PORTFOLIO MANAGEMENT, PRIVATE INFORMATION, AND SOFT DOLLAR BROKERAGE: AGENCY THEORY AND EVIDENCE*

Stephen M. Horan
Department of Finance
St. Bonaventure University
St. Bonaventure, New York 14778-0004
Phone: (716) 375-2091
Fax: (716) 375-2191
e-mail: shoran@sbu.edu

D. Bruce Johnsen
School of Law
George Mason University
3401 North Fairfax Drive
Arlington, Virginia 22201-4498
Phone: (703) 993-8066
e-mail: djohnsen@gmu.edu

First Draft: July 1996
Current Draft: July 1999

* For helpful comments and encouragement on earlier drafts, we thank Stuart Gillan, Richard Ippolito, Ken Lehn, Jeffery Peterson, Erik Sirri, Charles Trzcinka, Derek White and seminar participants at the University of Rochester, SUNY Buffalo, the 1997 Financial Management Association Meetings and the Office of Economic Analysis at the U.S. Securities & Exchange Commission. All remaining errors are ours. We extend special thanks to Eugene Fama and Kenneth French for supplying performance evaluation data and to Mobius Group, Inc., for supplying institutional money management data.

PORTFOLIO MANAGEMENT, PRIVATE INFORMATION, AND SOFT DOLLAR BROKERAGE:
AGENCY THEORY AND EVIDENCE

Abstract

This paper empirically examines the agency problems associated with the use of soft dollars in delegated portfolio management. We assume that active portfolio managers are hired to identify private information about mispriced securities, but in the absence of careful monitoring by investors or compensating organizational arrangements they will have too little incentive to do the necessary research. To the extent they nevertheless succeed in identifying mispriced securities, much of the value of the information can be lost to market interlopers due to low-quality broker executions. We develop two agency cost hypotheses for the role soft dollars play in active portfolio management. One hypothesis views soft dollars as a symptom of agency costs that allows money managers to unjustly enrich themselves at portfolio investors' expense. The other hypothesis views soft dollars as a method of reducing agency costs by encouraging optimal research and enforcing property rights to private information by bonding the quality of broker executions. Using a database of institutional money managers, we find that soft dollar use is positively related to different measures of risk-adjusted performance, suggesting that soft dollars reduce agency costs when other controls are uneconomic. Moreover, soft dollar use is unrelated to management fees, suggesting that managers do not use soft dollars to unjustly enrich themselves.

THE SOFT DOLLAR DEBATE: AGENCY THEORY AND EVIDENCE

1. Introduction

An impressive body of finance literature examines the returns to active portfolio management. At best, it appears that active managers just barely cover the added costs of attempting to identify mispriced securities. These results point to two potential problems in active portfolio management. First, in a world of agency costs, money managers might have a sub-optimal incentive to identify mispriced securities. Second, where property rights to private information are costly to enforce, much of the value of private information might be lost to market interlopers when the manager enters the market to trade. The natural question then arises, what organizational arrangements might arise in the context of portfolio management to ameliorate these problems. In this paper, we empirically examine the effects of soft dollar brokerage in ameliorating these problems.

Soft dollar brokerage, or simply "soft dollars", is a popular institutional arrangement in which investors subsidize the research inputs that managers use to identify profitable trading opportunities. In a typical soft dollar arrangement, a money manager agrees to place a designated dollar value of commission business (resulting from portfolio trades) with a broker over the coming month, quarter, or year. In consideration for this promise, the broker provides the manager with research credits equal to some percentage (often around 50%) of the promised commission business. The manager uses the credits to buy any of a large number of broker-approved research products sold in the market by third-party research vendors. The broker then pays the manager's research bill and cancels the appropriate number of credits from the manager's soft dollar account. Once having spent its soft dollar research credits, the manager is under an ethical, *but not a legal*,[1] obligation to place the promised commission business with the broker in question.[2]

Commission rates for soft dollar brokerage are no doubt higher than they would otherwise be for pure "discount" brokerage. Since investors bear commission costs, managers are said to "pay up" for soft dollar research on behalf of investors. The practice of formally bundling research and execution together into a single commission began toward the end of the era of

---

[1] See Johnsen (1994), p. 103.

[2] Presumably, the broker's recourse against opportunistically low rates is to refuse to extend future soft dollar credits to the manager.

fixed minimum commissions, as brokers found various nonprice methods of competing for lucrative institutional business. During this time, NYSE commissions were set far in excess of what would have, and ultimately did, prevail under freely negotiated commissions. With the deregulation of fixed commissions in 1975, Congress added Section 28(e) to the Securities Exchange Act (1934).[3] Labeled the "paying up amendment," Section 28(e) provided money managers with a specific safe harbor from fiduciary suits when they pay up for brokerage if they receive research products or services that they believe adequately compensate for the higher commission rate.

Deregulation brought the entry of "soft dollar brokers," who specialized in providing managers with third-party research pursuant to some form of soft dollar arrangement. Gradually, this competition forced the established brokerage firms to offer soft dollar credits to their institutional clients (Johnsen (1994)). Although brokerage commissions fell dramatically following deregulation, they nevertheless reached an equilibrium that exceeds the execution-only rates charged by discount brokers. For example, institutional discount brokerage commission rates run roughly two cents per share, whereas the average commission rate in our sample of managed portfolios ranges between six and eight cents per share. This equilibrium involves the routine receipt by money managers of soft dollar research credits, which, by one account, grew to one-third of the $2.4 billion in gross commissions money managers generated in 1994,[4] and by others to as much as $1 billion annually.[5]

Since a portfolio's brokerage commissions are capitalized into the price basis of the portfolio securities, investors ultimately bear the burden of soft dollars, and the question naturally arises whether they truly receive something of equal or greater value in return. Do

---

[3] Section 28(e) was part of the Securities Acts Amendments (1975) and is codified at 15 U.S. Code § 78bb(e) (1988). It reads, in relevant part:

> No person [who exercises] investment discretion with respect to an account shall be deemed to have . . . breached a fiduciary duty . . . solely by reason of having caused the account to pay a member of an exchange, broker, or dealer an amount of commission . . . in excess of the amount of commission another member of an exchange . . . would have charged . . . if such person determined in good faith that [it] was reasonable in relation to the value of the brokerage and research services provided . . . .

It applies to money managers regulated by both the SEC and the DOL. Although the DOL may have authority to issue its own regulations under 28(e), it has largely deferred to the SEC.

[4] See Hopfner, Adam, 1995, New disclosure regs promise to answer nagging questions about soft dollars, *Plan Sponsor* February, 60-61.

[5] See Johnsen (1994) and Conrad, Johnson, and Wahal (1998).

money managers unjustly enrich themselves at the expense of portfolio investors, as some contend, when they pay up for soft dollars rather than using only discount brokerage and paying hard cash out of their own pockets for all research? This question can be addressed, among other ways, by examining the effect soft dollars have on investor returns and other attributes of delegated portfolio management. The results of this research may be useful in the formation of pending legislation and administrative rule making that will affect an important component institutional money management.

The results in this paper shed light on the welfare effects of soft dollar brokerage. The paper proceeds as follows. In Section II, we develop a general theory of delegated portfolio management that accounts for the full range of agency costs and the transaction costs of enforcing property rights to private information. We assume that money managers are hired to identify private information about mispriced securities and to capture the associated profit opportunities for their managed portfolios through market trading. We also recognize that managers face a number of problems enforcing property rights to private information while attempting to trade in a marketplace filled with potential interlopers. In the absence of organizational arrangements that succeed in establishing property rights to private information, much of the value of the information would be captured by market interlopers.

Following Johnsen (1994), in Section III we develop two agency cost hypotheses to explain soft dollar use: the unjust enrichment hypothesis (UEH) and the incentive alignment hypothesis (IAH). Because the UEH and the IAH are both plausible versions of the agency problem in delegated portfolio management, the net effect of soft dollars on investor returns is an empirical question. We note that bundling trade execution with research into a single brokerage commission applies to traditional full-service brokerage, where the manager receives access to the broker's in-house research and services, as well as soft dollar brokerage. The most striking difference between full-service and soft dollar brokerage has nothing to do with bundling. The significant difference is that soft dollars give managers access to a broad range of third-party research inputs, which may be used to generate private information about mispriced securities internally.

In Section IV, we derive cross-sectional implications for the UEH and the IAH based on agency theory. In Section V, we describe our database, which is a sample of 1,273 institutional portfolios provided by the Mobius Group, Inc., for the years 1979 - 1993. We use commissions

(in excess of that required for execution) per managed dollar under management as a proxy for the extent to which portfolio managers *pay up*, in total, for bundled brokerage. We also assume that soft dollar use is proportional to the extent of paying up.

Our results, in Section VI, fail to reject the hypothesis that soft dollars align portfolio managers' interests with the interests of portfolio investors. Bundled brokerage is associated with higher risk-adjusted portfolio returns, and it is unrelated to the level of manager compensation, thereby rejecting the UEH and lending support to the IAH. We provide a summary and some concluding remarks in Section VII.

2. A General Theory of Delegated Portfolio Management

2.1. Agency Theory

This work should be viewed in the more general context of agency theory as developed by Jensen and Meckling (1976). In their view, agency costs arise whenever a principal delegates discretion to an agent, whose interest is ultimately to maximize his own wealth rather than the principal's. According to Jensen and Meckling, agency costs consist of the monitoring costs incurred by the principal, the bonding costs incurred by the agent, and any remaining residual loss. Most important, they recognize that whenever agency costs impede exchange the parties can jointly profit by adapting their arrangements to reduce or eliminate the associated losses.

It is worth noting that in many cases portfolio management is subject to several layers of agency. For example, where the "client" consists of the pensioners of a firm's labor force, the pension executive, an agent of the firm, negotiates with the portfolio manager and monitors its operation of the account. Similarly, the brokers hired by the manager to trade portfolio securities are agents of the fund subject to the manager's direction and monitoring. It is by no means evident that multiple layers of agency necessarily increase the sum total of agency costs. Quite possibly, the maligned incentives of successive agents actually tend to cancel out, especially when account is taken of the benefits from specialization arising out of agency arrangements. For example, an entire industry has arisen to monitor the performance of pension fund managers. Presumably, the net effect is to reduce agency costs compared to direct monitoring by the principal. In any event, we simplify by focusing on one layer of agency at a time.

2.2. The Client's Objective Function

Given the gains from specialization, and scale and scope economies in investment research and portfolio administration, we assume that investors hire managers to obtain private information about mispriced securities and to carry out wealth enhancing portfolio trades. Managers do this by combining three investment inputs: i.) labor effort, ii.) research, and iii.) portfolio executions. We view the first two inputs as internal and external research inputs, respectively, while execution is an external input provided by brokers that can have a considerable effect on portfolio wealth.[6] Although the manager may use these inputs in sub-optimal combination, efficient contracting will minimize the associated losses by providing incentives for these inputs to be applied efficiently.

2.3. The Organizational Constraints

We frame the agency problem as one in which investors hire portfolio managers. But it is instructive to keep in mind that the situation can also be seen as one, following Jensen and Meckling (1976), in which a wealth-constrained manager sells equity claims to attract outside investment. In this view, the manager specializes in identifying mispriced securities. He owns the initial portfolio, faces scale economies in identifying and trading on private information, and therefore seeks outside investors to provide additional capital until the net benefits of generating private information are exhausted. In the case of mutual funds, investors are so numerous that explicit contracting on an investor-by-investor basis is almost impossible. In money management, however, investors or their agents (such as a pension plan sponsor) contract directly with the manager and can arrange for their account to be managed separately from the manager's other accounts. Hence, in money management, investors are free to prohibit bundled brokerage and to require the manager to use only discount brokerage.

Delegated portfolio management is also constrained by the difficulty of enforcing property rights to investment research and the transaction costs from trading on private information. From time to time, portfolio managers succeed in identifying profitable portfolio trades, and sometimes they do so persistently (see Ippolito (1989) and Hendrick, Patel, and

[6] For example, disloyal brokers can erode portfolio returns by frontrunning the manager's informed trades, and even loyal brokers who act carelessly may reduce portfolio returns by failing to minimize price impact (Berkowitz,

Zeckhauser (1993)). It therefore pays investors to favor managers whose recent performance has been relatively good, and there is substantial evidence that investors move capital toward managers who have demonstrated recent superior performance (for example, Lakonishok, Shliefer, and Vishny (1992), Chevalier and Ellison (1997), DelGuercio and Tkac (1998) and Sirri and Tuffano (1998)). This phenomenon suggests that investment dollars flow to managers who are expected to generate private information until the net benefits to investors of generating that information are exhausted. In essence, the portfolio can be seen as a common pool in which entry will occur until all expected rents are exhausted (Cheung (1970)).

The costs of enforcing property rights to investment research arise from the presence of market interlopers who constantly attempt to free ride on private information produced by others (Garvey (1944)). When a manager succeeds in developing systems for identifying mispriced securities, interlopers can often infer the nature of the system or simply succeed in mimicking the manager's trades and siphoning off a portion of the returns. In such cases, the manager captures only a "first-mover" advantage and the market as a whole captures the remaining benefits when the system eventually becomes common knowledge.[7] Therefore, identifying profitable trades is only one of the problems managers face attempting to increase portfolio wealth. Getting the trade done discretely, without leakage to interlopers, is another. To the extent that quality-assured execution ameliorates the leakage problem, investors should be willing to pay a premium for it.

2.4. The Transaction Costs of Portfolio Brokerage

Leakage can occur due to broker disloyalty, in the form of frontrunning, or it can occur simply due to broker indolence or lack of care or confidentiality in search. Any of these manifestations of leakage can lead to price impact, whereby interlopers might capture a portion of the returns from identifying private information about mispriced securities. To the extent that a broker might reveal the information content of a particular trade to the market, intentionally or otherwise, managers can reduce leakage by keeping secret from their brokers which trades are informed. They will therefore enter into brokerage arrangements that attempt to reduce, as far as economically possible, their marginal costs of executing such trades, and will, in any event, seek

---

Logue, and Noser (1988)).

[7] This appears to have been the case for James Stowers, Sr., of Twentieth Century Fund. See *Investors Research*

to use some form of average pricing of commission payments to disguise the informed trades from the liquidity trades. For example, if talented managers were to pay up only on informed trades, they would signal to market interlopers that they held private information, leading to price impact. Instead, managers must pay up for superior brokerage execution on both informed and uninformed trades to help establish property rights to private information. Moreover, managers who are more capable of generating private information must engage in a greater amount of noise (i.e., uninformed) trading to obscure their informed trades. Although such noise trading is costly, it partially avoids the price impact that would otherwise occur and thereby increases portfolio returns.

2.5. The Agency Costs of Delegated Portfolio Management

In delegated portfolio management, agency conflicts between managers and investors can manifest themselves in at least three ways: i.) managers applying investment inputs in sub-optimal combination (which includes "shirking"), ii.) managers attempting to misappropriate portfolio wealth, and iii.) poor monitoring by managers of brokerage executions. First, managers may have an incentive to apply too little of their own labor or to substitute outside research for their own labor because they receive only a small share of portfolio wealth increments. By subsidizing managers' use of research products, soft dollars surely encourage managers to use more research products than they would use if they had to pay for such products out of their own pockets.[8] The important question is whether this research subsidy moves managers toward the optimal allocation of resources, or so far beyond the optimal allocation so as to eliminate any benefits. Likewise, managers may choose sub-optimal levels of trading activity if required to pay for all brokerage out of their own pockets. In delegated portfolio management, brokerage commissions universally go into the price basis of the security and are therefore paid for by portfolio investors. The notorious practice of *churning* refers to trading levels above those which are socially optimal,[9] and, as with research, the question is whether the brokerage subsidy moves

---

Corporation v. SEC Investors Research Corp. v. SEC, 628 F.2d 168 (1980).

[8] Managers can either perform investment research internally by combining their labor effort with the research inputs they receive from paying up for soft dollars, or they can purchase it from full-service brokers by paying up for the broker's in-house research. In the latter case, it appears as though the manager's labor effort will be lower, thus allowing him to effectively substitute brokerage, at the expense of portfolio investors, for his own labor effort.

[9] Dow & Gorton (1997).

managers toward, or excessively beyond, the optimal allocation of resources.

Another source of agency conflict is the potential for the manager to convert investor-provided resources into personal wealth. There are three ways to accomplish this. Managers can simply appropriate profitable trades for their own account without ever making the opportunity available to the portfolio. Similarly, managers can engage in so-called *front-running*. This occurs when the manager trades on the basis of private information for his own account ahead of the portfolio and before the information is impounded into prices. Alternatively, managers could conceivably convert portfolio executions into personal wealth through trading *kick-backs* by directing portfolio brokerage to those willing to pay cash or the in-kind equivalent.

Finally, agency conflicts affect the diligence with which the manager monitors the brokers he uses to trade for the portfolio. There are two ways in which this conflict can manifest itself. First, since managers bear only a small portion of any wealth loss that results from inefficient contracting with brokers, they may pay commission rates above the competitive rate, or at least be less than diligent in negotiating the best commission rate for the portfolio. The second problem is that brokers, too, have an incentive to shirk in providing portfolio executions by not searching diligently for better prices or by leaking news of an impending trade. Because money managers receive only a fraction of the gains from monitoring brokers, they may have too little incentive to carefully monitor these agents.[10] However, since superior performance attracts new assets, managers have a larger stake in performance than a static framework would suggest. In fact, the money manager's stake in portfolio performance may be larger than a corporate manager's stake in firm performance. Appendix A develops this idea more formally.

3. Two Agency Cost Hypotheses

3.1. The Unjust Enrichment Hypothesis

Berkowitz & Logue (1987) and Logue (1991) were perhaps the first scholars to articulate what can be called the "unjust enrichment hypothesis" (UEH) for soft dollar brokerage. In their view, soft dollars allow money managers to appropriate the wealth of portfolio investors, who face a free rider problem in monitoring managers' behavior. Any investor who bears the agency costs of monitoring its manager's use of soft dollars will receive only a pro rata share of the

associated benefits. Shareholders therefore will engage in too little monitoring than their collective interests would dictate, and managers will respond by exploiting the situation by overusing soft dollars. They will "churn" their accounts to generate soft dollar research credits, they will use research products that they would be unwilling to pay for with their own money, and they will allocate portfolio trades to brokers based on the brokers' willingness to provide soft dollar research credits rather than on expected execution quality.

To the extent managers in competitive labor markets, such as money management, are able to engage widely in this kind of unjust enrichment, equilibrium wages will adjust downward so that their full compensation will equal their marginal productivity. The real losses incurred by portfolio investors and money managers, jointly, arise from the inefficiency of soft dollars as a form of equilibrium manager compensation. Following Jensen and Meckling (1976), if soft dollars reduce portfolio performance on net balance, then both groups will have an incentive to eliminate them because both groups can share in the gains from doing so. Their unwillingness to do so suggests that the resulting monitoring and bonding costs are prohibitively high.

3.2. The Incentive Alignment Hypothesis

According to the "incentive alignment hypothesis" (IAH), soft dollars actually reduce agency costs by aligning the interests of money managers with those of portfolio investors. For most "active" money managers, the annual fee is a recurring 50 to 100 basis points of the net asset value of their portfolios. Although this arrangement essentially makes them co-owners of the portfolio with outside investors, their share is nevertheless smaller than one hundred percent. If they were required to pay for all research and execution out of their own pockets, they would bear a disproportionate share of the costs of generating portfolio returns in relation to the private benefits based on their portfolio share. Seen in this light, the agency problem faced by portfolio investors may be that managers will do too little research, identify too few profitable trading opportunities, and execute too few portfolio trades.

Soft dollar arrangements allow investors to subsidize investment research and encourage managers to investment more heavily in it. In fact, given the complimentary nature of inputs to the portfolio management process and that the inputs are normal goods, the research subsidy

[10] We addressed the manager's choice of sub-optimal levels of brokerage above and abstract from that problem here.

encourages managers to use more of all the inputs, not just research. A formal proof is provided in Appendix B.

It bears repeating that the UEH and the IAH apply not only to soft dollar brokerage to purchase third-party research but also to all situations in which the costs of research and execution are bundled into a single brokerage commission, including purchasing full-service brokerage or in-house research. Soft dollars are simply one form of bundling, which allows research and execution to be provided by entirely separate firms. Moreover, treating in-house and third-party research identically is consistent with the recently disclosed standards published by the AIMR.[11]

Soft dollar arrangements may also align the incentives of brokers and managers. Because money managers receive only a share of the gains from monitoring brokers' execution quality, they may have too little incentive to engage in careful monitoring. Bundling provides a bonding mechanism to assure that brokers perform diligently. When a broker provides soft dollar research credits to a money manager, it typically does so in advance of the commission payments it expects from the manager. The manager receives research credits that he can spend immediately and his account with the broker is debited in anticipation of a certain amount of future commissions. This account debit serves as a performance bond. The advance credits provided by soft dollar arrangements therefore appear to be an application of the quality assurance model developed by Klein and Leffler (1981), in which there are two goods – in this case high- and low-quality brokerage – that cannot be distinguished *ex ante*. Although consumers are willing to pay a higher price for the high quality good, the inability to accurately assess quality *ex ante* prevents them from paying a price above the producer's cost of producing the low quality good. As a result, only the low quality good will be produced. To overcome this situation, the producer can post a performance bond to assure that he will provide the high quality good if paid a sufficiently high premium, or rent, above the avoidable costs of production.[12] As long as the one-time gain from cheating is less than the present value of the rents from maintaining high quality, the producer will not cheat. Since the manager is under no legal obligation to perform the promised trades, the performance bond (i.e., research credits) could be lost entirely if the broker

[11] AIMR Soft Dollar Standards, 1998, Association of Investment Management and Research, p.4.
[12] Lesmond, Trzcinka, and Ogden (1998) have developed a method of empirically estimating transaction costs.

is discovered providing low quality executions.[13] By establishing an ongoing relationship of trust between brokers and managers, soft dollars also provide brokers with an incentive to recommend the appropriate research products.

Finally, in some soft dollar settings the portfolio manager determines the brokerage commission rate on each trade *after* it is completed. The rate will depend on the manager's *ex ante* assessment of trade difficulty, his *ex post* assessment of the broker's performance, and the nature of his relationship with the broker. Alternatively, the rate is a fixed commission rate for all trades negotiated between the manager and broker.[14] The broker prefers a higher rate, of course, because it decreases the manager's account obligation more quickly than a lower rate. In either case, the system of ex post pricing or fixed pricing implies that all trades are "average priced," ex ante, from the broker's perspective. Moreover, as long as the manager intends to fulfill his trading "obligations" with the broker over the established term of the soft dollar arrangement, this system reduces the manager's marginal cost of trading almost to zero and encourages him to engage in noise trading to obscure his informed trades.

The UEH and the IAH are both theoretically plausible but have yet to be subjected to empirical testing. The aim of this paper is to help determine whether soft dollars alleviate or aggravate agency conflicts between portfolio managers and investors by designing tests that can potentially refute either hypothesis. In doing so, we provide evidence that might be useful in the formation of pending legislation or administrative rule making.

4. Testable Implications

4.1. Shared Predictions

Both hypotheses predict that managers will use more research and trade more often as a result of soft dollar brokerage than they otherwise would. According to the IAH, the increase in research and trading is efficient because the manager is moving toward the optimal allocation of

---

[13] Though rare, industry reports demonstrate that managers have from time to time reneged on their soft dollar "commitments." Julie Rohrer, *Soft Dollars: The Boom in Third-Party Research*, Institutional Investor, Apr. 1984, p. 78. In at least one case, this led to the broker's insolvency. Philip Maher, *Why Wall Street Can't Bank on Soft Dollar*, Investment Dealers' Digest, Oct. 23, 1989, p. 18.

[14] This information comes from a casual survey of institutional brokers and traders. In addition, brokers may not know until after the trade is completed whether the commission will be a soft dollar commission or a hard dollar commission.

resources. According to the UEH, the increase in research and trading reflects the manager's overuse of research made possible by exorbitantly high commission rates and/or the churning of clients' accounts.

Examining how commission *rates* relate to soft dollar use does not distinguish the hypotheses because soft dollars reflect compensation for research, as well as brokerage. The IAH views the higher commissions as a necessary payment to compensate for the optimal amount of research. The UEH makes the same prediction, but contends that the soft dollar rate exceeds the value of research and brokerage combined. Both hypotheses, then, would predict that commission rates for index funds, which have little or no reason to pay up for research or other services, should be lower than commission rates for actively managed funds.

Comparing soft dollar use in situations characterized by high and low agency costs also fails to distinguish the two hypotheses. The UEH predicts soft dollar use will be higher in situations characterized by high agency costs, because weak monitoring enables managers to use soft dollars to unjustly enrich themselves. The IAH predicts soft dollar use will be higher in situations characterized by high agency costs, as well, because soft dollars help to align manager's incentives where alternative monitoring mechanisms are uneconomic.

4.2. Risk-adjusted Returns and Management Fees

Perhaps the most obvious way to determine if soft dollars are beneficial or detrimental to portfolio investors is to examine how risk-adjusted returns vary with the extent to which managers pay up for brokerage. The IAH predicts that soft dollar use will lead to higher risk-adjusted returns, while the UEH predicts that they will lead to lower risk-adjusted returns.

Another way to distinguish between the IAH and the UEH is to examine management fees. If managers use soft dollars to unjustly enrich themselves, then part of the residual loss resulting from the practice will be reflected in their market wage, i.e., management fees (see Jensen and Meckling (1976)). This is because managers will anticipate the opportunity to convert portfolio assets to their own use and will compete for the opportunity by offering to work for a lower wage. Alternatively, if soft dollars are a monitoring mechanism used when other monitoring mechanisms fail, then management fees should be unrelated (or perhaps even positively related) to soft dollar use.

One proxy for cross-sectional differences in agency costs identified by Easterbrook

(1984) and Pound (1988) is ownership concentration. According to Easterbrook, "Although a monitor-shareholder would incur the full costs of monitoring, he would reap gains only in proportion to his holdings. If shares are widely held, no one shareholder can capture even a little gain." (p.653 op. cit.) Since clients are essentially monitor-shareholders in this setting, fewer accounts (i.e., higher ownership concentration) should be associated with better monitoring, all else equal. Both hypotheses therefore predict that managers with highly concentrated account bases will be more parsimonious when paying up for soft dollars, all else equal.

5. The Data

The data from which the sample is drawn are supplied by Mobius Group, Inc., which has been in the business of selling returns data on money managers to the public since 1989.[15] The database is representative of both pension assets and the institutional market in general. For example, the pension assets in the sample represent 54% of all pension assets in the U.S. as of 1993.[16] Further, the Mobius database includes 940 of the largest 1,000 tax-exempt money managers as reported by *Pension & Investments*. Since the database covers institutional (rather than retail) managers, it contains large institutional index managers, such as Wells Fargo-Nikko, but does not include the popular retail Vanguard Index 500 Trust. The sample also fairly represents the institutional market as a whole. Eighty-four percent of the equity assets in the sample are tax-exempt, while 83% of aggregate institutional equity holdings are reported as held by pension funds.[17] Also, 14% of the equity assets in the sample are indexed while *Pension &*

[15] Other firms supplying money manager return data use their own database to support their main consulting business. Examples include Frank Russell Company and SEI Corp. The Mobius Group, on the other hand, provides no consulting services, so their data, alone, must pass the market test for reliability. Coggin and Trzcinka (1995) audit the accuracy of Mobius data by comparing the 68 worst performing managers having 10 years of data in the PIPER March 1993 database with those in the Mobius database. Of the fifty managers in both databases, all had identical returns (to within rounding error) in both databases. The worst performing managers may have an increased incentive to misreport if the payoff to cheating is asymmetric, such that the manager has limited downside risk, and if misreporting increases the variance of outcomes. The analogy in a corporate finance setting is when corporate management has an incentive to accept high-risk projects as the firm approaches bankruptcy. As the manager approaches the floor of possible payoffs, the incentive to gamble by misreporting performance increases.

[16] The estimate of all U.S. pension assets is taken from the Federal Reserve Board's Flow of Funds report for 1993.

[17] Aggregate figures are taken from the Federal Reserve Board's Flow of Funds report for 1993. Pension equity holdings are taken to be all public and private pension equity holdings. Institutional equity holdings are taken to be all U.S. corporate equity holdings less those of households, bank personal trusts, mutual funds, and the foreign sector.

Investments reports that 13% of all pension assets were indexed in 1993.[18]

[Insert Table 1 about here]

Managers in the Mobius database may report returns for a series of portfolios, or management styles, that it offers clients. Consequently, there are both firm-level and portfolio-level data. Since returns, commission rates, turnover, and management fees are reported at the portfolio-level, our observation of study is a portfolio rather than a firm. Any number of accounts (i.e., clients) is managed under each portfolio, or management style. Table 1 shows descriptive statistics for all domestic equity portfolios in the Mobius database.[19] Panels A and B present statistics on the distribution of portfolio assets and the number of accounts managed within each portfolio. The standard deviations are large, and the distributions are skewed. Not only is the median-sized portfolio below the mean, the portfolio in the 75th percentile is below the mean as well. In the statistical tests to follow, we transform portfolio assets and the number of accounts managed using a natural log operator so that the distributions are closer to normal.[20]

Another issue worth noting is how money manager returns data compare to those of mutual funds. The SEC plays an active role in monitoring mutual fund returns reporting, which may increase the quality of mutual fund reporting because the monitoring costs for an atomistic mutual fund investor are likely to far exceed the benefits. The money management industry, however, has alternative monitoring mechanisms because the net benefit from monitoring money managers is probably fairly high for many pension plan sponsors. Perhaps this is why an entire industry of pension fund consultants has emerged to screen the data and weed out high-quality from low-quality money managers. The Mobius Group does not charge managers to be in the database. Managers are included as long as they provide complete and accurate data through a questionnaire on a quarterly basis. There are at least three forms of selection bias here in addition

---

[18] The figure for indexed assets comes from Schramm, Sabine, 1994, Indexing shows small increase: International posts the only big gains, *Pensions & Investments* 22(3) February, 2-4. The estimate of all U.S. pension assets is taken from the Federal Reserve Board's Flow of Funds report for 1993.

[19] Although the data are retrieved from the fourth quarter 1994 database, the latest data reported are for fourth quarter 1993 because managers take several quarters to update their reports. For example, data on assets under management for fourth quarter 1993 are not widely available until the second, third or fourth quarter 1994 edition of the Mobius data.

[20] Although the Shapiro-Wilk test statistic rejects the hypothesis that the logarithmic variables are normally distributed, the test statistics for the logarithmically transformed variables are much closer to one than the test statistics for the raw variables, suggesting that the logarithmic transformation produces a distribution closer to normal. The null hypothesis that the distribution is normal cannot be rejected when the Shaprio-Wilk statistic is

to the usual survival bias. First, since managers self-report, it is possible that the superior performing managers report while the inferior performing managers do not. Second, managers who were once in the database may elect to be withdrawn. This may occur if a manager has had a particularly bad quarter and does not wish to publicize results until a better quarter. Third, calculated returns vary according to the methodology used to calculated them (e.g., dollar-weighted versus time-weighted). An upward bias in returns results because managers have an incentive to employ the most flattering calculation technique.

We measure risk-adjusted returns using a traditional Jensen's alpha and the estimated intercept from the three-factor model of Fama and French (1993), who explain the cross-section of security returns using the following regression.

$$R_{it} - r_{ft} = \alpha_i + b_i (R_{mt} - r_{ft}) + s_i SMB_t + h_i HML_t + e_{it} \qquad (1)$$

where R_{it} is the return on portfolio i in period t, R_{mt} is the return on the market portfolio in period t, r_{ft} is the risk-free rate in period t, *SMB* is the difference between returns on small- and big-stock portfolios with about the same weighted-average book-to-market equity and *HML* is the difference between returns on high and low book-to-market equity portfolios with about the same average size. *SMB* and *HML* represent factors that capture the firm-size and book-to-market effects, respectively.

[Insert Table 2 about here]

Panel A Table 2 shows the intercepts of OLS regressions for the 1,273 domestic equity portfolios with at least twelve quarters of reported returns. The time period under study is from 1979 to 1993; however, data is more abundant for recent years. The mean α is ninety-three basis points per quarter, or 3.7 percent annually (3.8 percent compounded quarterly). 85 percent of the intercepts are positive, 31 percent significantly so. The astronomical alphas can be attributed to data biases and not the particular benchmarks for several reasons. First, Carhart (1996) uses the FF factors on mutual fund data and finds intercepts near zero. Second, Panel A shows that alphas calculated with single-factor models produce similarly large alphas.

We attempt to mitigate the effect of any selection or reporting bias by forming a restricted sample of portfolios having returns that conform to four "quality" standards. The restricted sample has four filters: returns must be i.) gross of fees, ii.) based on only discretionary

---

insignificantly different from one.

portfolios, iii.) include terminated accounts, and iv.) not be from a prior firm. The performance measures are similarly large. We will use this restricted sample, along with the full sample, in tests that follow as a check of robustness. In any case, although there may be a remaining selection or reporting bias, we assume any upward bias is the same for all portfolios and have no reason to believe it is related to a portfolio's use of soft dollars.

Panel B provides external validity to the data. The Mobius database provides classifications for equity management styles, such as small capitalization, value and growth, which ought to be correlated with the size and book-to-market effects in equation (1). Strategy classes are measured on a discrete scale of 0 to 3. Three is descriptive of the fund's strategy, while zero is not descriptive. Classifications 1 and 2 are hybrids. The Pearson correlation coefficient between *s*, the coefficient on *SMB*, and the small capitalization strategy class variable is a significant 0.66, indicating that the small capitalization variable is truly capturing the portfolios' sensitivity to movements in small stocks. The correlation of *h*, the coefficient on *HML*, to the value and growth strategy class variables is 0.51 and -0.57, respectively, indicating that portfolios classified as "value" tend to have high estimated *h* coefficients, while portfolios classified as "growth" tend to have low estimated *h* coefficients. This finding suggests that the portfolios exhibit returns consistent with the strategy classifications.

Although we do not have data directly identifying money managers' use of soft dollars, we assume that soft dollar use is proportional to Premium Commissions per Managed Dollar, calculated as the average commission rate (less two cent per share) times annual turnover (expressed as a percent). We deduct two cents per share from a portfolio's average commission rate to remove the portion of total commissions paid attributable solely to execution thereby capturing the effect of paying up for brokerage.[21] Our measure of paying up for soft dollar brokerage contrasts with that of Conrad, Johnson, and Wahal (1998) who examine the average commission rate premium paid for soft dollar brokerage versus non-soft dollar brokerage. While they focus exclusively on commission rates, we consider that managers can pay up for brokerage

[21] The results that follow are insensitive to the exact amount of the execution-only deduction. However, it bears mentioning that any deduction conceptually removes execution-only brokerage for easy trades, not for trades requiring skill. Rather than paying up for soft dollar brokerage, managers may pay up to receive skilled brokerage on difficult trades. Although our measure of paying up for soft dollar brokerage mistakenly includes paying a premium for skilled trades, the following tests control for portfolio strategies (e.g., small capitalization, value, growth) which are likely correlated with trade difficulty.

via higher commission rates or higher portfolio turnover. Hence, we estimate aggregate soft dollar brokerage by multiplying soft dollar commission rates by turnover. If bundled brokerage adds no value, increasing either commission rates or turnover will have a deleterious effect on portfolio returns. Alternatively, if bundled brokerage facilitates contracting and profitable trading opportunities, the benefits reducing residual loss and generating private information will offset the costs of premium commission rates or increased turnover.

We use tax-exempt assets as a proxy for pension assets because pension funds are the most common tax-exempt vehicle, and it is common industry practice to use them synonymously. Lakonishok, Shleifer, and Vishny (1992) report that 90% of tax-exempt assets are pension funds.

6. Results

6.1. Commission Rates, Turnover

Many factors other than soft dollar brokerage affect commission rates and turnover, including portfolio size, the number of accounts, and portfolio management style. Table 3 illustrates how these factors affect soft dollar commission rates and turnover. The dependent variable is the average commission rate (in cents per share) less an execution-only commission rate of two cents per share. We remove the execution-only commission rate to isolate the effect of paying up through soft dollar arrangements. We expect a strong negative relation between portfolio assets and commission rates in the first regression of Table 3 because significant economies of scale exist in trading securities.[22]

[Insert Table 3 about here]

Table 3 also shows that index portfolios pay significantly lower average commission rates than actively managed portfolios. The index variable is a step variable that can take on four different values. An index classification of three very accurately describes a portfolio as indexed, while a classification of zero indicates that it would be wrong to apply the term "index" to portfolio strategy. Therefore, index portfolios pay, on average, two cents per share less in commissions than actively managed portfolios (i.e., the coefficient times the number of index

[22] Much of a broker's and manager's effort and costs in trading a block of securities are invariant to the size of the block, implying that commission rates should decrease with block size. If block size is directly related to assets

classification steps, 0.67 x 3). The two-cent difference is economically significant in light of a median rate of six cents per share. Under the UEH, this difference should approximate the extent to which active portfolio managers attempt to unjustly enrich themselves. Under the IAH, the difference should reflect, in part, the value of the research credits bundled into commission rates when soft dollars are used. Average commissions for index portfolios should be lower than those for actively managed portfolios because index portfolios do not utilize extensive amounts research, and index portfolio trades are presumed to be uninformed and will not require a quality-assuring brokerage premium. Accordingly, the difference should also reflect the quality-assuring premium required on active managers' trades that could contain private information and therefore require high quality execution to avoid price impact.

The first regression also shows an increase in the number of accounts managed in each portfolio increases commission rates because a larger number of accounts increases the administrative work of the broker booking the trades.[23] An increase in the administrative costs of trading should also decrease the level of portfolio turnover. The negative relationship between accounts in a portfolio and turnover is show in the second regression. In all, we are able to explain 17% and 26% of the cross-sectional variation in commissions and turnover, respectively.

---

under management, then average commission rates should decrease with portfolio assets.

[23] If the manager is trading a specific security for only one large account, the broker need book only one trade. If he is trading for a large number of accounts, the administrative work increases dramatically.

Strategy classes, or management styles, may pick up variations in Section 28(e)'s safe harbor protection that allow us to separate traditional soft dollar rebates from the implicity rebates provided by full-service brokers. Recall that Section 28(e) permits investment managers to pay up for brokerage in exchange for investment research as long as the extent of paying up is commensurate with the value of the research and other services received. By Securities & Exchange Commission Ruling, this protection is available only for trades conducted on an agency basis (i.e., those involving payment of a "commission"). Trades executed on a principal basis, for example on NASDAQ, receive no safe harbor protection. This might cause managers who fear liability for accepting soft dollar rebates on dealer trades to engage in less paying up for third party research. It will also lead them to shift toward in-house research and other services provided by full-service brokers when they seek rebates on dealer trades. This is because in such arrangements the full-service broker does not formally account for the bundled research, which is provided on a long-term relational basis. This shift toward in-house research is still captured by our measure of soft dollar brokerage.

The third regression of Table 3 shows how Premium Commissions per Managed Dollar (i.e., the product of soft dollar commission rate and portfolio turnover) is related to portfolio characteristics. The negative sign on the number of accounts suggests that soft dollar use decreases as client concentration increases and monitoring improves, a result that is consistent with both the UEH and IAH. We also see that some types of portfolios use less soft dollars (e.g., index, mutual fund timing) while others use more (e.g., growth, sector rotator, and hedged equity). Although not reported here, the effect of portfolio size and number of accounts are left qualitatively unaffected by excluding various strategy class variables.

6.2. Soft Dollars and Performance

Table 4 shows the probable effect of soft dollars on risk-adjusted returns. The first regression is a univariate test of this association, which shows that paying up for bundled brokerage is associated with higher risk-adjusted returns at the 99% confidence level. The risk-adjusted returns are net of commissions, implying that soft dollars are a net benefit to fund owners, and are reported in decimal units, such that .10 represents a 10% return. This result suggests that, holding turnover and other factors constant, a one cent increase in soft dollar commission rates increases risk-adjusted performance by 6.7 basis points per quarter. Why we

would expect soft dollar brokerage, or any other product or service available in the market, to generate persistent abnormal returns is a difficult question to answer. One explanation is that managers truly perceive a nonzero risk of civil suit or bad publicity from using soft dollars, even though their use is efficient, and that this risk must be compensated in portfolio returns. Otherwise, under the hypothesis that managers have difficulty enforcing property rights to private information about mispriced securities we would expect all abnormal returns to be competed away in the long run. Nonetheless, our results show that the effect of soft dollar use is nonnegative. If managers pay up for soft dollar brokerage in an attempt to unjustly enrich themselves, investors do not appear to be harmed. Soft dollars appear to at least pay for themselves.

[Insert Table 4 about here]

To bring control variables into the analysis, we account for the correlation between Premium Commissions per Managed Dollar and the other independent variables. Premium Commissions per Managed Dollar is first regressed against the other control variables. The residuals from that regression are used as the independent variable in the second and third regression of Table 4. The significantly positive relationship between soft dollars and performance remains after introducing the effects of these control variables. It also appears that index funds tend to underperform their actively managed counterparts even in the presence of other strategy class control variables, although this may result from selection and reporting data biases. The relatively low returns of portfolios with a high proportion of pension assets is consistent results reported by Ambachtsheer (1994), while the relatively high returns of hedged equity portfolios is consistent with results reported by Schneeweis and Spurgin (1998). It is also important to note that, although not reported here, these results are qualitatively unaffected by not accounting for the collinearity between the dependent variables.

[Insert Table 5 about here]

The positive relation between soft dollar brokerage and performance withstands further tests of robustness. Table 5 examines the relation between soft dollars and performance using two different samples and two different estimation procedures. Regression (1) estimates the relationship using the restricted sample of portfolios having returns that conform to four “quality" criteria. The positive relationship between bundled brokerage and performance is significant at the 99% level of confidence, as it is for all the tests of robustness. The data on

commission rates and turnover (and hence our soft dollar proxy) are only reported with the most recent set of returns, and may be less relevant with respect to earlier return data. However, these data are certainly related to the portfolio's strategy (as shown in Table 3), which is stable over time. To address this potential mismatch between return data and brokerage data, we estimate the relationship using only five years of returns from 1989-1993. As indicated in the second regression, quarterly risk-adjusted performance tends to increase with the use of soft dollars.

Some estimates of risk-adjusted performance are better than others are. That is, some estimated alphas are less noisy than others are. To place greater emphasis on those observations with more reliable estimates of performance, we perform a weighted-OLS analysis on the entire sample using the reciprocal of the alpha's standard error as weights in regression (3). Finally, we estimate the relationship between soft dollars and performance measuring performance with traditional Jensen's alpha in regression (4). In both cases, greater soft dollar use is associated with greater risk-adjusted performance at the 99% level of confidence. Although not reported here, we also weight observations based on portfolio size with qualitatively identical results. The results are essentially the same when using various combinations of sample construction and estimation procedures. These results are consistent with the IAH, but not the UEH.

6.3. Soft Dollars and Management Fees

If managers use soft dollars to unjustly enrich themselves in a competitive labor market, the expectation of being able to capture this value should be reflected in lower management fees. On the other hand, if soft dollars align managers' interests in the absence of other monitoring mechanisms, management fees should be either unrelated to the extent of paying up for bundled brokerage or positively related. Table 5 shows the likely effect of soft dollars on management fees. Management fees, expressed in basis points, of various account sizes appear to be unrelated to paying up regardless of account size. Interestingly, fees on larger accounts tend to increase with past performance, suggesting that managers gain pricing power when they report positive risk-adjusted returns. The expected negative relationship between indexing and management fees is also extant. It also seems that portfolios having relatively more pension assets have relatively low management fees. The relationship between soft dollars and management fees, however, is generally positive but statistically insignificant. It appears then that managers do accept lower management fees in attempt to compete for the opportunity to

unjustly enrich themselves through soft dollar brokerage. These results fail to reject the IAH but are inconsistent with the UEH.

[Insert Table 6 about here]

These results withstand the same tests of robustness as the relationship between soft dollars and performance. Using the restricted sample of portfolios having returns that meet four "quality"" criteria, regression (1) in Table 6 shows an insignificantly positive relationship between soft dollar use and management fees. Again, the data concerning management fees pertains to the most recently reported time period so older returns data may be mismatched with the more recent data on management fees. However, no detectable relationship is exists between soft dollars and management fees for the most recent set of return data in regression (2). Interestingly, weighting observations by the reciprocal of the alpha's standard error in regression (3) significantly strengthens the relationship and the explanatory power of the regression as measured by adjusted-r squared. Finally, measuring performance with a traditional Jensen's alpha fails to identify a significant relationship between soft dollars and management fees. The results are qualitatively unaffected by weighting observations by portfolio size or using various combinations of sample construction and estimation procedures.

7. Summary

The unjust enrichment hypothesis holds that soft dollars allow managers to misappropriate investors' wealth. The incentive alignment hypothesis holds that soft dollars discourage shirking and provide a mechanism by which managers can better monitor brokers. We present evidence that fails to reject the latter view. Soft dollars appear to be most common in situations where the cost of alternative monitoring mechanisms is high. That is, managers with a dispersed client base composed of few pension assets engage in more paying up for bundled brokerage and, presumably, use more soft dollars. Soft dollars appear to benefit investors, however, as they are positively related to risk-adjusted returns. Furthermore, since their use is unrelated to management fees, it appears that managers do not use soft dollars as an alternative form of compensation.

The inability to directly measure soft dollars, or even to clearly define them conceptually, is a stumbling block to resolving the soft dollar debate. The incentive alignment hypothesis recognizes that exclusive property rights to private information are costly to enforce. As a result,

privately informed portfolio managers cannot use low quality (discount) brokerage because of the dire consequences for price impact. Nor can they confine their trading strictly to those situations in which they are privately informed by "paying up" for high quality brokerage. As long as market interlopers stand ready to capture the value of managers' privately informed trades, managers must engage in some amount of noise trading to obscure their privately informed trades. Institutional brokerage commissions must converge to a fairly uniform equilibrium rate that reflects, on average, the marginal cost of executing a combination of noise trades and privately informed trades. This rate will necessarily exceed the marginal cost of executing purely uninformed, or liquidity, trades. The difference reflects a rent that brokers must compete to capture by providing managers with valuable nonprice concessions. These concessions can take the form of in-house research or services, or they can take the form of soft dollar credits that subsidize the manager's purchase of research inputs in the market from third-party providers, which allows managers to arrive at their own investment conclusions. To the extent that managers receive these concession ex ante, the concessions can effectively bond the quality of the broker's execution.

Regulators and professional associations are currently reviewing the use of soft dollars and proposing new legislation. The results of this research may help guide the formation of impending regulation. Future research could increase our understanding of the welfare effects of soft dollars by using data that directly measures their use. Knowing whether these relationships hold in the mutual fund industry, which has arguably different quality returns data, would increase our understanding further. Until such data become available, however, evidence that can partition portfolios across defined-benefit and defined-contribution pension plans would also provide additional insight, as this distinction provides an excellent proxy for the net benefits of careful monitoring. As residual claimants to portfolio assets, the sponsors of defined-benefit plans can be expected to monitor their managers better than defined-contribution plans. Examining soft dollar use across these plans will increase our understanding of soft dollars and their welfare effects.

APPENDIX A

Since assets under management are positively related to prior period performance, paying managers a share of assets under management gives them a stake in portfolio performance beyond the explicit advisory fee and may help alleviate the agency conflicts in delegated portfolio management. In other words, producing superior returns attracts future asset inflows on which future advisor fees are earned. In a long run, theoretical sense, managers with superior ability should capture all excess returns as new investors contribute funds to the portfolio in anticipation of capturing subsequent excess returns. Portfolio assets will continue to grow (as will the manager's total compensation) until all excess returns are exhausted. (see Johnsen (1994), footnote 93.)

In a static framework which ignores future increases (decreases) in the asset base that result from outperforming (underperforming) the benchmark index, the manager's marginal wealth at the end of period 1, MW_{m1}, is expressed by

$$MW_{m1} = \phi f MW_{p1} \qquad \textbf{(A1)}$$

where MW_{p1} is the marginal wealth increase of the portfolio in period 1 and $\phi = \Sigma^{T}_{t=1} f(1+r)^{-t}$ where f is the manager's fee expressed as a percent of assets under management, r is the risk-adjusted discount rate, and T is the number of periods that the wealth increase persists. Equation (1) ignores, however, that good performance attracts assets in future periods. Chevalier and Ellison (1997) report that a 1% increase in annual portfolio return in excess of a benchmark return increases a manager's asset base by about 2% the following year net of investment performance. In fact, the same 1% excess performance increases assets two and three years hence by about 1% and 0.5%, respectively. We call such a coefficient period t's "performance elasticity of assets". Since management fees are earned on these newly attracted assets, managers' stake in portfolio performance extends beyond the effect on current portfolio assets.

Consider that the manager attracts δ_t percent more assets in period t by exceeding the return on the benchmark index by one percent in period 1 (i.e., period t's performance elasticity of assets). If the manager outperforms the benchmark index by n percent, then the manager's marginal wealth as a function of portfolio wealth increments can be expressed by

$$MW_{m1} = \phi f MW_{p1} + \frac{\phi f n \delta_1 P_1}{(1+r)} + \frac{\phi f n \delta_2 P_2}{(1+r)^2} + \frac{\phi f n \delta_3 P_3}{(1+r)^3} + \ldots \qquad \textbf{(A2)}$$

where P_t is the value of the portfolio in period t. The first term represents the present value of the manager's benefit associated with portfolio wealth increases in the first period under the static view. The numerator of the second term represents the value (at the end of period 1) of the manager's claim on $n\delta_1 P_1$, the increase in portfolio assets resulting from exceeding the benchmark return by n percent in period 1. The subsequent terms are interpreted analogously for subsequent period asset inflows resulting from performance in period 1.

Making the simplifying assumption that the appropriate risk-adjusted discount rate, r, is equal to the expected internal investment return,

$$MW_{m1} = \phi MW_{p1} + \frac{\phi n\delta_1 P_0(1+r)}{(1+r)} + \frac{\phi n\delta_2 P_0(1+r)^2}{(1+r)^2} + \frac{\phi n\delta_3 P_0(1+r)^3}{(1+r)^3} + \ldots . \qquad \textbf{(A3)}$$

Dividing to unity and recognizing that $P_0 = MW_{p1}/r$, equation (3) can be re-written as

$$MW_{m1} = \phi MW_{p1} + \frac{\phi n\delta_1 MW_{p1}}{r} + \frac{\phi n\delta_2 MW_{p1}}{r} + \frac{\phi n\delta_3 MW_{p1}}{r} + \ldots$$

or

$$MW_{m1} = \phi MW_{p1}\left(1 + \frac{n\delta_1}{r} + \frac{n\delta_2}{r} + \frac{n\delta_3}{r} + \ldots\right). \qquad \textbf{(A4)}$$

For example, ignoring δ_t when $t > 3$, the manager's wealth increment can be estimated using asset elasticity estimates from Chevalier and Ellison (1997) where $\delta_1 = .02$, $\delta_2 = .01$, $\delta_3 = .005$. Assuming wealth increases are permanent, $\phi = 0.01$, and $r = 10\%$, and the portfolio return exceeds the benchmark index by 1%, the manager's marginal benefit of each marginal dollar of portfolio wealth is

$$MW_{m1} = .10(\$1)[\ 1 + .02/.10 + .01/.10 + .005/.10\ ] = .135$$

That is, for each incremental dollar of portfolio wealth, the manager gains 13.5 cents. When the manager outperforms the index by 2%,

$$MW_{m1} = .10(\$1)[\ 1 + 2(.02)/.10 + 2(.01)/.10 + 2(.005)/.10\ ] = .17$$

An examination of this example and the positive first derivative with respect to n of equation (4) reveals that managers receive increasing marginal wealth as portfolio performance increases. Unlike Lakonishok, Shleifer, and Vishny (1992), we find it difficult to believe that institutional money management is an industry that subtracts value when managers are given

such a large stake in their marginal performance, essentially sharing ownership in the portfolio. This is especially true given that much of the manager's payment comes in the form of future, performance induced fund flows based on investors' (presumably rational) expectations.[24] When compared to average corporate inside ownership, this stake is large. For example, Morck, Shleifer, and Vishny (1998) report mean and median board ownership of 10.6% and 3.4%, respectively.[25]

This analysis actually underestimates the manager's interest in superior performance in that it ignores any pricing power accruing to managers that beat the benchmark index. Evidence presented below suggests that managers reporting positive historical risk-adjusted returns are able to charge higher management fees than those with inferior performance.

[24] A test for our rationality formulation could be performed by examining the effect of stepped-down management fees on the portfolio inflows that follow superior performance. All else equal, our formulation predicts that stepped-down management fees will lead to larger portfolio inflows following superior performance. Portfolios and funds with stepped-down fees should be larger, on average, as a function of cumulative superior performance.

[25] See also McConnell and Servaes (1990) for similar reports regarding levels managerial inside ownership.

APPENDIX B

The notion that a research subsidy will increase the amount of research used in the production of excess returns derives from the notion that the input factors are complimentary goods. Input factors are complimentary if and only if the angle curve (i.e., expansion path of the indifference curve) of research with respect to the other inputs is monotonically increasing. A more formal analysis of requires defining a profit function for the portfolio manager and identifying the signs of the first-order cross-partial derivatives. If the first-order partial derivative of research with respect to the cost of research is negative, then the research demand function is downward sloping, implying that research subsidies encourage the use of more research. For example, assume that risk-adjusted excess returns, *y*, are generated by combining outside investment research, *r*, portfolio manager labor, *l*, and portfolio execution, *e*, in the following Cobb-Douglas technology

$$y = r^a l^b e^c \qquad \textbf{(B 1)}$$

such that $a, b, c > 0$ and $a + b + c < 1$. In other words, generating risk-adjusted excess returns requires positive amounts of all three inputs and is subject to decreasing returns to scale with respect to all three complimentary inputs.

Knowing that portfolio manager compensation is generally a function of assets under management and thus a function of *y*, we can define the manager's profit function as

$$p = B + fy - (k_r r + k_l l + k_e e) \qquad \textbf{(B 2)}$$

where *B* is the base management fee, f is the present value of future increases in management fees from producing positive risk-adjusted excess returns, and k_I is the marginal cost of input i. Substituting the (B1) into (B2),

$$p = B + fr^a l^b e^c - (k_r r + k_l l + k_e e)\,. \qquad \textbf{(B 3)}$$

To maximize their profit, managers will satisfy the first-order conditions,

$$
\begin{aligned}
ar^{a-1}l^{b}e^{c} &= \frac{k_r}{f} \\
br^{a}l^{b-1}e^{c} &= \frac{k_l}{f} \\
cr^{a}l^{b}e^{c-1} &= \frac{k_e}{f}
\end{aligned}
\qquad \textbf{(B 4)}
$$

To determine the effect of a subsidy that reduces the marginal cost of outside research, k_r, we examine the resulting factor demand functions. In other words, what is the slope of the demand function for research? But the demand for each input factor is a function of all the factor prices. To examine how the factor demands behave with respect to the factor prices, differentiate each of the first-order conditions with respect to each factor price using the chain rule. The result, in matrix form, is:

$$
\begin{bmatrix}
a(a-1)r^{a-2}l^{b}e^{c} & abr^{a-1}l^{b-1}e^{c} & acr^{a-1}l^{b}e^{c-1} \\
abr^{a-1}l^{b-1}e^{c} & b(b-1)r^{a}l^{b-2}e^{c} & bcr^{a}l^{b-1}e^{c-1} \\
acr^{a-1}l^{b}e^{c-1} & bcr^{a}l^{b-1}e^{c-1} & c(c-1)r^{a}l^{b}e^{c-2}
\end{bmatrix}
\begin{bmatrix}
\frac{\partial r}{\partial k_r} & \frac{\partial r}{\partial k_l} & \frac{\partial r}{\partial k_e} \\
\frac{\partial l}{\partial k_r} & \frac{\partial l}{\partial k_l} & \frac{\partial l}{\partial k_e} \\
\frac{\partial e}{\partial k_r} & \frac{\partial e}{\partial k_l} & \frac{\partial e}{\partial k_e}
\end{bmatrix}
= \frac{1}{f}
\begin{bmatrix}
1 & 0 & 0 \\
0 & 1 & 0 \\
0 & 0 & 1
\end{bmatrix},
$$

or

$$
HxS = \frac{1}{f} I \qquad \textbf{(B 5)}
$$

where H is the Hessian matrix, S is the substitution matrix, and I is the identity matrix. The second-order condition for a (strict) profit maximum is that the Hessian matrix is a symmetric, negative-definite matrix. H is symmetric. For H to be negative definite, $|D_1| < 0$, $|D_2| > 0$, and $|D_3| < 0$ where $|D_i|$ is the i^{th} principle minor.

$$
|D_1| = a(a-1)r^{a-2}l^{b}e^{c} < 0 \qquad \text{since } a < 1. \qquad \textbf{(B 6)}
$$

$$
|D_2| = abr^{2(a-1)}l^{2(b-1)}e^{c}\{1-a-b\} > 0 \qquad \text{since } a + b < 1. \qquad \textbf{(B 7)}
$$

$$
|D_3| = abcr^{3a-2}l^{3b-2}e^{3c-2}\{a+b+c-1\} < 0 \qquad \text{since } a + b + c < 1. \qquad \textbf{(B 8)}
$$

Since H is a symmetric negative definite matrix, H^{-1} is also a symmetric negative definite matrix.

From (B5) we know

$$S = H^{-1}\frac{1}{f}I \qquad \textbf{(B 9)}$$

Thus, the substitution matrix, *S*, is also a symmetric negative definite matrix. Since the diagonals of a negative definite matrix are negative, $\delta r/\delta k_r$ must also be negative. In other words, as the marginal cost of investment research is reduced through soft dollar arrangements, the manager will utilize more research inputs.

To examine the signs of the cross partials more formally, we need to find the inverse of the Hessian matrix, which can be expressed as

$$H^{-1} = \frac{adjH}{|H|} \qquad \textbf{(B 10)}$$

where *adjH* is the transpose of the cofactor matrix, or

$$H^{-1} = \begin{bmatrix} \dfrac{bcr^{2a}l^{2(b-1)}e^{2(c-1)}\{1-b-c\}}{|H|} & \dfrac{abcr^{2a-1}l^{2b-1}e^{2(c-1)}}{|H|} & \dfrac{abcr^{2a-1}l^{2(b-1)}e^{2c-1}}{|H|} \\ \dfrac{abcr^{2a-1}l^{2b-1}e^{2(c-1)}}{|H|} & \dfrac{acr^{2(a-1)}l^{2b}e^{2(c-1)}\{1-a-c\}}{|H|} & \dfrac{abcr^{2(a-1)}l^{2b-1}e^{2c-1}}{|H|} \\ \dfrac{abcr^{2a-1}l^{2(b-1)}e^{2c-1}}{|H|} & \dfrac{abcr^{2(a-1)}l^{2b-1}e^{2c-1}}{|H|} & \dfrac{abr^{2(a-1)}l^{2(b-1)}e^{2c}\{1-a-b\}}{|H|} \end{bmatrix} \qquad \textbf{(B 11)}$$

where C_{ij} is terms in the i^{th} row and j^{th} column of the cofactor matrix. The first column of H^{-1} corresponds to $\delta r/\delta k_r$, $\delta l/\delta k_r$, and $\delta e/\delta k_r$, respectively. In all terms, the numerator is positive and the denominator is negative by equation (B8), making all the demand cross partials negative. In other words, the factor demands of labor and execution with respect to the cost of research have negative slopes and more labor and execution will be used as the cost of research is decreased (i.e., as research is subsidized). This result obtains because the factor inputs are complimentary goods.

When investors subsidize research, the marginal cost of research, k_r, declines and more research will be consumed. It is important to note that the research subsidy can be used only toward the purchase of research, not toward the purchase of other factor inputs. This feature of soft dollar brokerage makes bundled brokerage superior to a cash subsidy in which the cash could otherwise be diverted to subsidize other inputs.

REFERENCES

Ambachtsheer, Keith P., 1994, The economics of pension fund management, *Financial Analysts Journal* 50(6), 21-31.

Berkowitz, Stephen A. and Dennis E. Logue, 1987, The portfolio turnover explosion explored, *Journal of Portfolio Management* 13, 38.

Berkowitz, Stephen A, Dennis E. Logue, and Able Noser, 1988, The Total Cost of Transacting on the NYSE, Journal of Finance, 43, 97.

Blume , Marshall E., 1993, Soft dollars and the brokerage industry, *Financial Analysts Journal* 49(2), 36-44.

Cheung, Steven, 1970, The structure of a contract and the theory of a nonexclusive resource, *Journal of Law and Economics* 13, 49-70.

Chevalier, Judith and Glenn Ellison, 1997, Risk taking by mutual funds as a response to incentives, *Journal of Political Economy* 105(6), 1167-1200.

Coggin, Daniel T. and Charles Trzcinka, 1995, Performance of Equity Managers: Style versus "neural network" benchmarks, working paper, State University of New York at Buffalo.

Conrad, Jennifer S., Kevin M. Johnson, and Sunil Wahal, 1998, Institutional Trading and Soft Dollars, working paper, University of North Carolina at Chapel Hill.

Del Guercio, Diane and Paula Tkac, 1998, The Determinants of the flow of fund of managed portfolios: Mutual funds vs. pension funds, working paper, Linquist College of Business, University of Oregon.

Dow, James, and Gary Gorton, 1997, Noise trading, delegated portfolio management, and economic welfare, *Journal of Political Economy* 105(5), 1024-1050.

Easterbrook, Frank H., 1984, Two agency-cost explanations of dividends, *American Economic Review* 74(4), p.650-659.

Fama, Eugene and Kenneth French, 1993, Common risk factors in the returns of stocks and bonds, *Journal of Financial Economics* 33(1), 3-56.

Garvey, George, 1944, Rivals and interlopers in the history of the New York security market, *Journal of Political Economy* 52, 128-143.

Horan, Stephen M., 1998, "A Comparison of indexing and beta among pension and nonpension Assets," *Journal of Financial Research* 21(3), 255-275.

Hendricks, Darryll, Jayendu Patel, and Richard Zeckhauser, 1993, Hot hands in mutual funds: The persistence of performance, 1974-1987, *Journal of Finance* 48, 93-130.

Ippolito, Richard A., 1989, Efficiency with Costly Information: A Study of Mutual Fund Performance, 1965-1984, Quarterly Journal of Economics, 1, 114.

Jensen, Michael C. and William H. Meckling, 1976, Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305.

Johnsen, Bruce D., 1994, Property rights to investment research: The agency costs of soft dollar brokerage, *The Yale Journal on Regulation* 11(75), 75-113.

Klein, Benjamin and Keith B. Leffler, 1981, The role of market forces in assuring contractual performance, *Journal of Political Economy* 89, 615.

Lakonishok, Josef, Andrei Shleifer and Robert W. Vishny, 1992, The structure and performance of the money management industry, in *Brookings papers on economic activity: Macroeconomics*, Brookings Institution, Washington, D.C., 339-391.

Lesmond, David A., Charles A. Trzcinka, and Joseph P. Ogden, 1998, "A New Estimate of Transaction Costs," *Review of Financial Studies*, forthcoming.

Logue, Dennis E., 1991, *Managing Corporate Pension Plans*.

McConnel, John J. and Henri Servaes, 1990, Additional evidence on equity ownership and corporate value, *Journal of Financial Economics* 27(2), 595-612.

Morck, Randall, Andrei Shleifer, and Robert W. Vishny, 1988, Management ownership and market valuation: An empirical analysis, *Journal of Financial Economics* 20, 193-315.

Pound, John, 1988, Proxy contests and the efficiency of shareholder overshight, *Journal of Financial Economics* 20(1/2), p.237-266.

Schneeweis, Thomas and Richard Spurgin, 1998, Multifactor analysis of hedge fund, managed futures, and mutual fund return and risk characteristics, *Journal of Alternative Investments* 1(2), 1-24.

Sirri, Erik and Peter Tuffano, 1998, Costly search and mutual fund flows, *Journal of Finance* 53(5), 1589-1622.

Shapiro, S. S. and M. B. Wilk, 1965, An Analysis of variance test for normality to large samples, *Applied Statistics* 31, 115-124.

Table 1

Descriptive Statistics for Domestic Equity Money Managers

Descriptive statistics for a sample of 1,273 domestic equity money manager portfolios as of 1993 compiled by Mobius Group, Inc. Portfolios must report at least 12 quarters of data to be included. Portfolio assets are measured in millions. Minimum account size is the smallest sized account accepted by a given manager expressed in thousands. Commissions are measured in cents per share. Annual turnover is defined as the minimum of purchases or sales divided by average market value. Minimum fee is expressed in dollars. The Shapiro-Wilk test statistic for normalcy is calculated using the method of Shapiro and Wilk (1965).

			Percentiles					*Std.*	*Shapiro-Wilk stat.*
	N	*Mean*	*Min*	*25%*	*Median*	*75%*	*Max*	*Dev.*	*(Pr < W)*
Panel A: Portfolio Assets (in millions)									
Tax-exempt	1098	747.4	0	23	123	526	30,495	2,201	0.35 (.00)
Taxable	1090	143.2	0	0	17	93	5,222	448.2	0.34 (.00)
Total	1135	924.9	0.1	53	185	733	30,495	2,427.9	0.39 (.00)
Ln (Total)	1135	5.19	-2.0	4.0	5.2	6.6	10.3	2.0	0.98 (.00)
Panel B: Number of Accounts Managed									
Tax-exempt	1091	71.4	0	3	11	30	16,436	701.6	0.08 (.00)
Taxable	1086	120.0	0	0	3	26	44,530	1,698.7	0.06 (.00)
Total	1120	190.9	1	5	16	62	60,966	2,363.6	0.07 (.00)
Ln (Total)	1120	2.88	0	1.6	2.8	4.1	11.0	1.8	0.96 (.00)
Panel C: Minimum Account Size (in thousands)									
Tax-exempt	1203	5,198.7	0	300	1,000	5,000	500,000	17,465	0.23 (.00)
Taxable	1133	4,315.0	0	250	1,000	5,000	500,000	16,041	0.21 (.00)
Panel D: Median Account Size (in thousands)									
Tax-exempt	1065	45,429	0	710	6,000	23,400	12,000,000	393,455	0.10 (.00)
Taxable	1007	28,902	0	11	602	3,000	4,158,000	219,965	0.12 (.00)
Total	1074	61,962	0	750	5,000	24,500	15,000,000	566,675	0.10 (.00)
Panel E: Trading and Fee Characteristics									
Commissions	1108	7.9	0	6	6	8	75	6.3	0.55 (.00)
Turnover (%)	1205	63.3	2	30	50	80	500	49.3	0.77 (.00)
Minimum Fee	1091	29,043	0	2,500	10,000	42,500	800,000	48,676	0.60 (.00)

Table 2

Performance and Risk Measures

Coefficients from OLS regressions of equity and cash quarterly portfolio excess returns on the Fama and French (1993) benchmarks.

$$R_{it} - r_{ft} = a_i + b_i(R_{mt} - r_{ft}) + s_iSMB_t + h_iHML_t + e_{it}$$

Specifically, *MKT*, *SMB*, and *HML* capture the market effect, firm size effect, and book-to-market effect in security returns, respectively. *b*, *s*, and *h* are the respective OLS coefficients. Portfolio returns are taken from data provided by Mobius Group, Inc. To be included in the analysis, a portfolio must have at least 12 quarterly returns in the database. The restricted sample has four filters: returns must be i.) gross of fees, ii.) based on discretionary portfolios, iii.) include terminated accounts, and iv.) not be from a prior firm. Small Capitalization, Value, and Growth are variables used by sample managers to describe their investment strategy. Strategy classes are measured on a discrete scale of 0 to 3. Three is descriptive of the fund's strategy, while zero is not descriptive. Figures are in percent.

Panel A. Intercepts (a)

Model	*N*	*Qtrly. Mean a*	*Std.Dev.*	*No. Pos. (%)*	*No. Neg.*	*Significant and Pos.(%)*	*Significant and Neg.(%)*
FF Three-Factor							
Entire Sample	1273	0.931	1.20	1083 (85.1)	190	397 (31.2)	5 (0.00)
Restricted Sample	843	0.788	1.15	683 (81.0)	160	207 (24.6)	5 (0.01)
Jensen Single-Factor							
FF Market Proxy	1273	0.715	1.03	1067 (83.8)	206	265 (20.8)	5 (0.00)
S&P 500	1273	0.681	1.07	1029 (80.8)	244	201 (15.8)	6 (0.00)

Panel B: Pearson Correlation Coefficients

	Strategy Class		
	Small Capitalization	*Value*	*Growth*
s	0.66	-0.11	0.11
(*p*-value)	(0.000)	(0.000)	(0.000)
[N]	[1210]	[1244]	[1237]
h	-0.21	0.51	-0.57
(*p*-value)	(0.000)	(0.000)	(0.000)
[N]	[1210]	[1244]	[1237]
Value	-0.08	1.00	-0.39
(*p*-value)	(0.05)	-	(0.000)
[N]	[1203]	[1244]	[1218]
Growth	0.21	-0.39	1.00
(*p*-value)	(0.000)	(0.000)	-
[N]	[1206]	[1218]	[1237]

Table 3

Cross-Sectional OLS Regressions of Commissions, Turnover, and Total Commissions on Portfolio Variables

Ordinary least squares regressions of average commission rates and turnover on fund characteristics from 1993 data compiled by Mobius Group, Inc. Average soft dollar commission is the average commission rate on equity trades expressed in cents per share less an execution-only commission rate of two cents per share. Annual turnover is the minimum of purchases or sales divided by average market value. Premium Commissions per Managed Dollar is the product of Average Soft Dollar Commission and Annual Turnover. Ln (Assets) is the natural log of portfolio assets. Ln (Accounts) is the natural log of the number of accounts managed. Strategy classes are measured on a discrete scale of 0 to 3. Three is descriptive of the fund's strategy, while zero is not descriptive. They are included to control for the effect of investment philosophies on commissions and turnover. Funds have at least 12 quarters of reported returns.

	Dependent Variable					
	(1) *Average Soft Dollar Commission Rate*		*(2)* *Annual Turnover*		*(3)* *Premium Commissions per Managed Dollar*	
	Parameter Estimate	*p-value*	*Parameter Estimate*	*p-value*	*Parameter Estimate*	*p-value*
Intercept	8.01	0.000***	86.38	0.000***	385.37	0.000***
Ln (Assets)	-0.91	0.000***	1.00	0.275	-30.06	0.000***
Ln (Accounts)	1.05	0.000***	-3.21	0.001***	35.00	0.000***
% Tax-exempt assets	-0.90	0.16	-5.00	0.299	-76.48	0.077*
Annual Turnover	-0.01	0.001***				
Average Soft Dollar Commission			-0.79	0.001***		
Strategy Classes						
Value	0.22	0.271	-4.22	0.006***	2.33	0.864
Growth	0.59	0.005***	-0.35	0.823	35.00	0.012**
Small Capitalization	-0.31	0.088*	1.21	0.382	1.45	0.907
Broad Market	0.01	0.955	-1.38	0.357	-8.27	0.540
Market Timer	-0.26	0.440	0.13	0.959	-19.32	0.393
Convertible	-0.19	0.573	-7.41	0.003***	-53.20	0.018**
Sector Rotator	0.04	0.895	5.53	0.006***	47.21	0.009***
Index	-0.67	0.034**	-13.20	0.000***	-53.06	0.012**
Contrarian	-0.12	0.626	-5.65	0.002***	-25.76	0.115
Theme Selection	-0.05	0.822	-0.50	0.779	-12.28	0.447
High Yield	0.21	0.401	-1.699	0.376	1.73	0.920
Core	-0.017	0.930	-3.37	0.018**	-17.30	0.176
Hedged Equity	-0.01	0.988	25.81	0.000***	129.01	0.000***
Socially Responsible	-0.21	0.406	-2.45	0.205	-27.24	0.116
Technical	0.96	0.001***	12.39	0.000***	133.08	0.000***
Mutual Fund Timing	-2.37	0.001***	29.86	0.000***	-204.71	0.000***
N	961		961		961	
F-value	11.04***		17.43***		11.37***	
Adj. R squared	0.17		0.26		0.17	

*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 4

The Effect of Soft Dollars on Performance

Intercepts from OLS regressions of equity and cash quarterly portfolio excess returns on the Fama and French (1993) benchmarks.

$$R_{it} - r_{ft} = a_i + b_i(R_{mt} - r_{ft}) + s_iSMB_t + h_iHML_t + e_{it}$$

Specifically, *MKT*, *SMB*, and *HML* capture the market effect, firm size effect, and book-to-market effect in security returns, respectively. Portfolio returns are taken from data provided by Mobius Group, Inc and cover the 1979 through 1993 period. To be included in the analysis, a portfolio must have at least 12 quarterly returns in the database. The product of Soft Dollar Commission and Annual Turnover is Premium Commissions per Managed Dollar. Ln (Assets) is the natural log of portfolio assets. Ln (Accounts) is the natural log of the number of accounts managed. The Index variable and other strategy class variables are measured on a discrete scale of 0 to 3. Three is descriptive of the fund's strategy, while zero is not descriptive. % Tax-exempt assets is the proportion of the portfolio composed of pension assets. To avoid collinearity, the Premium Commissions per Managed Dollar Residual term is the OLS residual from having the product of Premium Commissions per Managed Dollar as the independent variable and all other factors as independent variables. The residual term represents the portion of soft dollar brokerage left unexplained by the remaining independent variables.

	Estimated alpha from Fama and French (1993) OLS regressions		
Intercept	0.69***	1.66***	1.21***
Premium Commissions per Managed Dollar	0.076***		
Premium Commissions per Managed Dollar Residual		0.060***	0.037***
Ln (Assets)		-0.070***	-0.041*
Ln (Accounts)		0.024	0.031
% Tax-exempt assets		-0.509***	-0.330***
Value			-0.075**
Growth			0.155***
Small Capitalization			0.204***
Broad Market			-0.085**
Market Timer			-0.111*
Convertible			-0.160***
Sector Rotator			-0.016
Index		-0.276***	-0.204***
Contrarian			-0.027
Theme Selection			0.026
High Yield			-0.060
Core			-0.103***
Hedged Equity			0.379***
Socially Responsible			-0.026
Technical			0.083
Mutual Fund Timing			-0.277**
N	1102	967	961
F-value	80.65***	23.05***	17.41***
Adj. R-squared	.07	.10	.25

*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 5

Robustness Tests of the Effect of Soft Dollar Brokerage on Performance

Intercepts from OLS regressions of equity and cash quarterly portfolio excess returns on the Fama and French (1993) benchmarks.

$$R_{it} - r_{ft} = a_i + b_i(R_{mt} - r_{ft}) + s_iSMB_t + h_iHML_t + e_{it}$$

Specifically, *MKT*, *SMB*, and *HML* capture the market effect, firm size effect, and book-to-market effect in security returns, respectively. Portfolio returns are taken from data provided by Mobius Group, Inc and cover the 1979 through 1993 period. To be included in the analysis, a portfolio must have at least 12 quarterly returns in the database. The product of Soft Dollar Commission and Annual Turnover is Premium Commissions per Managed Dollar. Ln (Assets) is the natural log of portfolio assets. Ln (Accounts) is the natural log of the number of accounts managed. The strategy class variables are measured on a discrete scale of 0 to 3. Three is descriptive of the fund's strategy, while zero is not descriptive. % Tax-exempt assets is the proportion of the portfolio composed of pension assets. To avoid multicollinearity, the Premium Commissions per Managed Dollar Residual term is the OLS residual from having the product of Premium Commissions per Managed Dollar as the independent variable and all other factors as independent variables. Regression (1) has four filters: returns must be i.) gross of fees, ii.) based on discretionary portfolios, iii.) include terminated accounts, and iv.) not be from a prior firm. Regression (2) uses alphas estimated from returns in 1989 through 1993. Regression (3) is a weighted OLS regression weighted by the reciprocal of the standard error of the estimated Fama-French alpha. The dependent variable in regression (4) is a Jensen's single-factor alpha using the Fama-French market proxy.

	Dependent Variable: Estimated Alpha from Performance Regressions			
	(1) Restricted Sample	*(2) 1989-1993 Returns*	*(3) Weighted OLS by the SE reciprocal*	*(4) Jensen's Alpha*
Intercept	0.95***	1.09***	0.84***	0.95***
Premium Commissions per Managed Dollar Residual	0.042***	0.037***	0.028***	0.029***
Ln (Assets)	-0.001	-0.024	-0.030**	-0.062***
Ln (Accounts)	-0.018	-0.018	0.021	0.057***
% Tax-exempt assets	-0.329**	-0.394***	-0.156*	-0.261***
Value	-0.030	-0.806**	-0.055**	0.064*
Growth	0.173***	0.149***	0.120***	0.032
Small Capitalization	0.212***	0.260***	0.138***	0.052*
Broad Market	-0.059	-0.074**	-0.043*	-0.057*
Market Timer	0.040	0.039	0.075	0.058
Convertible	-0.058	-0.122*	-0.110***	-0.092
Sector Rotator	0.038	0.013	-0.017	0.019
Index	-0.157**	-0.171***	-0.152***	-0.076
Contrarian	-0.012	-0.023	-0.027	-0.010
Theme Selection	0.029	0.028	0.059*	0.009
High Yield	-0.049	-0.50	-0.053*	0.048
Core	-0.146***	-0.073**	-0.059***	-0.066**
Hedged Equity	0.271***	0.385***	0.132**	0.334***
Socially Responsible	-0.094	-0.086*	-0.009	-0.023
Technical	0.036	0.117**	0.093**	0.052
Mutual Fund Timing	-0.233	-0.311**	-0.165*	-0.211*
N	686	961	961	961
F-value	11.49***	17.42***	18.20***	6.52***
Adj. R-squared	.23	.25	.26	.10

*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 6

The Effect of Soft Dollars on Management Fees

Cross-sectional OLS regressions of management fees on portfolio variables for 1993 taken from the 1994 Mobius, Inc. data base. Parameter estimates are expressed in basis points. Ln (Assets) is the natural log of portfolio assets. Ln(Accounts) is the natural log of number of accounts managed. The Index Fund variable takes on values of 0 to 3 with 3 being a bona fide index fund and 0 being an actively managed portfolio as described by the money manager. Average Commission is the average commission rate on equity trades expressed in cents per share. Annual Turnover is the minimum of purchases or sales divided by average market value. The product of Average Soft Dollar Commission and Annual Turnover is a measure of Premium Commission per Managed Dollar. Alpha is the intercept of the OLS regression of portfolio returns on the Fama and French (1993) risk factor proxies. % Tax-exempt assets is the percent of pension assets in the portfolio. Fee1MM, Fee10MM, Fee50MM, and Fee100MM are management fees in basis points on one-million, ten-million, fifty-million, and one-hundred-million dollar accounts, respectively.

	(1) *Fee1MM*	*(2)* *Fee10MM*	*(3)* *Fee50MM*	*(4)* *Fee100MM*
Intercept	117.86***	80.62***	67.28***	66.43***
Alpha	5.86	5.33**	6.41***	5.70***
Premium Commissions per Managed Dollar Residual	-1.87	0.65	0.90	0.61
Ln (Assets)	13.54***	-0.05	0.10	-0.63
Ln (Accounts)	-15.24***	1.08	-0.51	-0.33
% Tax-exempt assets	-13.73	-13.04	-16.64***	-17.53***
Index	-19.09**	-10.02***	-6.56***	-5.58**
N	360	360	360	360
F-value	3.30***	4.65***	9.26***	8.10***
Adj. R-squared	.04	.06	.12	.11

*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.

Table 7

Robustness Tests of The Effect of Soft Dollars on Management Fees

Cross-sectional OLS regressions of management fees on portfolio variables for 1993 taken from the 1994 Mobius, Inc. data base. Parameter estimates are expressed in basis points. Ln (Assets) is the natural log of portfolio assets. Ln(Accounts) is the natural log of number of accounts managed. The Index Fund variable takes on values of 0 to 3 with 3 being a bona fide index fund and 0 being an actively managed portfolio as described by the money manager. The product of Average Soft Dollar Commission and Annual Turnover is Premium Commission per Managed Dollar. Alpha is the intercept of the OLS regression of portfolio returns on the Fama and French (1993) risk factor proxies or a single-factor performance model as indicated. % Tax-exempt assets is the percent of pension assets in the portfolio. Fee100MM is the management fees in basis points on a one hundred million-dollar account. . Regression (1) has four filters: returns must be i.) gross of fees, ii.) based on discretionary portfolios, iii.) include terminated accounts, and iv.) not be from a prior firm. Regression (2) uses alphas estimated from returns in 1989 through 1993. Regression (3) is a weighted OLS regression weighted by the reciprocal of the standard error of the estimated Fama-French alpha. The dependent variable in regression (4) is a Jensen's single-factor alpha using the Fama-French market proxy.

	Dependent Variable: Fee100MM			
	(1) Restricted Sample	*(2) 1989-1993 Returns*	*(3) Weighted OLS by the SE reciprocal*	*(4) Jensen's Alpha*
Intercept	65.65***	68.14***	58.23***	68.29***
Alpha	5.85**	4.51***	8.18***	5.68***
Premium Commissions per Managed Dollar Residual	1.46	0.75	1.01	0.79
Ln (Assets)	0.098	-0.87	-0.65	-0.60
Ln (Accounts)	-1.42	0.01	0.09	-053
% Tax-exempt assets	-22.82***	-17.59***	-14.52***	-18.49***
Index	-6.04**	-6.03**	-9.58***	-6.40**
N	248	360	360	360
F-value	5.61***	7.55***	28.39***	7.49***
Adj. R-squared	.10	.10	.31	.10

*Significant at the 10% level.
**Significant at the 5% level.
***Significant at the 1% level.