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Fund Advisor Compensation in Closed-End Funds

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ABSTRACT

This paper examines the relation between the premium on closed-end funds and organizational features of the funds and advisors, including the compensation scheme of the investment advisor. We find that the fund premium is larger when: (a) the advisor's compensation is more sensitive to fund performance; (b) the assets managed by the advisor are concentrated in the fund in question; (c) the advisor manages *other* funds with low compensation sensitivity to performance and with low concentration of assets managed by the advisor; and (d) the advisor's compensation contract evaluates performance relative to a benchmark.

THE GROWTH IN ASSETS UNDER MANAGEMENT by investment companies has motivated both theoretical and empirical interest in the contractual relationship between portfolio managers and their clients.[1] This paper considers how the interaction between organization structure, managerial incentives, and managerial behavior determines pricing of shares of closed-end funds. In particular, we examine how the form of the compensation scheme of the fund advisor/manager and the extent to which the assets managed by the fund advisor are spread across multiple funds are related to the premium at which a closed-end fund trades.

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[1] For example, Admati and Pfleiderer (1997) examine the role of benchmarks in the compensation of portfolio managers, Chevalier and Ellison (1999) and Khorana (1996) document how managerial turnover is sensitive to a mutual fund's portfolio characteristics, and Heinkel and Stoughton (1994) study the problem of motivating a portfolio manager of unknown ability to acquire valuable information. Lakonishok, Shleifer, and Vishny (1992) and Golec (1992) study the form of the contractual relation between clients and portfolio managers; and Barclay, Holderness, and Pontiff (1993) examine the association between managerial ownership of large blocks of stock and the discount of closed-end investment companies. Lemmon, Schallheim, and Zender (1995) discuss the connection between behavior and incentives in dual-purpose funds.

Our sample contains 425 fund-year observations on the form of the compensation contract of the investment advisor/manager and other variables for 81 externally managed (by an investment advisory company that is distinct from the closed-end investment fund company) closed-end funds managed by 71 advisors over the period from 1978 to 1991. Our main findings are that the premium on the fund is higher when: (1) the fund advisor's compensation scheme is more sensitive to performance; (2) the assets managed by the fund advisor are concentrated in the fund in question; and (3) the compensation contract uses a benchmark for performance evaluation. In addition, we find some evidence that the premium is larger when, for other funds the investment advisor manages, compensation is less sensitive to fund performance and the proportion of assets under management of the fund advisor is low. Our approach is motivated by the following observations.

First, the theory of the standard moral hazard problem (Holmstrom (1979) and Shavell (1979)), as well as related empirical work (e.g., Jensen and Murphy (1990)), focuses on the importance of the sensitivity of managerial compensation to performance as an incentive alignment mechanism. As with any relationship in which decision rights are delegated, potential conflicts of interest may arise between the shareholders and the investment advisors of closed-end investment companies. One solution requires the design and implementation of compensation contracts that provide optimal incentives for the investment advisor. In this respect, compensation policies should give the advisor/manager incentives to take actions that maximize the wealth of the holders of fund shares. Such actions could include effort allocated toward minimizing taxes, fundamental or technical analysis to improve returns, minimizing transaction costs, and configuring portfolio risk to match the risk profile desired by fund shareholders. Therefore, tying the compensation of the investment advisor to a measure of value, such as fund net asset value (NAV), can help to align the interests of the advisor with the interests of the fund's shareholders.[2]

Second, the multitask principal-agent model of Holmstrom and Milgrom (1991) suggests that the concentration in the fund in question of assets managed by the fund advisor and the sensitivity of compensation to performance relative to the other funds managed also are likely to be determinants of the fund premium. More specifically, when the assets in a fund represent only a small proportion of all assets managed by a fund advisor or the sensitivity of compensation to performance is low relative to other funds managed by the advisor, the fund advisor is less likely to concentrate attention and effort on that original fund. Unless the advisor's time and effort spent on other funds spill over to benefit the fund in question managed by the advisor (i.e., the

[2] For a treatment of the different roles of compensation plans, including motivation, sorting, and coordination, see Milgrom and Roberts (1992, p. 390). Starks (1987), Grinblatt and Titman (1989), Stoughton (1993), Heinkel and Stoughton (1994), and Huddart (1995), among others, apply the agency framework to understand the use of performance-based fees for portfolio/fund managers. Also see Rogerson (1985) and Bizjak, Brickley, and Coles (1993).

cross effects are positive and large), the obvious testable hypothesis is that the fund premium will be lower when the fund's assets represent a small proportion of the assets managed by the fund's investment advisor and the fund advisor's compensation scheme is less sensitive to performance than the compensation plan in other funds managed by the advisor. To measure the effects of incentive compensation we define the *effective marginal compensation rate* as the marginal compensation rate weighted by the proportion of assets under management that reside in the fund. Under reasonable assumptions, an increase in the effective marginal rate will be associated with a higher premium for that fund and, potentially, a lower premium for the other funds managed by the investment advisor. Thus, we rely on the effective marginal compensation rate as the primary incentive variable in our empirical specifications.

Finally, other features of the fund manager compensation scheme potentially are important for incentive alignment and pricing of the fund. For example, the value of evaluating fund advisor performance relative to a benchmark has been the focus of recent theoretical work. From the perspective of the literature on relative performance evaluation, there can be desirable incentive effects of tournaments. Using an appropriate benchmark that removes factors not under the control of the manager can sharpen inference and allow construction of better contracts for incentive alignment (Lazear and Rosen (1981) and Heinkel and Stoughton (1994)). Admati and Pfleiderer (1997) present an opposing point of view to suggest that use of a benchmark is generally inconsistent with optimal risk sharing and the goal of obtaining the optimal portfolio for the investor. Furthermore, they argue that a benchmark tends to weaken a manager's incentives to expend effort and is not useful in screening out bad managers. Whether there are net benefits derived from the use of benchmarks in the compensation of portfolio managers is an empirical question. Two other empirical questions concern the value of contractually specified reductions in compensation when expenses are "excessive" and increases in compensation when the assets of the fund generate income. We test whether compensation adjustments for a benchmark, income, and expenses are related to the premium at which the closed-end fund trades.

Our empirical results have implications for at least two strands of the literature. First, the results contribute to the substantial literature on incentive pay. In particular, we provide a detailed description of the structure of compensation for investment advisors of externally managed closed-end funds. We find that differences in the form of compensation of the primary decision maker are associated with differences in value and that the problem of multitasking is sufficiently important to be manifested in both the premium and the form of the advisor compensation scheme. Second, our results contribute to the ongoing effort to explain the cross-sectional variation in the closed-end fund premium. Our empirical analysis disentangles the incentive and valuation effects of compensation policy from other effects the prior literature has emphasized, including ownership structure, capital gains, expenses, and investor sentiment.

The remainder of this paper is structured as follows. Section I describes our data and characterizes the compensation contracts of the investment advisors in our sample, Section II presents the methodology and results, and Section III presents concluding remarks.

I. The Structure of Fund Advisor Compensation

Major parties to the nexus of contracts that define a closed-end investment company include the board of directors, investment advisor, fund manager, and fund shareholders. When an investment company is managed externally by a separate outside investment fund advisory company, the SEC requires that the compensation plan of the investment advisor be approved annually by the shareholders. Thus, the fund must publish a detailed summary of the form of the compensation contract of the investment advisor.

According to Loss and Seligman (1995, p. 3385), prominent authorities on securities law, "with one exception, any basis of compensation may be used as long as it is not so vague as to amount to fraudulent practice." Furthermore, this exception, which prohibits compensation dependent on capital gains or capital appreciation on the assets of the funds of a client, does not apply to registered investment companies that satisfy the "entity segregation" requirement.[3] The companies in our sample are all externally managed and, thus, satisfy the "entity segregation requirement." Therefore, short of fraud, there appear to be few, if any, regulatory limitations on the types of compensation contracts that are legally acceptable.[4]

A. *The Sample*

The early portion of our sample, based on Woodbury (1992), includes 32 companies that are listed in *Wiesenberger's Statistical Survey of Closed-End Investment Companies*, that are listed in the Q-File Data Set for the period 1978 to 1986, and that had at least two years during 1978 to 1986 for which the compensation plan of the fund advisor was clearly described. We supplement these data with information collected from the four volumes of *The Thomas J. Herzfeld Encyclopedia of Closed-End Funds* that were available to us (years 1989/90, 1990/91, 1991/92, and 1992/93, yielding data for 1988 to 1991). We include all bond (including convertible bond) funds and equity

[3] Moreover, the prohibition on performance fees does not apply to any other person "if the contract relates to the investment of more than $1 million in assets and the contract provides compensation based on the asset value of the company of fund under management averaged over a specified period and increasing and decreasing proportionately with the investment performance of the company or fund over a specified period in relation to the investment record of an appropriate index of securities prices . . ." (Loss and Seligman (1995, p. 3388)).

[4] See Davanzo and Nesbitt (1987) for another discussion of how regulation shapes compensation policy of closed-end funds. Along with the studies listed in footnote 2 above, also see Record and Tynan (1987), Kritzman (1987), and Grinold and Rudd (1987) for other studies of performance fees of fund managers.

(including specialized equity) funds that are at least two years old. The requirement that the fund be at least two years old eliminates relatively more funds in the recent sample years because many new funds were introduced during that time period.[5] No international funds, such as The Japan Fund, and no internally managed funds are included in our sample since their compensation schemes are not reported. We exclude all fund-year observations for which the advisory fee was fully or partially waived because fee waivers potentially garble any potential interpretation of the specified compensation scheme (see Christoffersen (1997) on the use of fee waivers). Our inspection of *Herzfeld* suggests that, for closed-end funds, fee waivers are infrequent, but when they do occur it is during the first couple of years after either the inception of the fund or a change in the fund advisor. Of the observations that meet our other sample criteria, there are only four instances of a fee waiver, which we exclude. We verify that our empirical results do not depend on including those few observations. In the end, the combined sample includes 425 fund-year observations: 81 funds and 71 fund advisors are represented.

B. The Structure of Fund Advisor Compensation

In our sample, compensation schemes for closed-end fund advisors always have a component that is specified as a continuous, piecewise linear function of the net asset value of the investment company.[6] The extent to which changes in NAV result in changes in compensation is given by the slope of the compensation scheme. Because a closed-end fund normally does not and often cannot issue more shares to fund expansion of the portfolio, the fund manager can increase NAV and his own compensation only by positive investment performance.[7] A typical compensation scheme is described in the *American General Convertible Securities Annual Report* (June 30, 1980):

> Management fees . . . are calculated monthly at an annual rate of 0.50% on the first $150 million of the average weekly net assets of the fund; 0.45% of the next $100 million of the average weekly net assets; 0.40% on the next $100 million of the average weekly net assets; and 0.35% on the average weekly net assets in excess of $350 million.

[5] For example, in the application of our criteria to the 35 equity funds in the 1989/90 *Herzfeld*, nine are internally managed, seven are less than two years old, one has an incomplete contract description, and four are classified as inactive. One fund is eliminated on the basis of two filters, so this leaves 14 equity fund observations for 1988.

[6] Compensation plans of investment advisors only rarely include a base salary or fixed fee. The percentage of closed-end investment companies with zero base compensation is 98.4 percent. Only Claremont Capital Corporation and U.S. Life Income use a fixed fee as part of the compensation plan of the investment advisor. The reason for the infrequent use of a base fee may be straightforward: If NAV gets too small the fund would be unable to pay the advisor.

[7] See Khorana, Wahal, and Zenner (1999) on the conditions under which a closed-end fund can do a rights issue.

Note that the compensation schedule of the advisor to American General Convertible Securities has four different marginal rates. In our sample, 55.1 percent of funds compensate managers using a single, positive rate. The other 44.9 percent, however, have more than one NAV interval with a different marginal rate of compensation on NAV. In 16 fund-year cases (3.8 percent of the sample including five different funds) the compensation contract is based on the maximum of five different marginal rates.

Although different marginal rates of compensation apply to different levels of NAV, only one such rate is likely to be particularly relevant. For each fund and each year, we define the (ex ante) *applicable marginal compensation rate* (APPLMGRT) as that compensation rate specified in the contract that corresponds to the NAV interval that contains the most recent year-end NAV as reported in either the proxy statement or the annual report for the corresponding year. Thus, the applicable marginal compensation rate is the percentage of a relatively "small" change in NAV that will be captured or lost by the investment advisor, where a small change in NAV is defined as a change that leaves the NAV in the same interval as the previous year.[8] Over all years in our sample, the average and median applicable marginal rates of advisor compensation in NAV are 0.546 and 0.500 percent (Tables I and II). These marginal rates imply that a $1,000 increase in NAV will increase the investment advisor's wealth by $5.46 at the mean and $5.00 at the median. Yearly average (median) performance sensitivity has increased 34.48 (26.0) percent during the sample period, from $4.06 ($5.00) per $1,000 increase in NAV for 1978 to $6.06 ($6.30) per $1,000 increase in NAV for 1991. By way of comparison, these numbers are higher than the estimate of $3.25 per $1,000 change in shareholder value found by Jensen and Murphy (1990) for CEOs of large public companies for data over the 1974 to 1986 period, but are similar to the estimate of CEO performance sensitivity of $6.00 found by Hall and Liebman (1998) based on more recent data over the 1980 to 1994 period.

Table I also reports a frequency count of the number of fund advisors managing single or multiple funds. In 1989, for example, of the 68 funds, 40 (58.8 percent) were managed by a fund advisor with no other assets under management in other funds in our sample. For those funds, the proportion of assets managed by the fund advisor that reside in the relevant fund would be 1.0 because the fund advisor's assets under management are concentrated in one fund. In contrast, for 1989, in nine cases an advisor managed two sample funds, in two cases the advisor managed three sample funds, and in one case the fund advisor managed four sample funds. In some years (1978 and 1986), no advisor managed more than one sample fund, but in the

[8] As a practical matter, the applicable marginal rate is a good measure of performance sensitivity for a given year. In only about two percent of the cases in our sample does a one-year change in NAV result in a change in the applicable marginal compensation rate (by crossing a kink point in the compensation scheme).

Table I

Summary Statistics by Year

Number of observations by type of fund, statistics on the closed-end fund premium, applicable marginal compensation rate, frequency count of the number of fund advisors managing 0, 1, 2, 3, or 4 funds, and proportion of fund advisor managed assets in the fund. The sample is composed of 425 complete observations on 81 externally managed, closed-end funds for the period 1978 to 1986, as reported in the Q-File Data Set and *Wiesenberger's Statistical Survey of Closed-End Investment Companies*, and for 1988 to 1991, as reported in *The Thomas J. Herzfeld Encyclopedia of Closed-End Funds*.

Year	Number of Observations	Number of Equity Funds	Number of Bond Funds	Mean Premium	Number (%) Selling at a Premium	Average Applicable Marginal Compensation Rate (APPLMGRT)	Number of the 71 Sample Fund Advisors Managing 0/1/2/3/4 Funds	Percentage of Funds Managed by a Fund Advisor Managing That Fund Only	Average Proportion of Fund Advisor Assets under Management in a Fund (ASSTMGT)
78	8	3	5	−0.182	0 (0)	0.00406	63/8/0/0/0	100.0	1.000
79	26	5	21	−0.172	0 (0)	0.00453	48/20/3/0/0	76.9	0.885
80	22	5	17	−0.150	0 (0)	0.00458	51/18/2/0/0	81.8	0.909
81	22	4	18	−0.089	0 (0)	0.00456	50/20/1/0/0	90.9	0.954
82	23	5	18	−0.063	3 (13.0)	0.00486	50/19/2/0/0	82.6	0.913
83	25	3	22	−0.048	6 (24.0)	0.00460	48/21/2/0/0	84.0	0.920
84	22	3	19	−0.027	8 (36.4)	0.00479	50/20/1/0/0	90.9	0.955
85	19	4	15	0.008	9 (47.4)	0.00453	53/17/1/0/0	89.5	0.947
86	5	2	3	0.119	3 (60.0)	0.00530	66/5/0/0/0	100.0	1.000
88	46	15	31	−0.044	17 (37.0)	0.00588	30/36/5/0/0	78.3	0.859
89	68	17	51	−0.033	21 (30.9)	0.00598	19/40/9/2/1	58.8	0.745
90	69	17	52	−0.084	6 (8.7)	0.00612	19/40/8/3/1	58.0	0.732
91	70	16	54	−0.012	28 (40.0)	0.00606	19/39/9/3/1	55.7	0.736
All years	425	99	326	−0.058	101 (23.8)	0.00546	—	—	0.829

Table II
Summary Statistics

The sample consists of 425 observations on 81 externally managed, closed-end funds and 71 fund advisors for the period 1978 to 1986 as reported in the Q-File Data Set and *Wiesenberger's Statistical Survey of Closed-End Investment Companies*, and for 1988 to 1991, as reported in *The Thomas J. Herzfeld Encyclopedia of Closed-End Funds.*

Variable Name	Definition	Mean	Median	Minimum	Maximum	Std. Dev.	*N*
	Panel A: Dependent Variable						
Premium	Market value of the outstanding shares in the closed-end fund minus the net asset value (NAV) of the constituent assets all divided by NAV.	−0.0579	−0.0487	−0.3850	0.3810	0.0942	425
	Panel B: Measures of Managerial Incentives						
Effective marginal compensation rate (EFFMGRT = APPLMGRT × ASSTMGT)	Applicable marginal compensation rate in the fund advisor's compensation scheme times the ratio of the fund NAV to the sum of NAV of all sample funds under management by the advisor.	0.0045	0.0050	0.0000	0.0125	0.0024	425
Mean of other effective marginal rate(s)	Mean of EFFMGRT of the other funds managed by the advisor.	0.0013	0.0000	0.0000	0.0125	0.0023	425
Concavity of compensation (CONCAV)	Arrow–Pratt concavity of compensation in NAV: the negative of the last marginal rate in contract minus the first marginal rate divided by the applicable marginal rate.	0.1163	0.0000	−1.2222	0.7500	0.2562	424
Adjustment for performance	Dummy variable equal to one if the compensation contract stipulates that the advisor's compensation can be adjusted when the fund performs better than a benchmark portfolio.	0.0212	0.0000	0.0000	1.0000	0.1441	425
Adjustment for expenses	Dummy variable equal to one if the compensation contract stipulates that the advisor's compensation is adjusted to account for excessive expenses.	0.4047	0.0000	0.0000	1.0000	0.4914	425

Adjustment for income	Dummy variable equal to one if the compensation contract stipulates that the advisor's compensation is adjusted to account for income generated by the fund assets.	0.2306	0.0000	0.0000	1.0000	0.4217	425
Applicable marginal compensation rate (APPLMGRT)	Marginal rate that corresponds to the interval that contains the actual NAV.	0.0055	0.0050	0.0000	0.0125	0.0022	425
Proportion of fund advisor assets under management in this fund (ASSTMGT)	The ratio of the NAV in the fund to the sum of the NAVs for all of the funds in the sample managed by the advisor.	0.8288	1.0000	0.0805	1.0000	0.2813	425
	Panel C: Control Variables						
Compensation ratio	Advisor compensation divided by NAV.	0.0071	0.0066	0.0029	0.3313	0.0160	424
Other-expense ratio	Other expenses, not including compensation, divided by NAV.	0.0128	0.0102	0.0037	0.0946	0.0098	425
Unrealized capital gains ratio	Unrealized capital gains divided by NAV.	0.0114	−0.0030	−0.6898	1.4437	0.1451	425
Equity fund dummy	Dummy variable equal to 1 if the fund is an equity or specialized equity fund.	0.2329	0	0.0000	1.0000	0.4232	425
NAV	Net asset value of the constituent assets of the fund ($millions).	192.4587	85.7190	9.2010	1863.4270	298.8992	425
T-bill rate	Yearly average three-month T-bill rate (%).	7.7385	7.5500	3.8800	14.3000	2.6282	425
Age	Number of years since fund's inception.	10.9668	9.0000	1.0000	62.0000	11.0532	422
Officer and director ownership	Proportion of shares owned by officers and directors.	0.0124	0.0004	0.0000	0.3430	0.0442	381
Ownership of other blockholders	Proportion of shares owned by five percent blockholders who are not officers or directors.	0.0375	0.0000	0.0000	0.4358	0.0801	375

more recent part of the sample the percentage of funds with a "distracted" fund advisor has risen above 40 percent. It is for these funds that the multitask principal-agent problem is likely to be important.

The frequency counts in Table I are reflected in the variable ASSTMGT, which is defined as the fund NAV divided by the sum of the NAVs of all funds in the sample also managed by the same fund advisor in that year. Summary statistics on ASSTMGT are reported by year in Table I and also in Table II (Panel B). In years in which all advisors managed exactly one fund, ASSTMGT is always 1.0. In other years, the average of ASSTMGT is lower. In the entire sample, the mean is 0.829, the median is 1.0, and the minimum and maximum are 0.081 and 1.0. Conditional on the advisor managing more than one fund, the mean of ASSTMGT is 0.427.

To account for the multitask aspect of aligning fund advisor incentives with shareholder interests, we multiply the applicable marginal compensation rate (APPLMGRT) and the advisor asset proportion (ASSTMGT). We do so in order to weight the applicable marginal compensation rate by the importance of that fund's performance sensitivity to overall fund advisor compensation. Summary statistics for the *effective marginal compensation rate* (EFFMGRT) are reported in Table II (Panel B). This effective compensation rate will always be no larger than the applicable compensation rate because the advisor asset proportion can be no larger than 1.0. The average EFFMGRT over all fund-years is 0.453, and the effective marginal rate is more stable than the applicable marginal rate during the sample period. The EFFMGRT increased slightly from 0.406 in 1978 to 0.446. It is possible that fund shareholders are aware of the multitasking problem, so that part of the observed increase in the applicable marginal rate can be explained as an adjustment to offset the increase in assets in other funds managed by the fund advisor.

Most of the investment companies use a schedule fee that is at least weakly concave in NAV: 43.3 percent of closed-end investment companies use a fee schedule that is at some points strictly concave in net asset value—that is, piecewise linear with a compensation rate that decreases with NAV. Moreover, an additional 55.1 percent of closed-end companies use a compensation scheme that is linear in NAV. Only the Lehman Corporation uses a contract that is not weakly concave. The contract for the Lehman Corporation, which we observe for 11 years (or 2.6 percent of our sample observations), contains an initial interval over which the effective marginal rate is zero. Except for this initial flat spot, the Lehman contract is increasing and concave in NAV.

Grinblatt and Titman (1989) argue that a concave compensation schedule provides managers with incentives to maximize the wealth of the shareholders of the fund. A natural first candidate to measure the concavity of the compensation function is the negative of its second derivative. Since the compensation function is piecewise linear, a discrete approximation to the second derivative of a function is required. We calculate the difference between the first and last marginal compensation rates. Because this measure is not unit free, we divide this discrete second derivative by a discrete ap-

proximation to the first derivative of the compensation function. The concavity measure is analogous to the Arrow–Pratt coefficient of absolute risk aversion.[9]

In principle, the compensation scheme of an investment advisor could adjust compensation based on the fund's portfolio return net of some benchmark return, such as the return on the S&P 500 Index, for equity portfolios, or the First Boston High Yield Index, for bond portfolios. Surprisingly, although Woodbury (1992) documents that some open-end investment companies use contracts that measure performance in relation to a benchmark return, very few of the closed-end investment companies in our sample use this type of incentive compensation. In all, only nine fund-year observations representing three funds include a benchmark for performance (Table II, Panel B), and all of these cases fall in the last four years of the sample. Unfortunately, the descriptions of this feature of the compensation contract tend to be less than complete. The disclosure typically states that compensation is to be "adjusted" based on whether return exceeds the benchmark. Thus, we resort to using a dummy variable to indicate the presence of an adjustment to compensation based on performance relative to a benchmark.

Compensation contract clauses specifying an adjustment to compensation for either excess expenses or income generated are reasonably frequent. In our sample, they occur 40.5 percent and 23.1 percent of the time, respectively (Table II, Panel B). The highest rate of usage of both these contractual features is in the early part of the sample, with a substantial decline in incidence in years 1988 through 1991. Once again, these adjustments are rarely described in specific terms, so we use dummy variables to indicate the presence of an adjustment for excess expenses and income.

Table I also presents statistics on the type of fund and fund premium for the 425 complete observations on 81 closed-end funds for the period 1978 to 1986 and 1988 to 1991. Of the fund-year observations, 23.29 percent (99) are based on equity funds and 76.71 percent (326) arise from bond

[9] This global measure of concavity, however, may be inappropriate for low volatility funds. When the NAV of a fund does not change very much through the years, the investment advisor will be compensated using an approximately linear segment of the compensation function despite any nominal concavity in the global compensation function. We try two things to account for this. First, we calculate the concavity measure as described in the text, but use the two marginal rates adjacent to the applicable marginal rate. If there is no distinct adjacent marginal rate, we use the applicable marginal rate in the calculation. Second, to account for the probability that compensation concavity comes into play, we divide the measure described in the text by the standard deviation of five years of quarterly NAV observations of the fund. Thus, our second proxy for concavity measures the Arrow–Pratt concavity per unit of volatility of NAV. Because an estimate of the standard deviation of NAV is required, this measure of concavity results in a smaller sample size. In any event, the results presented below in Tables IV through VI do not appear to be sensitive to the choice of concavity measure. This could be because, as indicated in footnote 8 above, concavity in the compensation scheme rarely comes into play.

funds.[10] The fund premium is calculated as the difference between the market value of the shares on the fund and the net asset (market) value of the constituent assets (NAV) divided by the net asset value of the constituent assets. The variable is positive when the fund trades at a premium and negative when the fund trades at a discount. As Table I indicates, the average premium for the funds in the sample is −5.8 percent, so that funds trade on average at a 5.8 percent discount from the market value of the assets in the fund portfolio. The premium ranges from −38.5 percent to 38.1 percent, with a median value of −4.9 percent. During the sample period 76.2 percent (324) of the fund-years sell at a discount and 23.8 percent (101) sell at a premium. During 1978 none of the funds in our sample traded at a premium, but in 1991, for example, 40.0 percent of the funds sold at a premium. Both the average applicable marginal compensation rate and the average fund premium have increased through time.

II. Managerial Incentives and the Closed-End Fund Premium

This section examines the relation between the closed-end fund premium and the main characteristics of the contracts used to compensate the advisors to the fund. As argued above, the alignment of interests between managers and shareholders potentially would call for the design and implementation of compensation contracts that are increasing and concave in performance and that include adjustments for performance, excess expenses, and income. The shareholders of any given fund could concentrate advisor effort on that fund alone by contractually requiring the advisor to manage no or few other funds. If capital markets value these attributes of the organization, and if transaction costs or other incentive considerations prevent funds from fully utilizing the incentive-alignment devices just mentioned, we expect a higher premium to NAV to be associated with usage of these devices. In particular, we expect the premium to be positively related to the *effective marginal compensation rate*, the presence of a performance benchmark, and concavity, and negatively related to the effective marginal compensation rate for other funds managed by the advisor. Moreover, the premium would be positively related to the presence of adjustments for excess expenses and income.

[10] As mentioned above, we concentrate on externally managed funds because the SEC requires disclosure of the compensation scheme. When the fund is managed internally, there is no such requirement for disclosure. To see whether this exclusion affects the composition of the sample, we checked *Herzfeld* for internally managed funds. We find in the 1989/90 (1990/91) edition that, including international funds, nine (nine) of 35 (43) equity funds and one (one) of 88 (88) bond funds were internally managed. The others were externally managed. Thus, it appears that the requirement that the fund be externally managed excludes proportionally more equity funds.

A. Control Variables

Table II, Panel C, describes our main control variables. Malkiel (1977) and Brauer (1988), among others, have suggested that the premium should vary with the fund's expense ratio. We use the ratio of the fund's expenses, excluding advisor compensation, to NAV to control for costs. As an additional measure of costs, we include advisor compensation divided by NAV as a measure of the level of compensation-related expenses. If the present value of costs is embedded in the discount, then larger values of our cost measures should be associated with a smaller premium (deeper discount). On the other hand, if higher costs reflect higher quality of management or more positive-NPV investment in the collection of information necessary to make value-increasing portfolio decisions, the relation between premium and costs could be positive.

We also control for the effect of taxes on the discount on closed-end funds. Malkiel (1977), Thompson (1978), and others argue that funds carrying unrealized capital gains should sell at a lower price than fully equivalent funds with no unrealized capital appreciation. The rationale is that discounts compensate investors for the built-in capital gains tax liability they acquire when they buy shares of funds with unrealized capital appreciation. As an empirical matter, Malkiel (1977) finds that a fund with 25 percent of its assets in unrealized appreciation will sell at a five percent discount. In contrast, Brickley, Manaster, and Schallheim (1991), in their paper on the tax-timing option, document correlations between unrealized gains/losses and the discount that are inconsistent with the built-in tax liability hypothesis. We use unrealized capital gains divided by NAV to control for potential tax effects.

In all estimated specifications we include a dummy variable for portfolio composition. The dummy variable takes the value of one if the fund is based on equities or specialized equities. The dummy is zero if the fund contains bonds or convertible bonds. This control variable is included for two reasons. First, as an empirical matter the discount is likely to vary by portfolio composition and/or investment objective. Weiss (1989) and Barclay et al. (1993), for example, find that bond funds sell at a larger premium than equity funds. In our sample, equity funds represent 23.3 percent of the fund-year observations. Second, portfolio composition and the form of the fund-manager compensation scheme are likely to be related. The optimal managerial compensation scheme probably differs by composition of the portfolio.[11]

It is possible that market mechanisms help to align fund advisor/manager incentives and shareholder interests. For example, reputation effects in the managerial labor market for fund managers are a likely source of incentive

[11] Funds in our sample state none, one, or more of "income," "appreciation," and "security" as investment objectives. These objectives are highly correlated with our fund type dummy variable. In most estimated specifications we also exclude the equity dummy and substitute a dummy variable for each of the three stated investment objectives of income, appreciation, and security. The results are not qualitatively altered from what is reported in Tables III through VI.

alignment. In addition, funds that are relatively visible may be subject to more intense monitoring and discipline, which would translate into higher share prices and, thus, higher premia. To the extent that size is correlated with public scrutiny and future performance, we expect the premium to be larger for a bigger fund.[12]

If there were no transactions costs then arbitrage would eliminate the discount. In this respect, fund size is likely to be negatively related to the costs of transacting to reduce the discount. First, the market for the shares of the fund itself can be less liquid for small funds. Second, it can be harder to replicate the underlying portfolio of the fund if that portfolio consists of relatively illiquid assets. If smaller funds concentrate on illiquid assets, such as real estate, specific sectors, specific countries (we exclude international funds), or high-risk assets, then smaller funds would have a smaller premium. We use the natural logarithm of NAV to control for the reputation/monitoring and liquidity effects and arbitrage-related transactions costs. Following Pontiff (1996), we also use the three-month T-bill date to measure holding costs associated with the potential arbitrage.

It is possible that both the premium and our compensation variables are determined in part by systemic effects, such as investor sentiment. The empirical designs of both Lee, Shleifer, and Thaler (1991) and Bodurtha, Kim, and Lee (1995) detect co-movement in market returns and fund premia. We use the yearly average premium of all funds in the sample to control for investor sentiment and/or other systemic forces.[13]

Finally, there are at least two reasons to control for ownership structure. First, it has been documented in the executive compensation literature that "firms in which a higher percentage of the shares are held by insiders or outside blockholders use less equity-based compensation" (Mehran (1995, p. 163)). This result may extend to closed-end funds and other investment companies. If ownership of fund shares by insiders results in incentives that substitute for performance sensitivity in the compensation contract, our empirical specification must control for insider ownership in order to isolate

[12] Having stated this hypothesis, we note that Barclay et al. (1993) provide evidence that is inconsistent with this prediction. In some of their regressions of the premium on size (and other variables), the estimated coefficient on fund size (natural logarithm of NAV) is significantly negative.

[13] We also use the return on the CRSP value-weighted index, a time trend, and yearly fixed effects to control for systemic determinants of the premium. In some specifications, we control for the age of the fund. There is some evidence that the premium follows a pattern through the life of the fund. For example, Weiss (1989) and Peavy (1990) document such an age-premium profile over a limited period after the initial public offering. On the possibility that there is a longer-term, age-premium profile, we include the age of the fund as an explanatory variable. In our sample, the average and median for fund age are 10.98 years and 9.00 years, respectively. The youngest fund is slightly more than one year old and the oldest fund is 62 years old. These variables have some explanatory power on their own but little explanatory power over and above other systemic variables. (We thank an anonymous referee for suggesting some of these variables.)

the effects of the compensation contract on the premium. Second, Barclay et al. (1993) present evidence that private benefits from control associated with fund manager stock ownership in the fund accrue to the fund manager and are capitalized in the fund premium. In this context, an important question is whether the compensation scheme of the fund advisor counteracts the adverse incentives associated with block ownership. To control for these effects we include in our regressions inside ownership (aggregate individual shareholdings of the officers and directors) and outside block ownership (aggregate holdings of all blockholders who hold at least five percent of the fund's common stock and who are neither officers nor directors of the fund).[14]

B. Maximum Likelihood Estimation of One-Way Random Components Models

Tables III through VI present maximum likelihood estimates (MLEs) of regression parameters based on one-way error components models. Closed-end funds do not frequently change their compensation schemes, though as NAV changes the manager may be subject to a different marginal compensation rate and the proportion of the advisor's assets under management in the fund will change. But, to the extent that the fund advisor faces the same marginal rate, benchmark adjustment, excess expenses adjustment, or income adjustment through time, or other independent variables are correlated through time, the standard assumptions underlying ordinary-least-squares (OLS) regression are unlikely to be satisfied. In our sample, 27 funds appear for two or three years, 26 for four years, and the remaining 28 funds appear from five to 12 years. Thus, we assume one-way random effects to correct for the panel nature of our data and to avoid the obvious associated econometric problems.[15]

C. Results: Determinants of the Sensitivity of Compensation to Performance

Table III provides a multivariate description of the compensation data. It reports the results of regressing (MLE of one-way random components models) the applicable marginal compensation rate on characteristics of the fund and manager and other features of the compensation scheme. The parameter estimates indicate that the sensitivity of managerial compensation to performance is significantly higher in equity funds relative to bond funds.

[14] There are 381 valid observations on inside ownership. Missing cases are due to missing proxy statements. For the 375 valid cases of other blockholdings, the proxy either confirms that there is no blockholder that is not a director or officer or gives the holdings of each "outside" blockholder. Missing cases are due to missing proxy statements or instances in which the proxy statement is silent as to whether there were any nondirector, nonmanagement holders of large blocks.

[15] In the same way, Barclay et al. (1993) use a one-way, variance-components model (as described in Hsiao (1986)) to correct for the same problem. Also see Batalgi (1995) and Batalgi and Lee (1990).

Table III

Relation between Sensitivity of Compensation and Fund Characteristics

Maximum likelihood estimates of one-way error components regression of the sensitivity of the fund manager compensation scheme to NAV on variables describing other characteristics of the fund. The t-statistics are in parentheses. The sample is composed of 425 fund-year observations on 81 externally managed, closed-end funds for the period 1978 to 1986 as reported in the Q-File Data Set, and *Wiesenberger's Statistical Survey of Closed-End Investment Companies*, and for 1988 to 1991, as reported in *The Thomas J. Herzfeld Encyclopedia of Closed-End Funds*.

Variable	Model 1	Model 2	Model 3
Intercept	0.0089***	0.0084***	0.0082***
	(16.059)	(15.044)	(14.036)
Dummy for equity and specialized equity funds	0.0029***	0.0017***	0.0016***
	(13.789)	(6.722)	(6.498)
Fund size: Logarithm of NAV	−0.0003***	−0.0002*	−0.0002
	(−3.936)	(−1.694)	(−1.638)
Age of the fund in years	−0.0008***	−0.0001***	−0.0001***
	(−10.224)	(−9.521)	(−8.779)
Fund proportion of advisor managed assets (ASSTMGT)	−0.0018***	−0.0018***	−0.0020***
	(−5.474)	(−5.702)	(−6.130)
Adjustment for a performance benchmark dummy	—	0.003***	0.0033***
		(5.826)	(5.889)
Adjustment for excess expenses dummy	—	−0.001	−0.0006
		(−0.665)	(−0.317)
Adjustment for income dummy	—	−0.0017***	−0.0017***
		(−8.355)	(−8.058)
Officer and director ownership	—	0.0073***	0.0066***
		(3.430)	(3.113)
Ownership by outside (not officer/director) blockholders	—	0.0013	0.0012
		(1.133)	(1.000)
Other-expense ratio	—	—	0.0194**
			(2.312)
Unrealized capital gains ratio	—	—	0.0008
			(1.367)
N	422	368	368
F-statistic	67.372***	50.638***	42.462***

*, **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively.

Furthermore, when the assets managed by the fund advisor are concentrated in the fund in question, the applicable marginal compensation rate is significantly lower. This suggests that shareholders are aware of the multitasking issue and, when the advisor manages significant assets in other funds, shareholders attempt to attract the attention and effort of the fund manager with a compensation scheme that is more sensitive to performance. Finally, compensation sensitivity is positively related to the use of a performance benchmark, officer and director ownership, the lack of an adjustment for income, and fund age.

D. Results for the Full Sample: Determinants of the Premium

For the full sample, Table IV gives the results of regressing the fund premium against different combinations of the primary variables (measuring fund advisor incentives) and the control variables. The parameter estimates show that the premium increases in the effective marginal compensation rate of the fund advisor. In five of the seven models EFFMGRT is statistically significant at conventional levels: Model 1, $p = 0.0022$; Model 2, $p = 0.0364$; Model 3, $p = 0.0087$; Model 4, $p = 0.0149$; and Model 5, $p = 0.0387$. Furthermore, the estimated coefficients appear to be economically significant. On the basis of the parameter estimate on EFFMGRT from Model 3, for example, increasing the effective marginal compensation rate by one standard deviation (0.002412) would increase the premium by 1.370 ($= 0.00241 \times 5.683$) percentage points. Thus, for the average fund, ceteris paribus, an increase of the effective marginal rate from 0.0045 (the mean value) to 0.0069 would increase the premium from -5.796 percent to -4.426 percent. The average of the same calculation for all seven models in Table IV yields a more conservative estimate of the premium increase of 1.000 percent. In summary, the higher the marginal proportion of NAV that is captured by managers as a result of their actions and the higher the fund NAV as a proportion of the assets under management by the fund advisor, the higher the premium (lower the discount). This result is consistent with the view that advisor incentives are "better aligned" with the interests of fundholders when the effective marginal compensation rate is higher.[16]

Models 4 through 7 include the average effective marginal compensation rate for all other funds in our sample managed by the specific fund advisor. This variable takes the value of zero when the advisor manages no other fund. Larger values are due to high sensitivity of compensation to NAV and/or a large portfolio managed in other funds. Thus, positive values should proxy for the incentive to allocate time and effort to other funds under management. As expected, the parameter estimates on this incentive variable are all negative. One is significant at the 0.05 level (Model 6, $p = 0.0310$), two are significant at the 0.10 level (Model 4, $p = 0.0504$; Model 7, $p = 0.0569$), and one is insignificant at conventional levels (Model 5, $p = 0.1201$). Note that including more control variables tends to shift explanatory power from

[16] To determine whether the components of the effective marginal rate have additional explanatory power, we estimate the seven models in Table IV but also include the two components of EFFMGRT. That is, we also include the applicable marginal compensation rate and the fund NAV scaled by the aggregate NAV managed by the fund advisor. These regressions fail to distinguish among EFFMGRT, APPLMGRT, and ASSTMGT. All three variables, while jointly providing explanatory power, generally are statistically insignificant. Of course, by construction, EFFMGRT is highly positively correlated with APPLMGRT and ASSTMGT. We also estimate the same specifications without EFFMGRT. One or the other (and sometimes both) of ASSTMGT and APPLMGRT tend to be statistically significant, but which provides the most power varies across the specifications. ASSTMGT tends to provide the most power when more control variables are included, and APPLMGRT tends to provide more power when fewer controls are included.

Table IV

Full Sample: Relation between Fund Premium and Fund Characteristics

Maximum likelihood estimates of one-way error components regression of the fund premium on variables describing the fund manager's compensation scheme, the proportion of the fund advisor's assets under management represented by the fund, and control variables. The *t*-statistics are in parentheses. The sample is composed of 425 fund-year observations on 81 externally managed, closed-end funds for the period 1978 to 1986 as reported in the Q-File Data Set, and *Wiesenberger's Statistical Survey of Closed-End Investment Companies*, and for 1988 to 1991, as reported in *The Thomas J. Herzfeld Encyclopedia of Closed-End Funds*.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	−0.090***	−0.092***	−0.092***	−0.090***	−0.0836***	−0.089***	−0.091***
	(−4.187)	(−3.925)	(−2.961)	(−3.767)	(−2.663)	(−3.312)	(−2.753)
Applicable marginal compensation rate × Fund proportion of advisor managed assets (= EFFMGRT)	5.954***	4.270**	5.683***	4.897**	4.662**	2.397	1.123
	(3.076)	(2.100)	(2.700)	(2.445)	(2.076)	(1.097)	(0.444)
Average EFFMGRT for all other funds managed by the advisor	—	—	—	−3.392*	−2.941	−3.851**	−3.673*
				(−1.962)	(−1.558)	(−2.164)	(−1.910)
Adjustment for a performance benchmark dummy	—	0.071**	—	—	—	0.082***	0.084**
		(2.542)				(2.955)	(2.872)
Adjustment for excess expenses dummy	—	—	—	—	—	0.008	0.009
						(0.961)	(0.967)
Adjustment for income dummy	—	—	—	—	—	−0.014	−0.022*
						(−1.439)	(−1.802)
Concavity (CONCAV)	—	—	—	—	—	0.009	0.018
						(0.612)	(1.066)

Dummy for equity and specialized equity funds	−0.048***	−0.080***	−0.046***	−0.050***	−0.047***	−0.051***	−0.045***
	(−4.467)	(−4.530)	(−3.587)	(−4.640)	(−3.688)	(−4.648)	(−3.358)
Fund Size: Logarithm of NAV	0.018***	0.018***	0.020***	0.018***	0.020***	0.020***	0.021***
	(4.493)	(4.500)	(4.317)	(4.593)	(4.364)	(4.789)	(4.519)
Average premium of sample funds	0.982***	0.978***	0.904***	0.996***	0.903***	0.994***	0.916***
	(13.216)	(13.250)	(7.392)	(13.388)	(7.398)	(13.429)	(7.526)
Officer and director ownership	—	—	0.274***	—	0.282***	—	0.215**
			(2.607)		(2.686)		(2.027)
Ownership by outside (not officer/director) blockholders	—	—	−0.187***	—	−0.190***	—	−0.197***
			(−3.155)		(−3.214)		(−3.349)
Compensation-expense ratio	—	—	−2.935*	—	−2.338	—	−0.457
			(−1.914)		(−1.482)		(−0.257)
Other-expense ratio	—	—	0.101	—	0.054	—	0.033
			(0.233)		(0.125)		(0.077)
Unrealized capital gains ratio	—	—	0.073**	—	0.066**	—	0.068**
			(2.384)		(2.127)		(2.215)
Three-month T-bill rate	—	—	0.000	—	0.000	—	−0.000
			(0.091)		(0.167)		(−0.009)
N	425	425	368	425	368	424	367
F-statistic	58.817***	48.958***	21.000***	48.143***	19.388***	28.733***	15.528***

*, **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively.

the fund's own effective marginal rate to the average effective marginal rate for other funds managed by the investment advisor. These results provide some additional evidence that stronger incentives to devote attention to other funds detracts from fund value.

The results on the dummy variable indicating the presence of a performance benchmark are uniform in magnitude and statistical significance. The presence of a performance benchmark is associated with a premium that is between 7.1 and 8.4 percent larger (Models 2, 6, and 7). Although the p-values are 0.011 (Model 2) or smaller, these estimates should be interpreted with caution because so few fund-year observations (nine of 425 associated with three funds) include a benchmark. In the same spirit, the parameter estimates for Model 2 suggest that the results on the effective marginal compensation rate are not driven by the subsample of firm-year observations with a performance benchmark.

The estimated coefficients associated with adjustments for excess expenses and income are generally small and statistically insignificant. Moreover, concavity has no substantial effect on the discount. There is little support for the notion that concavity in the compensation scheme of the fund advisor has value.

Of the control variables, the equity fund dummy, fund size, and the average premium have very high explanatory power. On the basis of the estimates in Table IV, equity funds are associated with a more extreme discount of between 4.5 and 5.1 percent relative to bond funds ($p < 0.001$ in all specifications). The individual fund premium tends to move approximately one-for-one with the yearly average premium—the coefficient estimates on the yearly average premium range from 0.903 to 0.996 (with $p < 0.0001$ in all models). Thus, the individual fund premium is closely related to our proxy for systemic effects such as investor sentiment. The estimated coefficient on the log of NAV is positive and stable, so the premium depends on our measure for reputation/monitoring, liquidity effects, and transaction costs that might inhibit arbitrage. The lower such costs, or the more monitoring and/or liquidity there is, the larger the premium. Note, however, that the estimates on our other measure of arbitrage-inhibiting costs, the three-month T-bill rate, are always small and statistically insignificant.

Neither expense ratio has much power. Further, it does not appear that the positive coefficient on the effective marginal rate is driven by a negative association between that rate and expenses. To the contrary, both expense ratios are significantly and positively correlated with the effective marginal rate ($p < 0.01$ for both ratios for both Pearson and Spearman correlation coefficients). While unrealized capital gains scaled by NAV are significant at the 0.05 level, the *positive* estimates are inconsistent with the notion that the discount compensates investors for the built-in capital gains that they buy into when they acquire fund shares. Instead, the evidence is consistent with the notion that investors value unrealized capital gains either because they see prior capital gains as an indicator of good future performance (e.g., see Lee et al. (1991) on investor sentiment) or for some other reason (e.g.,

see Brickley et al. (1991) on the tax-timing option). Finally, the coefficients on the proportion of shares owned by insiders, officers and directors, are always positive and significant at the 0.05 level. The proportion of shares owned by outside (not an officer or director) five-percent blockholders is always negatively related to the premium, and the estimated coefficients are significant at the 0.01 level. Thus, the result of Barclay et al. (1993) is confirmed in our sample.[17]

E. Results for the Bond and Equity Subsamples: Determinants of the Premium

We repeat the analysis in Table IV for the subsamples of bond (Table V) and equity funds (Table VI). Comparing Tables V and VI, we find that the parameter estimates on the effective marginal compensation rate have similar p-values in the two subsamples, but the coefficients tend to be more positive in the much smaller subsample of equity funds. It would appear that both bond and equity funds contribute to the explanatory power of EFFMGRT documented in Table IV for the full sample, though the results are not as strong in the subsamples.

The results in the full sample for the average effective marginal compensation rate for all other funds in our sample managed by the specific fund advisor are driven by the subsample of bond funds. Table V reports coefficients that are negative and generally significant for bond funds. In contrast, the coefficients for the equity subsample (Table VI) are insignificantly positive. The dummy for a performance benchmark has a positive coefficient in both subsamples and is significant at the 0.05 level for equity funds. The coefficient on the excess expenses adjustment dummy is positive in the equity fund subsample and negative in the bond fund subsample.

The logarithm of NAV is highly significant in all specifications for both types of funds. Larger funds have a less extreme discount. Moreover, the yearly average premium has high statistical power, though the sensitivity of fund premium to the yearly average premium appears to be lower for equity funds than for bond funds, particularly in the specifications that include many control variables. The ratio of compensation-related expenses to NAV is negatively related to the bond fund premium ($p < 0.05$) and positively related (though not statistically significant) to the equity fund premium. Other expenses do not seem to matter much (though see Model 7 of Table VI). The three-month T-bill rate is generally insignificant for equity funds, but, in contrast to the prediction of Pontiff (1996), it is positive and significant at the 0.10 level for bond funds. Unrealized capital gains scaled by NAV is weakly positively related to the bond fund premium but insignificant and negatively related to the equity fund premium. For bond funds, officer and

[17] Because blockholders, management, and board members often vote in coalitions (Barclay et al. (1993)), in some specifications we use the sum of insider ownership and other blockholdings. The results on ownership structure are weaker, but the results on the incentive variables do not differ from those reported here.

Table V

Bond Funds: Relation between Fund Premium and Fund Characteristics

Maximum likelihood estimates of one-way error components regression of the bond fund premium on variables describing the fund manager's compensation scheme, the proportion of the fund advisor's assets under management represented by the fund, and control variables. The *t*-statistics are in parentheses. The sample is composed of 327 fund-year observations on externally managed, closed-end funds for the period 1978 to 1986 as reported in the Q-File Data Set, and *Wiesenberger's Statistical Survey of Closed-End Investment Companies*, and for 1988 to 1991, as reported in *The Thomas J. Herzfeld Encyclopedia of Closed-End Funds.*

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	−0.081***	−0.075***	−0.092***	−0.075***	−0.085***	−0.058*	−0.074**
	(−2.980)	(−2.753)	(−2.876)	(−2.785)	(−2.610)	(−1.919)	(−2.158)
Applicable marginal compensation rate × Fund proportion of advisor managed assets (= EFFMGRT)	4.632**	3.846*	4.963**	2.886	3.851	0.673	1.711
	(2.134)	(1.704)	(2.137)	(1.279)	(1.611)	(0.270)	(0.609)
Average EFFMGRT for all other funds managed by the advisor	—	—	—	−4.264**	−3.324*	−5.024***	−3.787**
				(−2.571)	(−1.849)	(−2.924)	(−2.048)
Adjustment for a performance benchmark dummy	—	0.092	—	—	—	0.104	0.121*
		(1.260)				(1.435)	(1.708)
Adjustment for excess expenses dummy	—	—	—	—	—	0.003	−0.001
						(0.308)	(−0.057)
Adjustment for income dummy	—	—	—	—	—	−0.019**	−0.016
						(−2.097)	(−1.197)

Concavity (CONCAV)	—	—	—	—	—	−0.019	−0.017
						(−0.995)	(−0.832)
Fund size: Logarithm of NAV	0.016***	0.015***	0.025***	0.018***	0.025***	0.017***	0.024***
	(3.182)	(3.053)	(4.547)	(3.565)	(4.618)	(3.339)	(4.104)
Average premium of sample funds	1.021***	1.021***	1.127***	1.039***	1.123***	1.024***	1.115***
	(12.962)	(12.974)	(8.391)	(13.255)	(8.402)	(11.968)	(8.351)
Officer and director ownership	—	—	−0.114	—	−0.124	—	−0.115
			(−0.458)		(−0.500)		(−0.461)
Ownership by outside (not officer/director) blockholders	—	—	−0.266***	—	−0.284***	—	−0.264***
			(−3.226)		(−3.432)		(−3.116)
Compensation-expense ratio	—	—	−9.350***	—	−8.284***	—	−6.930**
			(−3.998)		(−3.453)		(−2.166)
Other-expense ratio	—	—	0.133	—	0.068	—	0.019
			(0.323)		(0.166)		(0.044)
Unrealized capital gains ratio	—	—	0.068	—	0.064	—	0.082*
			(1.637)		(1.547)		(1.847)
Three-month T-bill rate	—	—	0.005***	—	0.004*	—	0.005*
			(2.146)		(1.814)		(1.897)
N	326	326	282	326	282	325	281
F-statistic	63.974***	48.465***	22.441***	50.471***	20.719***	26.456***	15.383***

*, **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively.

Table VI

Equity Funds: Relation between Fund Premium and Fund Characteristics

Maximum likelihood estimates of one-way error components regression of equity fund premium on variables describing the fund manager's compensation scheme, the proportion of the fund advisor's assets under management represented by the fund, and control variables. The *t*-statistics are in parentheses. The sample is composed of 99 fund-year observations on externally managed, closed-end funds for the period 1978 to 1986 as reported in the Q-File Data Set, and *Wiesenberger's Statistical Survey of Closed-End Investment Companies*, and for 1988 to 1991, as reported in *The Thomas J. Herzfeld Encyclopedia of Closed-End Funds*.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Intercept	−0.209***	−0.185***	−0.249**	−0.237***	−0.285***	−0.269***	−0.348***
	(−3.283)	(−2.871)	(−2.619)	(−3.457)	(−2.882)	(−3.613)	(−3.544)
Applicable marginal compensation rate × Fund proportion of advisor managed assets (= EFFMGRT)	9.702**	6.044	5.053	11.584**	8.717	8.400	0.100
	(2.251)	(1.269)	(0.944)	(2.498)	(1.435)	(1.571)	(0.014)
Average EFFMGRT for all other funds managed by the advisor	—	—	—	12.907	16.148	14.287	12.538
				(1.093)	(1.259)	(1.190)	(0.986)
Adjustment for a performance benchmark dummy	—	0.067*	—	—	—	0.084**	0.098**
		(1.724)				(2.133)	(2.293)
Adjustment for excess expenses dummy	—	—	—	—	—	0.045*	0.085***
						(1.906)	(2.879)
Concavity (CONCAV)	—	—	—	—	—	0.027	0.019
						(0.947)	(0.564)

Fund size: Logarithm of NAV	0.024***	0.023***	0.039***	0.026***	0.041***	0.034***	0.051***
	(3.028)	(2.942)	(3.701)	(3.214)	(3.850)	(3.849)	(4.826)
Average premium of sample funds	0.823***	0.828***	0.479*	0.788***	0.461*	0.778***	0.475*
	(4.358)	(4.429)	(1.752)	(4.117)	(1.692)	(4.164)	(1.832)
Officer and director ownership	—	—	0.513***	—	0.519***	—	0.352**
			(3.314)		(3.367)		(2.298)
Ownership by outside (not officer/director) blockholders	—	—	−0.105	—	−0.129	—	−0.149
			(−1.058)		(−1.278)		(−1.554)
Compensation-expense ratio	—	—	3.361	—	2.399	—	5.070
			(1.103)		(0.767)		(1.626)
Other-expense ratio	—	—	0.992	—	0.699	—	3.979*
			(0.451)		(0.317)		(1.741)
Unrealized capital gains ratio	—	—	−0.063	—	−0.046	—	−0.056
			(−1.030)		(−0.744)		(0.944)
Three-month T-bill rate	—	—	−0.009	—	−0.008	—	−0.009
			(−1.608)		(−1.351)		(−1.630)
N	99	99	86	99	86	99	86
F-statistic	14.513***	11.853***	6.056***	11.206***	5.651***	8.115***	5.909***

*, **, and *** indicate significance at the 10, 5, and 1 percent levels, respectively.

director ownership is not strongly related to the premium, while the proportional holdings of outside blockholders are negatively related to the premium ($p < 0.01$). In contrast, for equity funds, officer and director ownership is positively and significantly related to the premium ($p < 0.05$) and ownership of outside blockholders is negatively and insignificantly related to the premium.

F. Other Issues

First, we test and correct for the use of panel data by estimating one-way error components models. In this way, we reduce inference problems that arise when a data set is a time series of similar cross sections. Another approach is to estimate the cross section of data for one of the years in the sample. We do so for 1991, the year with the most observations (70 of the total 425), while excluding the average premium and T-bill rate. The parameter estimates are qualitatively similar to those reported in the tables, but, not surprisingly, the t-statistics generally are not large. Similarly, we estimate the models, using the average of the values of each variable over the number of years a fund appeared in the sample. Once again, the parameter estimates are qualitatively similar to those reported in Tables IV to VI, but the t-statistics are smaller. For example, the p-value for EFFMGRT tends to be about 0.20.

Second, for four observations in our sample, in the following two years the fund was open-ended or there was mention in the *Wall Street Journal* that there was some possibility the fund would be open-ended. Because open-ending the fund or anticipation of the same eliminates the discount (see Brickley and Schallheim (1985)), we exclude these observations and reestimate our regressions. The results are essentially the same as reported in our tables.

Third, the compensation schemes in our data are for the companies that serve as outside investment advisors to the funds. We are silent on the agency problem of how the advisory company structures compensation to provide incentives to employees.

Fourth, it is important to note that the structure of the managerial compensation scheme is potentially endogenous. Thus, it may be appropriate to estimate systems of equations which include an equation with the form of the compensation scheme on the left-hand side and the premium and other variables on the right-hand side. Of course, for some time horizon, everything is endogenous and there is no hope of constructing a suitable empirical experiment. In the case of the empirical analysis in the present paper, however, it seems appropriate to view the fund manager compensation scheme as predetermined. The compensation schemes are contractually specified and, for a given advisor and fund, the contracts rarely change through time. Thus, compared to the premium and many of our control variables, the compensation contract is relatively predetermined or exogenous, and the empirical specifications we estimate are likely to be appropriate.

Finally, future work could focus attention on the similarities and differences in organization form between funds that are externally managed and those that are internally managed. This is likely to be useful only in the historical sense, however, because there are now very few internally managed closed-end funds. In the 1998 population of closed-end funds tracked by Lipper Analytical Services, only four of 515 funds are internally managed (we thank Donald Cassidy of Lipper Analytical Services for these figures). Thus, it appears that examination of the organizational structure and associated valuation consequences for externally managed funds is particularly relevant.

III. Conclusion

This paper describes the empirical relation between the premium on closed-end funds and various features of the organization form, including characteristics of the fund-advisor compensation scheme and the concentration in the fund of assets managed by the fund advisor. We examine a sample of 425 observations on 81 externally managed, closed-end funds managed by 71 fund advisors for the 13 years from 1978 to 1986 and 1988 to 1991. Compensation explicitly depends positively on net asset value and is generally (weakly) concave in NAV. A few funds adjust compensation on the basis of performance relative to a benchmark portfolio. Many funds penalize the fund advisor for excess expenses and pay additional compensation that depends on the income generated by the fund assets. Finally, in the recent part of the sample we find that the concentration in a single fund of assets managed by fund advisors has declined substantially.

Controlling for ownership structure, investor sentiment, the composition of capital gains, size, expenses, ease of arbitrage, and other variables, we find that the premium on closed-end investment companies increases with the effective marginal compensation rate (the sensitivity of fund manager compensation to NAV weighted by the proportion of net asset value managed by the fund advisor residing in the fund in question). Both bond and equity funds appear to contribute to this effect. Based on our regression parameter estimates, ceteris paribus, increasing the effective marginal compensation rate of the investment advisor by one standard deviation will increase the premium by about one percent. Similarly, for the full sample, increasing the slope of the compensation plan or the relative size in assets managed of other funds managed by the advisor decreases the fund premium. These results provide evidence that performance sensitivity, in the sense of the standard moral hazard problem, and concentration of assets managed by an advisor in a fund, in the context of the multitask principal-agent problem, have incentive-alignment effects.

Based on our parameter estimates, evaluating advisor performance relative to a benchmark is associated with a substantially larger premium. In contrast, penalizing the manager for excess expenses, adjustments for income, and concavity of the advisor compensation scheme have little power to explain the premium.

These results suggest at least two issues that deserve future consideration. First, it is an interesting question as to why the compensation scheme of the fund advisor/manager is written to be contingent on NAV. It seems that if fund owners are interested in maximizing shareholder value, compensation should depend on the price or value of the shares on the fund.

A second issue concerns interpretation of our results. If investors price the incentives that shape the investment choices of the advisors of closed-end investment companies, our results are consistent with the notion that some (and, perhaps, even all) of these funds have suboptimal organizational forms. In particular, compensation schemes that are more sensitive to NAV and include adjustments for performance relative to a benchmark may align better the incentives of the fund manager with the interests of the owners of the fund. Furthermore, restricting the fund advisor to manage only the one fund, thereby concentrating the advisor's assets under management in one fund, also might align more closely advisor and shareholder interests. Any such inferences from our analysis, however, must rely on the presence of transaction costs, regulatory constraints, information asymmetries, or boundedly rational investors, all of which are constraints and costs that could prevent discovery and/or implementation of an optimal organization plan.[18] Of course, this style of argument has particular force here, because it is to such costs that we generally appeal to explain both the existence of mutual funds in the first place and the fact that on average closed-end funds trade at a discount from NAV.[19]

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[18] Of the two components of the effective marginal rate, our conjecture is that this problem is more acute for the proportion of assets managed by the fund advisor than for the applicable marginal rate specified in the compensation scheme. It may be harder to write binding contracts on the former than on the latter. For example, faced with the restriction that the advisory company can manage only one fund, the fund advisor potentially could circumvent the contractual restriction by starting another advisory firm to manage other funds.

[19] Nevertheless, it is important to recognize that, in contrast to this point of view, it is possible that fund manager compensation is optimally structured and that the observed correlation between the premium and structure of compensation is driven by some other underlying, primitive characteristics of the fund and/or management team that are not captured by our control variables. Certainly this would be consistent with the use of the compensation scheme as a sorting mechanism. Nevertheless, we have no satisfying answer to the question as to what those relevant, primitive characteristics might be.

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