross performance is ranked between one and 10 where one represents the bottom decile of funds and 10 represents the top decile of funds. Funds are ranked separately by year. Funds are also ranked against funds of their own type. Four different fund-types are used to rank funds: institutional/taxable, institutional/tax-free, retail/taxable, and retail/tax-free. For example, an institutional/taxable fund only includes institutional funds with taxable dividends.

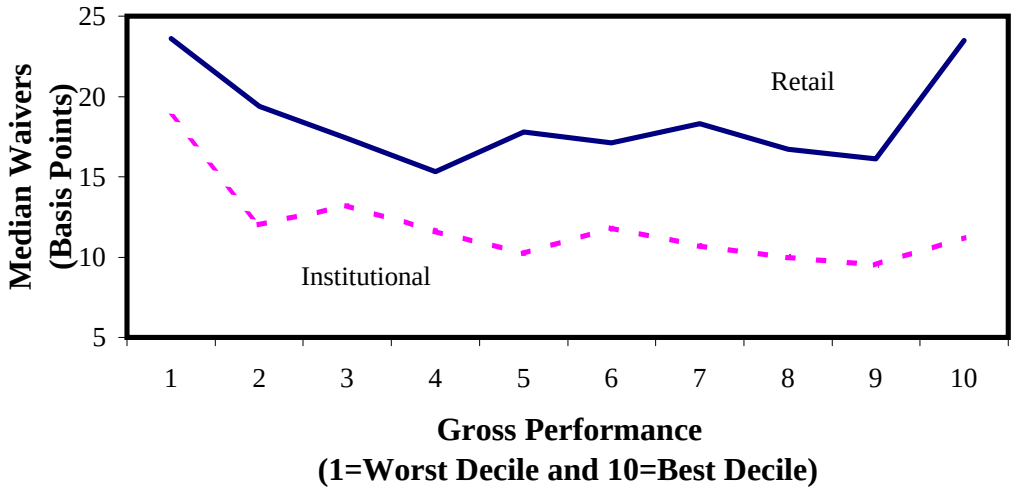

Figure 6. Median Waivers by Net Performance 1990-1995

This graph plots the median waiver by current net performance. Net performance is ranked between one and 10 where one represents the bottom decile of funds and 10 represents the top decile of funds. Funds are ranked separately by year. Funds are also ranked against funds of their own type. Four different fund-types are used to rank funds: institutional/taxable, institutional/tax-free, retail/taxable, and retail/tax-free. For example, an institutional/taxable fund only includes institutional funds with taxable dividends.

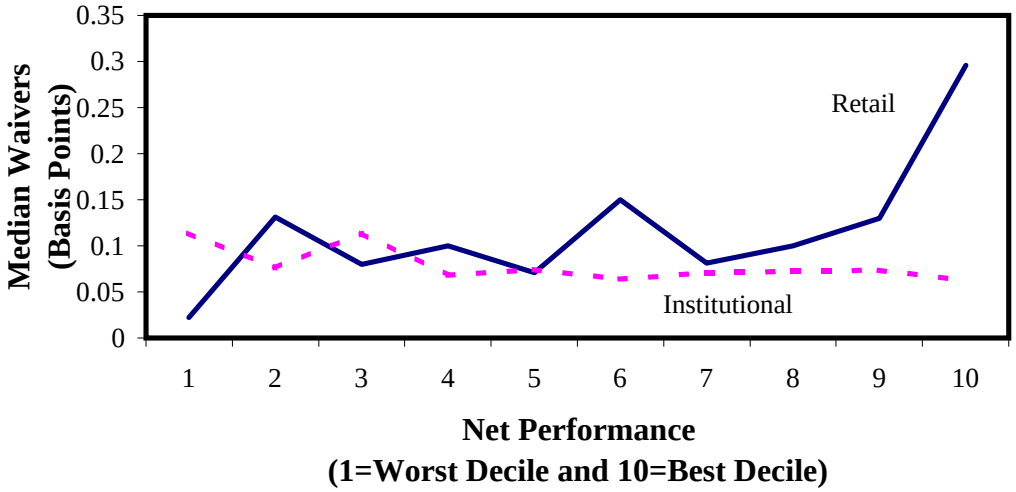

Table I
Summary Statistics for Money Market Funds 1990-1995

The data is from Lipper Analytical Services and includes money market funds from 1990 to 1995. Panel A compares the descriptive statistics for funds that waive and ones that do not waive fees, where Panel A defines a waiving fund as a fund which waived during a year, regardless of its history and future. Panel B defines a waiving fund as one that waived each year from 1990 to 1995 and a non-waiving fund as one that did not waive for the entire period during from 1990 to 1995. The statistics in Panel A are equally-weighted averages for each of the listed variables across years and across funds, separating retail and institutional funds. The statistics in Panel B are also averages; however, they only include funds that maintained a consistent waiver decision between 1990-1995. In Panel B, one fund observation has six time-series observations, so the statistics average across years and funds. GROSS ADVISORY FEES, NET EXPENSES, NON-ADVISORY FEES and WAIVERS are annualized and expressed in basis points of the average net assets of the fund. NET ASSETS are in billions of dollars. GROSS RETURNS and NET RETURNS are expressed as an annual percent and only include taxable funds that have considerably higher returns than non-taxable. AGE is the number of years the fund has been in existence. PERCENT OF FUNDS is the number of funds that waived (or did not waive) divided by the total number of funds. The third and sixth columns provide difference in means tests where the bold face font indicates the difference is significant at the five percent level.

Panel A: Fund types by One-Year Waiving Decision

	Institutional Funds		Difference In Means	Retail Funds		Difference In Means
	Do Not Waive	Waive	for Institutional	Do Not Waive	Waive	for Retail
Contracted Advisory Fee (bp)	32.50	40.90	**-8.40**	44.50	48.99	**-4.49**
Net Assets (billions)	0.75	0.60	0.16	1.10	0.32	**0.79**
Gross Returns (%) (Only Taxable)	5.23	5.15	0.09	5.40	5.09	**0.31**
Net Returns (%) (Only Taxable)	4.78	4.76	0.03	4.63	4.43	**0.20**
Net Expenses (bp)	45.50	42.10	**3.40**	73.90	62.50	**11.40**
Waivers (bp)	0.00	18.90	**-18.90**	0.00	32.80	**-32.80**
Percent of Funds (%)	21.21	78.79	**-57.58**	45.41	54.59	**-9.17**
Age (Years)	6.63	5.29	**1.34**	9.88	5.07	**4.81**
Non-advisory Fees (bp)	11.10	17.00	**-5.90**	21.80	36.40	**-14.60**
Number of Observations	330	1226		1396	1678	

Panel B: Fund types by Six-Year Waiving Decision

	Institutional Funds		Difference In Means	Retail Funds		Difference In Means
	Never Waive	Always Waive	for Institutional	Never Waive	Always Waive	for Retail
Contracted Advisory Fee (bp)	29.68	43.13	**-13.45**	44.12	50.50	**-6.38**
Net Assets (billions)	0.69	0.96	-0.26	1.41	0.36	**1.05**
Gross Returns (%) (Only Taxable)	5.42	5.44	-0.02	5.42	5.44	-0.03
Net Returns (%) (Only Taxable)	4.92	4.98	-0.07	4.76	4.73	0.02
Net Expenses (bp)	42.78	42.44	0.34	71.32	59.44	**11.88**
Waivers (bp)	0.00	14.56	**-14.56**	0.00	33.47	**-33.47**
Percent of Funds (%)	12.50	48.61	**-36.11**	40.74	25.07	**15.67**
Age (Years)	6.81	7.74	**-0.94**	11.51	6.64	**4.86**
Non-advisory Fees (bp)	11.97	11.74	0.23	20.78	38.02	**-17.24**
Number of Observations	108	420		858	528	

Table II
Flexibility of Waivers

Panel A uses annual data from Lipper Analytical Services, 1990 to 1995. Panel B uses eight quarters of data from IBC Donoghue Data, 1993 to 1994. Panel A provides the standard deviation of *annual changes* in contracted fees and waivers. Panel B provides the average standard deviation of *quarterly changes* in waivers using *quarterly* annualized data. The units are basis points in both Panels A and B.

Panel A: Standard deviation of annual changes in contracted fees and waivers			
	Overall	Retail	Institutional
Contracted Fee			
No waiver previous year	3.8	3.9	3.5
Fund waived previous year	13.7	17.0	6.8
Waiver			
No waiver previous year	5.1	5.5	2.9
Fund waived previous year	48.4	55.7	35.6
Net Advisory Fee			
No waiver previous year	6.4	6.9	3.4
Fund waived previous year	45.4	51.5	35.0
Number of Observations			
No waiver previous year	1364	1122	242
Fund waived previous year	2184	1265	919

Panel B: Standard deviation of quarterly changes in annualized waivers			
	Overall	Retail	Institutional
Waiver			
No waiver previous quarter	3.2	2.6	5.2
Fund waived previous quarter	12.9	13.7	11.2
Number of Observations			
No waiver previous year	2155	1817	338
Fund waived previous year	2577	1663	914

Table III
Non-linearities in Fund Flows

The data for this fund flow estimation comes from Lipper Analytical Services, 1990 to 1995. The left hand side variable is fund flows measured as the percentage change in assets. The first column tests non-linearities between performance and fund flows in the bottom 20 percent and top 20 percent of funds. The second column tests non-linearities in the bottom 20 percent and top 10 percent of funds. YEAR 91, YEAR 92, YEAR 93, and YEAR 94 are dummy variables taking the value one for each respective year. LAG WNW is a lagged dummy variable taking the value one if the fund waived in the previous year and zero otherwise. INSTIT is a dummy variable taking the value one if the fund is an institutional fund and zero if it is retail. BANK is a dummy variable taking the value one if the fund uses a bank as its distribution channel. COMPLEX is the number of funds in the fund family divided by 1,000. FIVE YEAR is a dummy variable taking the value one if the fund is less than five years old and zero otherwise. AGE is the number of years the fund has been in existence from the time of its inception to the year the fund is observed. LAGGED ASSET is the log of lagged asset size in millions of dollars. LRKNTRT is the lagged ranked net return by year and by fund category ranging from zero to one. The fund categories are defined: institutional/tax-free, institutional/taxable, retail/tax-free, and retail/taxable. To control for the non-linearities in fund flows, LMED and LHI are added for both retail and institutional funds. In both the first and second columns, LMED is max(LRKNTRT - 0.2, 0). LHI differs in the two columns. LHI is max(LRKNTRT - 0.8,0) in the first column and max(LRKNTRT - 0.9,0) in the second column. These variables are separated into institutional and retail funds by multiplying by the dummy variable INSTIT for institutional funds and (1-INSTIT) for retail funds. INITIAL INVESTMENT is the log of the initial investment size needed for an investor to initiate an account with the fund in dollars. TAXFREE is a dummy variable taking the value one if the fund offers a tax-free dividend payment. Panel B provides some Wald tests of the slope of the fund flow function in the top 10 percent and 20 percent performing funds. There are 3,177 observations in both regressions. p-values are provided in parentheses.

Panel A: Piecewise fund flow estimation

	Bottom 20% & Top 20%		**Bottom 20% & Top 10%**	
Variables	*Coefficient*	*p-value*	*Coefficient*	*p-value*
Lag WNW	0.159	(0.000)	0.156	(0.000)
Instit	-0.172	(0.562)	-0.154	(0.604)
Bank	0.102	(0.223)	0.108	(0.196)
Complex	0.455	(0.102)	0.442	(0.112)
Five Year	0.840	(0.000)	0.833	(0.000)
Age	-3.040E-02	(0.000)	-3.011E-02	(0.000)
Lag Asset	-2.730E-05	(0.005)	-2.590E-05	(0.008)
LRkNtRt Instit (a_1)	6.100E-05	(1.000)	-0.238	(0.839)
LMed Instit (a_2)	-0.391	(0.789)	0.008	(0.995)
LHi Instit (a_3)	2.613	(0.016)	5.445	(0.012)
LRkNtRt Retail (b_1)	-0.543	(0.558)	-0.511	(0.574)
LMed Retail (b_2)	0.525	(0.603)	0.488	(0.615)
LHi Retail (b_3)	1.734	(0.133)	6.377	(0.027)
Initial Investment	0.026	(0.163)	0.026	(0.162)
Year91	0.359	(0.000)	0.356	(0.000)
Year92	0.233	(0.012)	0.229	(0.014)
Year93	0.065	(0.396)	0.063	(0.408)
Year94	-0.057	(0.397)	-0.059	(0.384)
Taxfree	-0.199	(0.000)	-0.197	(0.000)
Constant	0.239	(0.363)	0.237	(0.368)

Panel B: Testing the Slope for funds in the top 10 percent or 20 percent of funds

	F-stat	*p-value*	*F-stat*	*p-value*
$a_1+a_2+a_3-b_1-b_2-b_3 = 0$	0.140	(0.712)	0.110	(0.746)
$a_1+a_2+a_3=0$	6.670	(0.010)	6.640	(0.010)
$b_1+b_2+b_3=0$	2.530	(0.112)	4.960	(0.026)

Table IV
Simultaneous Estimation of Contracted Fee and Waivers for Retail Funds

This Simultaneous Panel Regression models the decision of the retail fund manager to waive, W, and set the contracted advisory fee, F. The sample excludes those funds with non-advisory fees greater than the mean non-advisory fee for all funds within a specific fund category. Two fund categories are used to determine the cut-off of low non-advisory fee funds: retail/bank and retail/non-bank. The simultaneous equations model is written as

$$F = a_{1F} * W + a_F * X_F + u_F$$
$$W = a_{1W} * F + a_W * X_W + u_W$$

where W equals the waiver as a percent of assets and is censored at zero, F equals the contracted fee as a percent of assets, X_F is a matrix containing all the exogenous variables of gross advisory fees, and X_W is a matrix containing all the exogenous variables of the waiver decision. The exogenous variables included in X_F and X_w are factors affecting the net fee decision of managers. YEAR 91, YEAR 92, YEAR 93, and YEAR 94 are dummy variables taking the value one for each respective year. FEDERATED, DREYFUS, and COMPASS are dummy variables that control for three large fund complexes. LAGGED ASSET is the log of lagged asset size in millions of dollars. TAXFREE is a dummy variable taking the value one if the fund offers a tax-free dividend payment. NON-ADVISORY is the non-advisory fee charged by the fund in percent of net assets. BANK is a dummy variable taking the value one if the fund uses a bank as its distribution channel. LOAD is a dummy variable taking the value one if the fund charges front or back-end load fees. AGE is the number of years the fund has been in existence from the time of its inception to the year the fund is observed. COMPLEX is the number of funds in the fund family divided by 1,000. INITIAL INVESTMENT is the log of the initial investment size needed for an investor to initiate an account with the fund in dollars. RANKED GROSS RETURNS are the current gross annual yields for the funds ranked by year and by taxable and taxfree funds ranging from zero for the worst funds and one for the best funds. MEDIUM RANKED RETURN is max(RANKED GROSS RETURN - 0.2, 0). HIGH RANKED RETURN is max(RANKED GROSS RETURN - 0.8 , 0). LAGGED WNW is the lagged dummy variable of waivers. LAGGED GROSS ADVISORY is the gross advisory fee chosen by the manager in the previous year. Panel B provides Wald tests of the model and the joint significance of the coefficients on gross, medium, and high ranked returns. p-values are provided in parentheses.

Panel A: Test Results

	Contracted Advisory Fee		Waiver	
Independent Variables	*Coefficient*	*p-value*	*Coefficient*	*p-value*
Waiver	0.0480	(0.004)		
Contracted Advisory Fee			0.2206	(0.003)
Year 91	0.0011	(0.874)	0.0233	(0.301)
Year 92	-0.0098	(0.155)	0.0099	(0.632)
Year 93	0.0023	(0.731)	0.0011	(0.953)
Year 94	-0.0051	(0.448)	0.0431	(0.015)
Intercept	0.3804	(0.000)	-0.2361	(0.001)
Federated	0.0457	(0.012)	0.0111	(0.829)
Dreyfus	0.0195	(0.073)	0.1393	(0.000)
Compass	-0.1135	(0.000)	0.2238	(0.000)
Lagged Assets	-0.0133	(0.000)	-0.0058	(0.229)
Non-Advisory	-0.1463	(0.000)	0.3830	(0.000)
Bank	0.0130	(0.007)	0.0246	(0.162)
Load	0.0026	(0.058)	-0.0224	(0.412)
Age	0.0022	(0.009)	-0.0092	(0.000)
Complex	0.0075	(0.773)	0.0321	(0.694)
Initial Investment	-0.0040	(0.000)	-0.0039	(0.326)
Ranked Gross Return (a_1)	0.0222	(0.760)	-0.3800	(0.025)
Medium Ranked Return (a_2)	-0.0437	(0.588)	0.3352	(0.084)
High Ranked Return (a_3)	0.1645	(0.000)	0.4965	(0.007)
Lagged WNW			0.3830	(0.000)
Lagged Gross Advisory	0.4051	(0.000)		

Panel B: Test Statistics

	Wald Test	*p-value*	*Wald Test*	*p-value*
Model Test	9.62E+04	(0.000)	952.62	(0.000)
H_o: $a_1 + a_2 = 0$			1.25	(0.264)
H_o: $a_1 + a_2 + a_3 = 0$			8.12	(0.004)
H_o: $a_2 = a_3 = 0$			15.88	(0.000)
No. of Observations	1620		1620	

Table V

Simultaneous Estimation of Contracted Fee and Waivers for Institutional Funds

This Simultaneous Panel Regression models the decision of the institutional fund manager to waive, W, and set the contracted advisory fee, F. The sample excludes those funds with non-advisory fees greater than the mean non-advisory fee for all funds within a specific fund category. Two fund categories are used to determine the cut-off of low non-advisory fee funds: institutional/bank and institutional/non-bank. The simultaneous equations model is written as

$$F = a_{1F} * W + a_F * X_F + u_F$$
$$W = a_{1W} * F + a_W * X_W + u_W$$

where W equals the waiver as a percent of assets and is censored at zero, F equals the contracted fee as a percent of assets, X_F is a matrix containing all the exogenous variables of gross advisory fees, and X_W is a matrix containing all the exogenous variables of the waiver decision. The exogenous variables included in X_F and X_w are factors affecting the net fee decision of managers. YEAR 91, YEAR 92, YEAR 93, and YEAR 94 are dummy variables taking the value one for each respective year. FEDERATED, DREYFUS, and COMPASS are dummy variables that control for three large fund complexes. LAGGED ASSET is the log of lagged asset size in millions of dollars. TAXFREE is a dummy variable taking the value one if the fund offers a tax-free dividend payment. NON-ADVISORY is the non-advisory fee charged by the fund in percent of net assets. BANK is a dummy variable taking the value one if the fund uses a bank as its distribution channel. LOAD is a dummy variable taking the value one if the fund charges either front or back-end load fees. AGE is the number of years the fund has been in existence from the time of its inception to the year the fund is observed. COMPLEX is the number of funds in the fund family divided by 1,000. INITIAL INVESTMENT is the log of the initial investment size needed for an investor to initiate an account with the fund in dollars. RANKED GROSS RETURNS are the current gross annual yields for the funds ranked by year and by taxable and tax-free funds ranging from zero for the worst funds and one for the best funds. MEDIUM RANKED RETURN is max(RANKED GROSS RETURN - 0.2, 0). HIGH RANKED RETURN is max(RANKED GROSS RETURN - 0.8 , 0). LAGGED WNW is the lagged dummy variable of waivers. LAGGED GROSS ADVISORY is the gross advisory fee chosen by the manager in the previous year. Panel B provides some Wald tests of the model and the joint significance of the coefficients on gross, medium, and high ranked returns. p-values are provided in parentheses.

Panel A: Test Results				
	Contracted Advisory Fee		Waiver	
Independent Variables	*Coefficient*	*p-value*	*Coefficient*	*p-value*
Waiver	-0.0145	(0.647)		
Contracted Advisory Fee			0.2650	(0.000)
Year 91	-0.0048	(0.419)	-0.0468	(0.002)
Year 92	0.0013	(0.823)	-0.0530	(0.000)
Year 93	0.0011	(0.842)	-0.0259	(0.046)
Year 94	0.0026	(0.637)	-0.0156	(0.200)
Intercept	0.0599	(0.000)	-0.0903	(0.021)
Federated	0.0219	(0.000)	-0.0083	(0.625)
Dreyfus	-0.0315	(0.001)	-0.1249	(0.000)
Compass	-0.0068	(0.344)	0.0412	(0.018)
Lagged Assets	0.0006	(0.732)	-0.0082	(0.069)
Non-Advisory	0.1699	(0.000)	0.1797	(0.234)
Bank	0.0097	(0.000)	0.0251	(0.047)
Age	-9.34E-05	(0.892)	-5.13E-06	(0.997)
Complex	0.0243	(0.248)	0.1671	(0.005)
Initial Investment	-0.0017	(0.000)	0.0014	(0.178)
Ranked Gross Return (a_1)	-0.2192	(0.001)	-0.4518	(0.000)
Medium Ranked Return (a_2)	0.2324	(0.001)	0.4524	(0.001)
High Ranked Return (a_3)	-0.0147	(0.284)	-0.1903	(0.179)
Lagged WNW			0.1911	(0.000)
Lagged Gross Advisory	0.9291	(0.000)		
Panel B: Test Statistics				
	Wald Test	*p-value*	*Wald Test*	*p-value*
Model Test	3.17E+06	(0.000)	880.05	(0.000)
H_o: $a_1 + a_2 = 0$			5.08E-03	(0.943)
H_o: $a_1 + a_2 + a_3 = 0$			2.32	(0.128)
H_o: $a_2 = a_3 = 0$			11.30	(0.004)
No. of Observations	753		753	