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Empirical Evidence on Closed-End Mutual Fund Discounts

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<Abstract>

This paper investigates the determinants of discounts on closed-end mutual funds. Empirical tests on a panel of closed-end mutual funds show that the magnitude of discounts seems to be unequal for different types of funds. I find strong evidence on tax-timing option effect even after controlling for other variables which have been theorized to be important in determining discounts on closed-end mutual funds. Also, the uncertainty about the value of underlying assets in the fund's portfolio has a significant influence on discounts.

Ⅰ. Introduction

Closed-end mutual funds provide researchers a unique opportunity to test the valuation framework developed in financial economics, since market valuations exist both for assets of a firm and for ownership claims on returns from those assets. Most closed-end funds hold securities traded in the secondary markets as their assets, and their own shares are also traded on large national exchanges such as the New York Stock Exchange and the American Stock Exchange.[1]

Unlike open-end funds which continually offer new shares to the investing public, closed-end funds maintain the number of shares which was outstanding at the initial public offerings. While investors in an open-end fund may redeem their shares directly to the mutual fund at net asset value, share holders of closed-end funds buy and sell their shares in the open market. Thus, if capital markets are perfect, the market value

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1) Recently, approximately 250 closed-end investment companies were actively traded in the United States, roughly 200 on the New York Stock Exchange, and the balance on the American Stock Exchange and the over-the-counter market.

of assets must be equal to the value of the claims on those assets. On average, however, the market value of the closed-end mutual fund's shares is less than the value of the portfolio held as the fund's asset. In other words, most closed-end funds sell at a discount.[2] The discount phenomenon on closed-end mutual funds has been a puzzle to financial economists, since arbitrage activities in capital markets should drive discounts to zero.

In truly frictionless capital markets, however, financial intermediation would not arise since no benefit could accrue to financial intermediaries. Thus, the existence of financial intermediaries is an indirect evidence of capital market frictions, and then the discount phenomenon on closed-end mutual funds is not a puzzle anymore. More interesting issues would be the sources of discounts and their behavior through time and across funds.

Several theories have been advanced to explain discounts on closed-end mutual funds. These include; information inefficiency in the market(Pratt (1966)), managerial ability(Boudreaux (1973)), accounting problems(Malkiel (1977)), institutional restrictions (Litzenberger and Sosin(1977)), accrued capital gains tax liabilities (Malkiel (1977)), distribution policy(Malkiel (1977)), agency problems and corporate takeover(Brock and Hester (1983)), noise traders(Lee, Shleifer, and Thaler (1991)), demand for diversification(Bailey and Lim (1992)), transactions costs and expenses (Kumar and Noronha (1992)), and recently, tax timing options(Kim (1994)). However, there is not a single theory which provides a clear explanation why closed-end fund shares usually trade at a discount from their net asset values, and the empirical evidence reported in extant literature is not conclusive. Moreover, as shown in the recent debate by Chen, Kan and Miller(1993) and Chopra, Lee, Shleifer, and Thaler (1993), the interpretation of the empirical results is not settled.

The number of closed-end mutual funds surged over the past several years, especially after 1986. As of 1983, there were 45 closed-end investment companies with total assets of more than $6.9 billion. However, more than 300 funds were formed

2) According to the Wiesenberger Investment Companies Service, the average discount on the eleven diversified closed-end mutual funds was 2.4 percent at the close of 1992. The actual discounts ranged from 18.3 percent to a premium of 14.4 percent. Among the specialized and non-diversified closed-end funds, discounts ranged from 8.7 percent to a 9.8 percent premium. For the funds investing in senior securities, discounts ranged from 13.8 percent to a premium of 12.6 percent.

after 1985, bringing the total asset size to the record level of more than $85 billion.

Considering the increased interest in closed-end investment companies and unsettled empirical issues, this paper provides additional empirical evidence on closed-end mutual fund discounts by examining the validity of the recently developed tax-timing option argument with various other theories. Unlike the existing literature which focuses only on diversified funds, I expand the sample to include various types of funds. I also attempt to improve methodology by using more refined variable definitions and regression model.

The findings of the paper are as follows. First, the size of discounts seems to be different depending on fund types. Second, the tax-timing option value turns out to be an important factor like other control variables in determining discounts on closed-end mutual funds. Third, an interesting finding is that the fund with a large amount of fixed income securities in its asset portfolio tends to have a low discount.

The paper is organized as follows. Section II briefly explains the closed-end mutual funds and some of their institutional details. Tax-timing option argument is briefly introduced in section III. In Section IV, empirical predictions of existing theories are examined and variables are defined. Section V presents the empirical results and Section VI concludes the paper.

Ⅱ. Institutional Details

1. Closed-End Mutual Funds

Closed-end mutual funds can be classified into several subcategories with different management objectives. First, diversified closed-end mutual funds have broadly diversified portfolios. Diversified funds must keep at least 75 percent of their assets well diversified. Typically, most of the assets in a diversified closed-end mutual fund are invested in common stocks.

Second, specialized closed-end mutual funds show a wide variety of specialized types of operation, and within their specific areas of investment, all companies are broadly diversified. For example, there are several specialized closed-end funds which

limit their investment to a particular industry or geographic area, even though they are diversified in that they invest in a broad portfolio of securities. Several other funds specialize by investing predominantly in convertible issues.

Third, nondiversified funds place all or a considerable amount of their assets in special situation investments. Although nondiversified funds could invest entirely in a single stock in principal, the tax law makes the strategy disadvantageous in practice. In order to qualify for special tax treatment, nondiversified funds must keep at least 50 percent of their assets diversified. Moreover, no more than 25 percent of assets can be invested in any one company.

Fourth, a dual purpose fund is a special kind of closed-end mutual fund. Most closed-end funds issue only one type of claim on their assets which is common stock. Unlike ordinary closed-end mutual funds, the shares of dual purpose funds are divided into two types, income shares and capital shares. The income shares receive dividends or income that the fund may earn, subject to a stated minimum cumulative dividend, and are redeemed at a fixed price at the predetermined maturity date of the fund. On the other hand, the capital shares pay no dividends and are redeemable at net asset value at the fund's maturity date. In this case, the net asset value for capital shares received at maturity is the market value of securities in the fund at that date, less the promised repayment of capital to income shares.

Finally, bond funds mostly invest in senior securities or convertible bond issues, and many international funds have been formed after 1987.

2. Tax Law on Closed-End Mutual Funds

The Investment Company Act of 1940 eliminated the double taxation(once at the corporate level, and once at the personal level) of income generated by the mutual fund's activities, if certain requirements are met. If at least 90 percent of dividends and interest income received by an investment company is distributed to its shareholders, the company does not have to pay corporate tax on the amount distributed. It must pay taxes on the undistributed portion of net realized capital gains. The net realized capital gains in a given year are defined as the difference between capital gains and losses realized from the sale of securities held in the closed-end fund's portfolio during the

year. If this difference is negative, it may carry losses forward to offset future capital gains. However, it cannot distribute losses directly to its shareholders. If a fund decides to retain a portion of its realized capital gain, it must pay taxes based on the highest marginal personal tax rate. Then, the fund distributes a tax receipt to its shareholders which is deductible from personal income taxes due. On the other hand, unrealized capital gains are not taxed and need not be distributed until realized.

Investors who hold a closed-end fund's shares must pay taxes on distributions from the fund based on their own personal tax rates. Prior to the Tax Reform Act of 1986, if the fund realizes capital gains, the determination of whether the gains were taxed at the long-term or short-term capital gains rates was dependent on how long the securities had been held by the fund. Under current tax law after the 1986 Tax Reform Act, however, all capital gains are treated as ordinary income regardless of the holding period. Although the maximum tax rate for individuals can be as high as 34 percent, the tax on a net capital gain of an investor with a 34 percent marginal tax bracket is guaranteed by law not to exceed 28 percent. Therefore, capital gains distributions are taxable at ordinary income tax rates which do not exceed 28 percent.

Ⅲ. Tax-Timing Options

Under current U.S. tax code, taxes on capital gains and losses are levied based not on accrual but on realization. The tax environment provides investors with valuable tax-trading opportunities. Assuming the same tax rate for both long- and short-term capital gains and losses, Constantinides(1983) argues that the optimal tax-trading strategy is to realize capital losses immediately and defer capital gains until the forced liquidation. He demonstrates that, compared with a suboptimal policy of never voluntarily realizing capital losses, the optimal tax-trading strategy would generate a tax-timing option value that constitutes 3 to 19 percent of the position in the stock. Therefore, the tax-timing option value should be a significant factor in the decision-making process of investors.

An investor who wishes to hold a portfolio of securities can achieve the goal by either indirect investment or direct investment in capital markets. With indirect

investment, the investor purchases shares of a closed-end mutual fund that holds the portfolio of securities as its asset. With direct investment, the investor directly forms a portfolio identical to the one held by the closed-end mutual fund. From the tax-timing option perspective, if the investor purchases shares of the closed-end mutual fund, he obtains tax-trading opportunities associated with shares of the fund. However, the investor loses tax-trading opportunities associated with the idiosyncratic movements of the individual security prices in the portfolio. On the other hand, if the investor directly invests in the primary assets by forming the same portfolio as the one held by the closed-end mutual fund, he can take full advantage of tax-trading opportunities of the individual securities. Like other options, the value of the portfolio of tax-timing options on underlying assets is greater than the value of the tax-timing option on the portfolio composed of the same underlying assets. Therefore, the tax-timing option value of owning shares of a mutual fund is likely to be less than the tax-timing value of direct ownership of the assets that comprise the fund. If the tax-timing option value is not of trivial magnitude, the loss in tax-trading opportunities will at least partially, but significantly, explain the magnitude of discounts on closed-end mutual funds.

The tax-timing option argument provides the following empirical implications. First, high correlations among assets in the fund's portfolio will result in low discounts, since the loss in tax-trading opportunities caused by combining assets will be small if the underlying asset prices tend to move in the same direction. Ceteris paribus, therefore, funds holding diverse types of securities should exhibit relatively large discounts.

Second, cross-sectionally, closed-end mutual funds with more volatile securities in their portfolios should show greater discounts than funds with less volatile securities, other things being equal.

Third, the 1986 Tax Reform Act has eliminated the favorable tax treatment on capital gains by making capital gains income taxable as ordinary income. Also, there is currently no difference between long- and short-term capital gains tax rates. Thus, the 'restart option' is not available to investors under the current tax law.[3] This implies

3) The 'restart option' enables investors to take advantage of the difference between long- and short-term tax rates. If the underlying security has a high volatility, an investor may voluntarily realize capital gains long-term, expecting to realize capital losses at a higher short-term tax rate. Constantinides(1984) argues that the 'restart option' is often more valuable than the other type of tax-timing option which is available when long- and short-term capital gains tax rates are identical.

that the current tax law is less disadvantageous to closed-end mutual fund investments. Then, I would, if anything, expect to observe a larger number of closed-end mutual funds forming after the 1986 Tax Reform Act.

Ⅳ. Empirical Design

1. Variables

In this section, variables to test the theories developed in the extant literature are defined and empirical predictions on the variables are presented.

A. Tax-Timing Options

The tax-timing argument suggests that the discounts are positively correlated with the average variance of the constituent assets. The disadvantage of losing valuable tax-trading opportunities associated with underlying assets will be greater when the underlying assets have higher variances. Thus, if daily prices of the constituent assets fluctuate with a high variance, the discounts will be large.

To test the tax-timing option argument, the difference between the square root of the average variance of the fund's assets and the standard deviation of the fund's own share prices is calculated as follows. First, the asset composition data of the major closed-end funds are collected by searching the Moody's Bank & Finance Manual from 1974 to 1990.[4] Second, daily prices for each security included in the portfolio are obtained from the Center for Research in Security Prices(CRSP) tapes each year from 1973 to 1989. Third, based on the price data, the variances of underlying assets included in the portfolio are calculated each year. Fourth, the average variance of the fund is calculated each year from 1973 to 1989 by weighting the variances of underlying assets with the market value of those assets. Finally, the difference between the square root of the average variance and the standard deviation of the fund's own share prices is included in the test(STD). For example, the Tri-Continental Corp. held 94

4) Each issue contains data as of December of the previous year. For example, the 1974 issue shows information on the funds as of December 1973.

underlying securities at the end of 1973. Based on the 94 daily stock price series 94 variances are calculated. Then, the average variance of the Tri-Continental Corp. for 1973 is computed by weighting the 94 variances with the market value of underlying securities. Finally, the difference between the square root of the average variance and the standard deviation of the share prices of the Tri-Continental Corp. is obtained. I repeat the same procedure for all funds included in the sample and for all years from 1973 to 1989.

To control for the influence of factors which other theories argue have an impact on discounts, the regressions also include the variables which are explained in what follows.

B. Accrued Capital Gains Tax Liabilities

Under current tax law concerning closed-end mutual funds, unrealized capital gains are not taxed until they are realized. Then, an investor would be unwilling to purchase shares of a closed-end fund at its net asset value since he must assume the tax liability accrued on the unrealized capital gains in the fund's portfolio. Accordingly, a fund with a large amount of unrealized appreciation should sell at a lower price than the net asset value of the fund or an otherwise identical fund with no unrealized capital appreciation. This argument can also explain premiums on closed-end mutual funds, because of the asymmetrical tax treatment on capital gains and losses. Although realized capital losses may be carried forward to offset future capital gains, the losses may not be distributed to the fund's shareholders as a tax shield. If the fund has unrealized losses, a taxable investor may prefer buying the fund's shares to the alternative of investing directly in the constituent securities by himself, since expected future capital gains taxes would be lower with the strategy of purchasing the closed-end fund's shares.

The ratio of capital gains distribution to the net asset value per share(CAPD) is used to test the argument in the regression. Since the policy of realizing and distributing capital gains tends to lower the unrealized appreciation and thus limit future tax liabilities, there will be a negative relationship between capital gains distribution and discounts.

C. Transactions Costs and Management Fees

Since managing a fund incurs expenses which are deducted from income prior to the payment of dividends to shareholders, the expenses can explain discounts on closed-end mutual funds.

A counter argument to this theory is that the transactions costs are too small and constant to justify the magnitude and the variability of discounts on closed-end funds. In practice, annual management fees range from less than $\frac{1}{4}$ of 1 percent to 1 percent of the net asset value. As far as the magnitude is concerned, however, 1 percent annual expense is consistent with about a 10 percent fund discount. For instance, suppose that a fund has a net asset value of $10 a share and the fund's shares can be purchased for $9, i.e., the fund is selling at 10 percent discount. If the fund earns a 10 percent return on its net asset and charges 1 percent for expenses, the fund will distribute $0.90. In this situation investors get a 10 percent return on their investment since the fund's shares were purchased for $9, and the 10 percent discount from net asset value is consistent with 1 percent expense.

As a variable to capture the effect of expenses on discounts, Malkiel(1977) uses current expenses divided by the net asset value, which is problematic. In practice, the expenses are taken from the investment income that the fund receives from its portfolio of securities, and the balance is subsequently distributed to the fund's shareholders as dividends. This implies that the fund's net asset value overstates the market value of the fund since it does not exclude the present value of future expense payments. As an alternative I use expenses over cash flows(EXP) as a measure of expenses, where the cash flows are the sum of expenses and dividends paid, including dividends that are reinvested by shareholders. Considering the tax law wherein the fund does not have to pay corporate taxes on the amount distributed if at least 90 percent of dividends and interest income received by the fund is distributed to its shareholders, the sum of expenses and dividends can be interpreted as gross investment income. Thus, the ratio of expenses to cash flows correctly represents the portion of investment income that is consumed as expenses and not paid out to shareholders.

D. Managerial Ability

Boudreaux(1973) argues that if investors expect that future portfolio revisions will result in portfolios better than those presently held, closed-end funds will, other things being equal, sell at a premium over net asset value. Conversely, he predicts that closed-end funds would sell at a discount when the market expects that future portfolio revisions will result in portfolios worse than currently held portfolios. In a similar vein, Roenfeldt and Tuttle(1973) state that the discount from or the premium over the net asset value of a closed-end fund is functionally related to the market's expectation of the fund manager's ability to predict security prices. If investors expect that a fund manager has the ability to successfully predict future security prices, the excess demand for that fund will cause the price of its shares to rise to a level representing a premium over the fund's net asset value per share. Conversely, if the fund manager is not expected to be successful in predicting future security prices, the fund would be expected to have a performance inferior to the market, and its shares would sell at a discount due to the excess supply of its shares.

However, the arbitrage argument completely negates this story. If a fund sells at a discount, an arbitrageur could buy all shares of the fund at a cheaper price than the net asset value and liquidate the company. This process will reduce the magnitude of the discount, and in equilibrium, there will not be any discounted mutual fund share. On the other hand, if a fund sells at a premium, an arbitrageur could form a portfolio which is the same as the portfolio held by the fund, and issue shares based on the portfolio at a higher price than the net asset value of the company. This process will reduce the magnitude of the premium, and in equilibrium, there will not be any mutual fund share selling at a premium. Besides, Jensen(1968) demonstrates that over the period 1945-1964, mutual fund managers did not outperform the market. After transactions costs, mutual funds even underperformed the market. This empirical result throws doubt on the argument based on managerial ability.

Data for the measure of performance are collected from Wiesenberger's Management Results section. Performance is calculated on a total return basis, i.e., with capital gains accepted in fractional shares and income dividends reinvested (PERM). Adjustments are also made when asset value per share is affected by rights offerings or payment of federal taxes on retained gains.

E. Accounting Problems

It is possible that the shares of closed-end mutual funds are priced to yield normal returns, but the net asset value has been inaccurately represented. The fund buying the letter stock is required to sign an "investment letter" pledging that the stock has been bought for investment purposes and the fund will hold the shares for a considerable period of time. Thus, the sale of letter stock is restricted. Closed-end mutual funds often buy such stocks at a considerable discount from the market price of the unrestricted shares and use the market price of the unrestricted shares to estimate the value of letter stocks.. Since the shares are unregistered, however, and are highly illiquid, the market prices of these stocks are not a fair indication of their value on liquidation. Thus, the net asset value is inflated relative to the true market value.

If the net asset value is reported greater than the true market value, funds with a large amount of letter stock will sell at a relatively large discount. To test this hypothesis, I use the ratio of the value of restricted stock to the net asset value(LET).

F. Uncertainty

The higher the variability of the underlying asset prices, the more uncertain the value of underlying assets. If discounts on closed-end mutual funds are caused by some mispricing in capital markets, the mispricing will be larger for more uncertain bundles of assets. Thus, the fund with a large amount of fixed income securities in its portfolio will show a smaller discount than the fund with a heavy investment on equity income securities. To test the uncertainty effect, I employ a variable defined as the ratio of the value of bonds included in the fund's asset portfolio to the net asset value (BOND).

The uncertainty effect is consistent with a noise trader argument in which rational investors interact in financial markets with investors who are less than fully rational, so-called noise traders. Lee, Shleifer and Thaler(1991) assert that the risk from holding a closed-end fund consists of two parts: the risk of holding the fund's portfolio and the risk that noise trader sentiment about the funds changes. As long as the risk from the unpredictability of future noise trader sentiment is systematic, the risk will be priced in equilibrium. They argue that the existence of unpredictable fluctuations in noise-trader sentiment about asset returns can lead to fluctuations in demand for closed-end fund shares, which will in turn be reflected in the size of discounts. Intuitively, if the value

of the underlying assets is relatively less uncertain, the mispricing by noise traders expressed as discounts on closed-end funds will be smaller.

G. Dividend Payments

The ex-dividend stock price of a fund with large dividend payments will be smaller than that of an otherwise identical fund with a small amount of dividends. Thus, if a fund follows a policy of making regular generous dividend payments, the discounts of the fund will be higher than a fund with small dividend payments, since the discount is a difference between the net asset value and the stock price by definition.

The variable for the fund's dividend policy is defined as income dividends divided by the market price of the fund's share(DIV). Table 1 summarizes the variables used in the analysis.

2. Data and Empirical Strategy

I identify the sample for the empirical analysis by searching the Wiesenberger Investment Companies Service from 1974 to 1990.[5] The survey of the Wiesenberger Investment Companies Service, which is issued annually, includes virtually all of the active closed-end investment companies in the United States. Data from the Wiesenberger Investment Companies Service are cross checked with the Moody's Bank & Finance Manual. Daily stock prices are obtained from the Center for Research in Security Prices(CRSP) daily tapes each year over the sample period.

The empirical analysis is composed of two parts. In the first part, I examine the descriptive statistics and the time-series pattern of discounts and run a regression on the total sample constructed from the Wiesenberger Investment Companies Service. In the second part, I run a regression on the subsample composed of major actively traded closed-end funds to perform a more in-depth analysis using additional variables. To be included in the subsample, each fund must satisfy the following selection criteria.

1) The fund must have data for variables discussed in the previous section.

2) The portfolio of the fund consists mostly of securities traded in the United States.

3) The fund is broadly diversified in equity securities.

The first criterion is a usual data requirement. The purpose of the second selection

Table 1 Variable Definitions

The discounts are measured as the difference between the net asset value and the stock price of the fund divided by the net asset value. The independent variables are defined as follows:

STD	=	the difference between the square root of the value weighted average variance of the fund's stock portfolio and the standard deviation of the fund's own shares,
DIV	=	the ratio of income dividends to the share price of the fund,
CAPD	=	the ratio of capital gains distribution to the net asset value,
EXP	=	the ratio of expenses to the sum of expenses and dividends paid, including dividends that are reinvested by shareholders,
PERM	=	the total return including capital gains accepted in fractional shares and income dividends reinvested,
LET	=	the ratio of the value of restricted stock to the net asset value, and
BOND	=	the ratio of the value of bonds included in the fund's asset portfolio to the net asset value.

criterion is to collect funds that are likely to have the vast majority of their portfolios in U.S. securities traded on the New York Stock Exchange or the American Stock Exchange. The third criterion is required to calculate a meaningful measure of the variable to test the tax-timing option argument, i.e., the difference between the square root of the value weighted average variance of the fund's stock portfolio and the standard deviation of the fund's own shares. I do not require complete data for a whole sample period in order to avoid a possible survivorship bias. In other words, the sample includes funds which no longer exist due to the reasons such as liquidations, mergers and acquisitions, and restructurings.

To investigate the determinants of discounts on closed-end mutual funds, I run fixed-

effects(panel data) regressions on the total sample and the subsample composed of major closed-end funds over the sample period of 1973 to 1989. As will be shown in the next section, discounts are very different depending on fund types. Under this situation, it is not appropriate to use the ordinary least square regression, since it assumes a common intercept. In order to control the fund types, I employ the fixed effects regression which is estimated by generalized least squares. In addition, to avoid the misrepresentation of the empirical results, outliers are eliminated before running regressions by calculating Cook's D statistics.[6]

Ⅴ. Results

1. Total Sample of Closed-End Funds

In this subsection, I examine the pattern of discounts based on fund types. Table 2 reports descriptive statistics for the discounts and the number of funds for each fund type from 1973 to 1989. First, discounts change year to year and some premiums are also observed. For the total sample, the minimum discount is -0.003 in 1989 and the maximum is 0.207 in 1973. The average discount of the total sample over the sample period is 0.084.

Second, discounts vary with the fund types. The average discount of bond funds is 0.047, diversified funds 0.124, nondiversified funds 0.221, specialized funds 0.136, funds with restricted stocks 0.633, international funds -0.018, capital shares of dual-purpose funds 0.256, and income shares of dual-purpose funds -0.146. This difference in discounts across fund types may partially be explained by the fact that the Investment Company Act allows closed-end funds to pursue diversification and investment objectives that cover a wider range than the open-end funds. Table 3

6) A measure of the overall influence an outlying observation has on the estimated coefficients was proposed by Cook(1979). A large value of Cook's D statistics indicates that the observed value has strong influence on the estimated coefficients. Values of Cook's D statistics can be compared to the values of the F distribution with(k+1, n-(k+1)) degrees of freedom. Usually, an observation with a value of Cook's D that falls at or above the 50th percentile of the F distribution is considered to be an influential observation.

Table 2 Descriptive Statistics of the Discounts on Various Types of Closed-End Mutual Funds

For each year, discounts are shown in the first row and the number of each type of funds is shown in parentheses.

Year	Total	Bond	Diver-sified	Non-Diversified	Speci-alized	Letter Stock	Inter-national	Dual-Capital	Purpose Income
1973	0.207	0.105	0.208	0.351	0.163	0.608	·	·	·
	(69)	(26)	(14)	(9)	(15)	(5)	·	·	·
1974	0.161	0.100	0.244	0.419	-0.095	0.658	·	·	·
	(67)	(26)	(14)	(7)	(15)	(5)	·	·	·
1975	0.180	0.073	0.253	0.279	0.243	·	·	·	·
	(64)	(26)	(12)	(7)	(19)	·	·	·	·
1976	0.131	0.049	0.191	0.170	0.211	·	·	·	·
	(60)	(27)	(9)	(6)	(18)	·	·	·	·
1977	0.123	0.082	0.150	0.079	0.188	·	·	·	·
	(56)	(27)	(9)	(4)	(16)	·	·	·	·
1978	0.153	0.147	0.219	-0.052	0.164	·	·	·	·
	(54)	(27)	(9)	(3)	(15)	·	·	·	·
1979	0.158	0.158	0.147	0.215	0.154	·	·	·	·
	(57)	(27)	(14)	(4)	(12)	·	·	·	·
1980	0.146	0.133	0.153	0.173	0.161	·	·	·	·
	(54)	(27)	(13)	(4)	(10)	·	·	·	·
1981	0.120	0.080	0.116	0.321	0.158	·	·	·	·
	(50)	(27)	(10)	(4)	(9)	·	·	·	·
1982	0.060	0.052	0.051	0.166	0.057	·	·	·	·
	(47)	(27)	(9)	(3)	(8)	·	·	·	·
1983	0.025	0.035	-0.059	0.173	0.043	·	·	·	·
	(45)	(26)	(10)	(3)	(6)	·	·	·	·
1984	0.002	0.032	-0.085	0.010	0.002	·	·	·	·
	(43)	(26)	(9)	(2)	(6)	·	·	·	·
1985	0.023	0.012	0.025	-0.115	0.079	·	·	·	·
	(44)	(26)	(10)	(1)	(7)	·	·	·	·
1986	0.001	-0.051	0.071	-0.142	0.138	·	·	·	·
	(54)	(32)	(16)	(1)	(5)	·	·	·	·
1987	0.086	0.003	0.174	·	0.171	·	0.124	·	·
	(86)	(39)	(21)	·	(8)	·	(18)	·	·
1988	0.055	0.012	0.095	·	0.195	·	0.062	0.286	-0.114
	(157)	(80)	(23)	·	(15)	·	(31)	(4)	(4)
1989	-0.003	0.011	0.088	·	0.080	·	-0.145	0.226	-0.178
	(215)	(124)	(23)	·	(20)	·	(40)	(4)	(4)
73-89	0.084	0.047	0.124	0.221	0.136	0.633	-0.018	0.256	-0.146
	(1222)	(620)	(225)	(58)	(204)	(10)	(89)	(8)	(8)

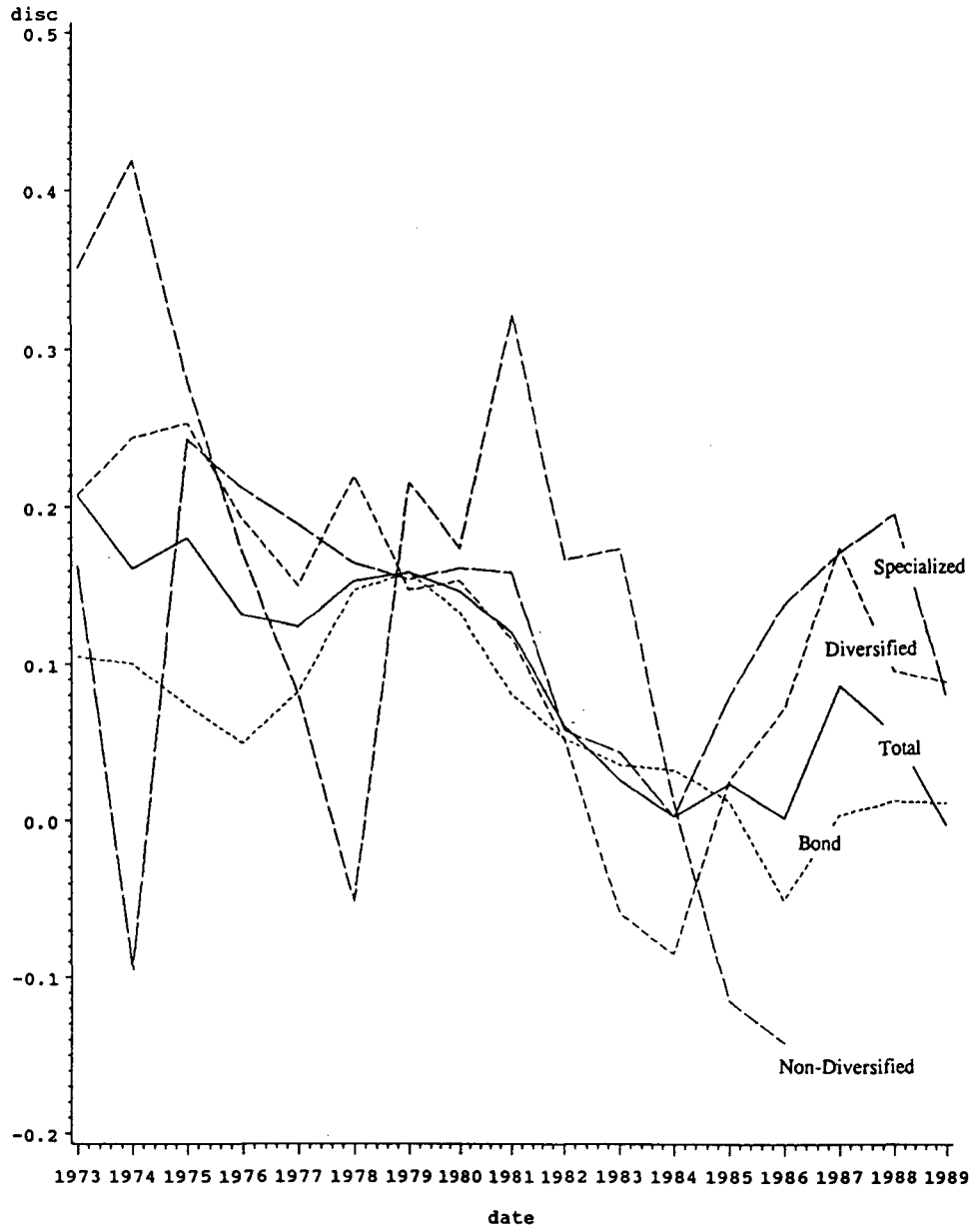
reports the result of hypothesis test that different types of funds have the same level of discounts. Although the test result must be interpreted with caution for letter stock funds and dual-purpose funds due to small sample sizes, most p-values of 0.0001 indicate that, on average, discounts on closed-end funds are significantly different depending on fund types. Figure 1 shows the time series pattern of discounts on different types of funds. Again, different types of funds show very different time series patterns of discounts. Since the existing papers focus only on diversified or international funds, the results shown in these papers must be interpreted with caution.

Third, bond funds have smaller discounts than most other types of funds. The discounts range from 0.158 to -0.051. The result can be interpreted in two ways. First, the price movements of bonds are relatively less uncertain than those of equity securities, leading to a lower degree of mispricing represented as discounts. Second, since bonds are homogeneous in that the prices of various bonds respond similarly to changes in the general level of interest rates, the correlations among assets in the bond funds are high. Then, the tax-timing theory predicts that bond funds will have smaller discounts than other types of funds, since the loss in tax-trading opportunities is relatively small.

Fourth, the average discount on specialized funds is 0.136, which is of similar magnitude to that on diversified funds. Since specialized closed-end mutual funds are broadly diversified within their specific areas of investment, the similarity of discounts on the two types of funds is not surprising.

Fifth, the discount on restricted funds is very high as the accounting problem argument suggests, even though the sample size is small to derive a meaningful statistical test.

Sixth, Pratt(1966) argues that discounts are primarily the result of a lack of sales effort and public understanding, i.e., discounts are caused by information inefficiency in capital markets. The "understanding" is lacking, because closed-end fund industry generally has been far less aggressive in merchandising its shares. These funds have no salesman selling their shares, and brokers expend little effort to sell them, relative to open-end mutual fund shares, because of smaller commissions. This argument predicts that the magnitude of discounts will become smaller over time, since closed-end funds have become better known in the capital markets reducing the degree of information



<Figure 1> Time Series Behavior of Discounts on Different Types of Funds

inefficiency. As shown in Table 2, however, the time persistence of net asset value-market price divergences, both positive and negative, is strong evidence against this argument. Also, the evidence on market efficiency suggests that the performance of discounted fund shares stems from something other than information inefficiency in the market.

Seventh, differently from other six fund types, the average discount on the international funds is negative, -0.018. In other words, on average, the international funds sell at a premium. The premium on funds which hold foreign stocks may reflect the fact that such funds can achieve greater diversification, advantage of exchange control, and tax benefits than funds holding only domestic stocks. Bonser-Neal et al. (1990) assert that investors might not have been able to duplicate the international funds' portfolios because limitations exist on new nondomestic investment in the equities of certain foreign companies. Such restrictions could drive the prices of some funds to premiums over their net asset values.

Finally, since the 'restart option' is not available to investors after the 1986 Tax Reform Act, the current tax law is less disadvantageous to closed-end mutual fund investments from the tax-option perspective. The dramatic increase in the number of closed-end mutual funds after 1986 is consistent with this argument.

To investigate common factors in determining the discounts on different types of closed-end mutual funds, I run the fixed effects(panel data) regression of discounts on three independent variables, and the results are shown in Table 4.[7] First, supporting the argument based on unrealized capital gains tax liabilities, the coefficient of capital gains distribution is negative and statistically significant at the 1 percent level. Thus, the reduction in potential tax liabilities due to the generous distribution tends to narrow the discounts. Malkiel(1977) finds a similar result where he obtains stronger results when the capital gains distribution instead of the unrealized appreciation is used as an independent variable.

In the extant literature, empirical evidence on the role of expenses in determining discounts is mixed. Malkiel(1977) finds that discounts are not related to management fees. As discussed in the previous section, the measure of expenses in Malkiel's paper

7) Only three explanatory variables are used due to data availability. Firms with many missing variables are also excluded from the initial sample.

Table 3 Differences in Discounts Based on Fund Types

Numbers reported are p-values for the hypothesis of equal discounts among different types of funds. Codes for fund types are as follows:

1 Bond funds
2 Diversified funds
3 Non-Diversified funds
4 Specialized funds
5 Letter Stock funds
6 International funds
7 Dual-purpose funds (capital shares)
8 Dual-purpose funds (income shares)

	1	2	3	4	5	6	7	8
1	·							
2	0.0001*	·						
3	0.0001*	0.0007*	·					
4	0.0001*	0.5499	0.0032*	·				
5	0.0001*	0.0001*	0.0001*	0.0001*	·			
6	0.0032*	0.0001*	0.0001*	0.0001*	0.0001*	·		
7	0.0027*	0.0611	0.6396	0.0873	0.0001*	0.0001*	·	
8	0.0055*	0.0001*	0.0001*	0.0001*	0.0001*	0.0759	0.0001*	·

* Significant at the .01 level

is problematic. Using a better measure of expenses, however, Kumar and Noronha (1992) show that the expenses are one of the variables that explain the size of discounts on closed-end funds. The proxy variable for expenses in this paper is defined as expenses over cash flows(EXP), where the cash flows are the sum of expenses and dividends paid, including dividends that are reinvested by shareholders. This definition is consistent with the measure in Kumar and Noronha. The result also indicates that

Table 4 The Fixed Effects Regressions Explaining Discounts on the Total Sample of Closed-End Mutual Funds

This table reports the results of the fixed effects regression on the total sample. The fixed effects regression is estimated by generalized least squares. The dependent variable is the discounts on closed-end mutual funds. The explanatory variables are defined as follows: CAPD is the ratio of the dollar value of capital gains distribution to the net asset value, EXP is the ratio of expenses to the sum of expenses and dividends paid, including dividends that are reinvested by shareholders, and DIV is the ratio of income dividends to the share price of the fund. The figures for Bond, Diversified, Nondiversified, Specialized, Letter Stock, International, Dual(capital shares), and Dual (income shares) represent the value of coefficients and t-statistics for intercepts of different types of funds from the fixed effects regression.

Variable	Coefficient	t-Statistic
Bond	-0.1540	-6.85*
Diversified	0.0254	1.27
Non-Diversified	0.0805	3.25*
Specialized	-0.0078	-0.36
Letter Stock	0.2538	3.17*
International	-0.2253	-7.45*
Dual(capital shares)	-0.0368	-0.27
Dual(income shares)	-0.3656	-6.70*
CAPD	-0.5000	-3.96*
EXP	0.3235	7.75*
DIV	1.6775	9.24*
R^2	0.2729	
F Statistic	76.13	
p-Value	0.0001	
# of Observations	1005	

* Significant at the .01 level

Table 5 Descriptive Statistics of the Variables for the Subsample of Major Closed-End Funds

The dependent variable is the discounts on closed-end mutual funds. The explanatory variables are defined as follows: CAPD is the ratio of dollar value of capital gains distribution to the net asset value, EXP is the ratio of expenses to the sum of expenses and dividends paid, including dividends that are reinvested by shareholders, DIV is the ratio of income dividends to the share price of the fund, STD is the difference between the square root of the average variance of the fund's stock portfolio and the standard deviation of the fund's own shares, PERM is the total return including capital gains accepted in fractional shares and income dividends reinvested, LET is the ratio of the value of restricted stock to the net asset value, and BOND is the ratio of the value of bonds included in the fund's asset portfolio to the net asset value.

Variable	N	Mean	Std	Min	Max
CAPD	204	0.0597	0.0515	0.0000	0.2676
EXP	197	0.2089	0.1213	0.0558	0.7792
DIV	200	0.0401	0.0166	0.0030	0.0956
STD	193	0.5590	0.4707	0.0674	2.8377
PERM	191	0.1411	0.2142	-0.3300	1.3070
LET	197	0.0117	0.0466	0.0000	0.3355
BOND	196	0.1254	0.1034	0.0000	0.7029

expenses are important and significant in determining closed-end fund discounts. The coefficient is positive and statistically significant at the 1 percent level, implying that the funds with a large amount of expenses have a high discount.

The positive sign for dividend variable confirms the prediction that the generous dividend payout policy may tend to result in a higher discount. Large dividend payments tend to depress stock prices to a large degree and widen the difference between the net asset value and the share price of the fund, i.e., the discounts

Overall, the F value, p-value, and R-square imply that the model has a significant

explanatory power about the discounts.

2. Major Closed-End Funds

To further investigate discounts on closed-end funds and to test the tax-timing option argument with various other theories, I run the fixed effects regression on the subsample of major closed-end funds. Table 5 shows descriptive statistics of the variables used in the analysis, and Table 6 reports the correlation matrix between variables. As shown in Table 6, there is not a severe multicollinearity problem among explanatory variables. Table 7 reports the results from the regression.

As in the analysis of the total sample, the coefficient of the capital gains distribution is again significantly negative, and the coefficients of expenses and dividend payments are significantly positive at the 1 percent level. Thus, funds with small capital gains distributions, large expenses and dividend payments tend to have high discounts as theories predict.

Consistent with the tax-timing option argument, the difference between the square root of the weighted average variance of constituent securities in the fund and the standard deviation of the fund's own share prices is significantly positively correlated with the magnitude of the discount. That is, funds composed of higher variance securities lose more tax-timing option value by bundling these securities into a portfolio and thus have greater discounts.

Boudreaux(1973) and Roenfeldt and Tuttle(1973) assert that the funds can sell at a discount or at a premium depending on the expectation on the fund's performance. They predict that the fund with a better performance potential will sell at a less discount in the market. The negative sign of the coefficient of the variable proxying the fund's performance is supportive of this prediction, even though the coefficient is not statistically significant.

The proportion invested in letter stocks is positively correlated with the discounts indicating that the funds holding a large amount of letter stocks are expected to sell at a greater discount than the funds with a small amount of letter stocks, ceteris paribus. This is consistent with the prediction that the fund whose net asset value is more inflated relative to the true market value will sell at a deeper discount.

Table 6 Correlation Matrix of the Variables for the Subsample of Major Closed-End Funds

The dependent variable is the discounts on closed-end mutual funds. The explanatory variables are defined as follows: CAPD is the ratio of dollar value of capital gains distribution to the net asset value, EXP is the ratio of expenses to the sum of expenses and dividends paid, including dividends that are reinvested by shareholders, DIV is the ratio of income dividends to the share price of the fund, STD is the difference between the square root of the average variance of the fund's stock portfolio and the standard deviation of the fund's own shares, PERM is the total return including capital gains accepted in fractional shares and income dividends reinvested, LET is the ratio of the value of restricted stock to the net asset value, and BOND is the ratio of the value of bonds included in the fund's asset portfolio to the net asset value.

	DISC	CAPD	EXP	DIV	STD	PERM	LET	BOND
DISC	·	-.424	-.034	.269	.148	-.016	.372	-.186
CAPD		·	.100	-.199	-.049	.093	-.248	.140
EXP			·	-.140	.089	.143	-.126	.250
DIV				·	-.087	-.128	.013	.245
STD					·	-.195	-.222	-.136
PERM						·	-.045	.031
LET							·	-.145
BOND								·

Supportive of the uncertainty effect, the percentage of bonds in the fund's portfolio is strongly negatively correlated with the discount implying that if the value of fixed income securities in the fund's asset portfolio is high, discounts on the fund will be low. Thus, if the uncertainty of the future price movement of the fund's portfolio is low, then the discount would be small, since the degree of mispricing would be low. This could be part of the reason why the discounts on bond funds are relatively lower than the discounts on diversified stock funds in Table 2. Furthermore, for dual purpose

Table 7 The Fixed Effects Regressions Explaining Discounts on Major Closed-End Mutual Funds

This table reports the results of the fixed effects regression on the total sample. The fixed effects regression is estimated by generalized least squares. The dependent variable is the discounts on closed-end mutual funds. The explanatory variables are defined as follows: CAPD is the ratio of dollar value of capital gains distribution to the net asset value, EXP is the ratio of expenses to the sum of expenses and dividends paid, including dividends that are reinvested by shareholders, DIV is the ratio of income dividends to the share price of the fund, STD is the difference between the square root of the average variance of the fund's stock portfolio and the standard deviation of the fund's own shares, PERM is the total return including capital gains accepted in fractional shares and income dividends reinvested, LET is the ratio of the value of restricted stock to the net asset value, and BOND is the ratio of the value of bonds included in the fund's asset portfolio to the net asset value. The figures for Diversified, Nondiversified, and Specialized represent the value of coefficients and t-statistics for intercepts of different types of funds from the fixed effects regression.

Variable	Coefficient	t-Statistic
Diversified	-0.0029	-0.07
Non-Diversified	0.0941	1.99**
Specialized	-0.0484	-1.15
CAPD	-0.4296	-2.98*
EXP	0.2748	3.73*
DIV	3.1067	5.20*
STD	0.0288	1.94**
PERM	-0.0003	-1.07
LET	0.6983	4.02*
BOND	-0.2375	-3.37*
R^2	0.4947	
F Statistic	68.07	
p-Value	0.0001	
# of Observations	176	

* Significant at the .01 level
** Significant at the .05 level

funds, the income shares have far smaller discounts than the capital shares as expected.

This result is consistent with what Brickley and Schallheim(1985) find about the time pattern of the discounts surrounding the announcement of reorganizing closed-end funds. They show that the discount dramatically decreases at the time of announcement, and from the time of announcement to the actual reorganization, the gap narrows even further, approaching zero in most cases. This time pattern of declining discounts is probably due in part to the reduction in uncertainty about the true net asset value.

In addition, if bond funds show smaller discounts, that is, less disadvantageous, more bond funds are expected to be formed. In fact, Weiss(1989) documents that the increasing number of new IPOs occurs each year from 1985 to 1987, and, unlike U.S. stock funds and foreign stock funds, the growing popularity of bond funds during this three-year period is evident.

Overall, the model is successful in explaining discounts on closed-end mutual funds as evidenced by the high value of R-square and statistically significant coefficients for most explanatory variables with predicted signs.

Ⅵ. Concluding Remarks

The discounts on closed-end mutual funds have been a perplexing phenomenon to financial economists. If capital markets are perfect and competitive, the value of the firm's assets must be equal to the value of claims on its underlying assets. For closed-end funds, however, the former is greater than the latter on average, i.e., closed-end funds sell at a discount. In this paper, I attempt to examine the factors which explain the structure of discounts on closed-end mutual funds. The findings of the paper are as follows. First, the size of discounts on closed-end funds seems to be different depending on fund types. Second, discounts are related to capital gains distribution policy, expenses, dividend payments, letter stock proportions, bond proportions, and the lost tax-timing option value.

In particular, the difference between the square root of the average variance of the fund's assets and the standard deviation of the fund's own share prices is employed as a

variable to test the most recently developed tax-timing option argument. While an investor who holds the same portfolio as the closed-end mutual fund can take advantage of tax-trading opportunities of the securities in the portfolio, an investor buying shares of the closed-end mutual fund cannot. If the tax-timing option constitutes a significant portion of asset value, the lost tax-trading opportunities should amount to an economically significant magnitude. This lost tax-timing option value explains a portion of the discount on closed-end funds. The empirical result shows a strong tax-timing option effect even after controlling for other variables which have been argued to be important in determining discounts on closed-end mutual funds.

There are other indirect evidences which support the tax-timing option argument in the existing literature. For example, Brauer(1984, 1988) argues that, since managers of funds with larger discounts may be more incompetent and enjoy higher perquisites than managers of funds with lower discounts, dissatisfied investors would exert more pressure on managers to open-end funds with larger discounts. Then, open-ending closed-end mutual funds will have relatively greater discounts than non-open-ending closed-end funds. If this is the case, the tax-option argument predicts that open-ending funds should have lower correlations among assets in the portfolio than non-open-ending funds. The proxy for low correlation could be a dissimilar asset composition. Brickley and Schallheim(1985) report closed-end funds that open-ended or liquidated from 1962 to 1982. Among a total of sixteen funds, there are nine diversified funds, four specialized funds, and three non-diversified funds. Diversified closed-end mutual funds have broadly diversified portfolios. Specialized closed-end mutual funds are broadly diversified within their specific areas of investment. Non-diversified funds place all or a considerable amount of their assets in special situation investments. Therefore, out of sixteen funds that open-ended or liquidated from 1962 to 1982, thirteen funds have relatively dissimilar asset compositions. This result is consistent with the tax-timing option argument.

As another evidence, Brauer(1984) and Brickley and Schallheim(1985) show that actual liquidations of closed-end mutual funds involve significant reductions in discounts. If a closed-end mutual fund liquidates, the discount on the fund's shares will disappear, because the loss in tax option value will be eliminated. This casual empiricism is consistent with the tax-timing option based model.[8)]

Another interesting result in this paper is a negative coefficient of the variable representing bond proportions. If discounts on closed-end mutual funds are caused by some mispricing in capital markets, the mispricing will be larger for more uncertain bundles of assets. Then, stock funds will show greater discounts than bond funds, other things being equal. The result in this paper strongly supports the uncertainty effect.

Investment companies can be classified as unit investment trusts and management companies wherein there are two types of companies, closed-end and open-end companies. The unit investment trust represents shares consisting of "units" or interests in an existing unmanaged portfolio of securities. The unit trusts cannot make a continuous offering of shares as do mutual funds, and holdings are not managed in the customary sense. Contrary to unit investment trusts, managed companies have a board of directors and managers and the holdings are actively managed. There are no management companies Korean capital market, although there are funds similar to the unit investment trusts. However, with the current deregulation trend and the pressure to open Korean capital market internationally, the possibility of the closed-end mutual funds being formed in the future cannot be ignored.

If they were introduced in the Korean capital market, the analysis in this paper can provide some useful implication. First, at the beginning stage of the closed-end fund industry, the information asymmetry could cause a large magnitude of discounts. However, the magnitude of discounts will become smaller over time as closed-end funds become better known in the capital markets reducing the degree of information inefficiency. If the degree of information asymmetry is different depending on the fund types, then it is possible to devise a portfolio strategy to obtain abnormal returns.

Second, the Investment Company Act in the U.S. allows closed-end funds to borrow money, trade options and futures contracts, and speculate aggressively. The law also allows closed-end funds to pursue diversification and investment objectives that cover a wider range than the open-end funds. If the regulation in Korean capital market were similar to the Investment Company Act, the closed-end funds can contribute to enhance the efficiency of the capital market by providing new opportunities not

8) This reduction in discounts can also be explained by the uncertainty effect. However, note that the coefficient of the tax-timing option variable is statistically significant even after controlling for the uncertainty effect in the regression.

exploited so far by investors.

Third, the potential closed-end mutual fund must design an efficient operating environment since the high expenses can lead to a large discount of the fund's shares in the capital market.

Finally, for the distribution policy, i.e., the distribution of the unrealized capital gains, the results in this paper cannot be applied directly to Korean market, since there are currently no capital gains taxes for listed companies. Under the current tax law, the unrealized capital gains tax liabilities will not have any relationship with the magnitude of discounts.

References

Bailey, W. and J. Lim, "Evaluating the Diversification Benefits of the New Country Funds," *Journal of Portfolio Management,* (Spring 1992), 74-80.

Bonser-Neal, C., G. Brauer, R. Neal, and S. Wheatley, "Closed End Country Fund Prices and International Investment Restrictions," *Journal of Finance,* (June 1990), 45, 323-348.

Boudreaux, K., "Discounts and Premiums on Closed-End Funds : A Study in Valuation," *Journal of Finance,* (May 1973), Vol. 28, 515-522.

Brauer, G., 'Open-ending' closed-end funds, *Journal of Financial Economics* Vol. 13, (1984), 491-508.

_____, "Closed-End Fund Shares' Abnormal Returns and the Information Content of Discounts and Premiums," *Journal of Finance,* (March 1988), 113-127.

Brickley, J. and J. Schallheim, "Lifting the Lid on Closed-End Investment Companies : A Case of Abnormal Returns," *Journal of Financial and Quantitative Analysis* Vol. 20, (March 1985), 107-117.

Brock, W., and D. Hestor, "Ownership and the Valuation of Corporate Equities," Working Paper, University of Wisconsin, (1983).

Chen, N., R. Kan, and M. Miller, "Are the Discounts on Closed-End Funds a Sentiment Index?" *Journal of Finance* Vol. 48, (June 1993), 795-800.

Chopra, N., C. Lee, A. Shleifer, and R. Thaler, "Yes, Discounts on Closed-End Funds Are a Sentiment Index," *Journal of Finance* Vol. 48, (June 1993), 801-808.

Constantinides, G., "Capital Market Equilibrium with Personal Tax," *Econometrica,* (May 1983), 611-636.

_____, "Optimal stock trading with personal taxes : Implications for prices and the abnormal January returns," *Journal of Financial Economics* Vol. 13, (1984), 65-89.

Cook, R., "Influential Observations in Linear Regression," *Journal of the American Statistical Association* Vol. 74, (1979), 169-174.

Jensen, M., "The Performance of Mutual Funds in the Period 1945-1964," *Journal of Finance* Vol. 23, No. 2, (May 1968), 389-416.

Kim, C., "Investor Tax-Trading Opportunities and Discounts on Closed-End Mutual Funds," *Journal of Financial Research* Vol. 17, (Spring 1994), 65-75.

Kumar, R., and G. Noronha, "A Re-Examination of the Relationship between Closed-End Fund Discounts and Expenses," *Journal of Financial Research,* (Summer 1992), 139-147.

Lee, C., A. Shleifer, and R. Thaler, "Investor Sentiment and the Closed-End Fund Puzzle," *Journal of Finance,* (1991), 75-109.

Litzenberger, R. and J. Sosin, "The Theory of Recapitalizations and the Evidence of Dual Purpose Funds," *Journal of Finance,* (December 1977), 1433-1455.

Malkiel, B., "The Valuation of Closed-End Investment Company Shares," *Journal of Finance* Vol. 32, (June 1977), 847-859.

Pratt, E., "Myths Associated with Closed-End Investment Company Discounts," *Financial Analysts Journal* Vol. 22, (1966), 79-82.

Roenfeldt, R. and Tuttle, D., "An Examination of the Discounts and Premiums of Closed-end Investment Companies," *Journal of Business Research* Vol. 1, (1973); 129-140.

Weiss, K., "The Post-Offering Price Performance of Closed-End Funds," *Financial Management,* (Autumn 1989), 57-67.

Wiesenberger, A., *Investment Companies*, New York : Arthur Wiesenberger and Company, (1993).