THE UNIVERSITY OF TEXAS AT SAN ANTONIO, COLLEGE OF BUSINESS

# Working Paper SERIES

May 29, 2008

Wp# 0049FIN-92-2008

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# The behavior of discounts of closed-end funds undergoing open-ending

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## Abstract

Based on an extensive sample of U.S. closed-end funds undergoing open-ending conversion, we examine the behavior of discounts prior to the announcement till the date of open-ending. Discounts are significantly reduced upon announcement of open-ending with price increase. Announcement period return is directly related to the pre-announcement discount, liquidity, and other characteristics of the fund. We decompose the pre-announcement discount into structural and diosyncratic parts, and report that there is a greater reduction of the idiosyncratcic part of the discount. We examine the role of distributions to the investors on the size and behavior of discounts subsequent to the open-ending announcement. We find that small amounts of discounts remain at the time of the open-ending and investigate potential explanations for such discounts.

Keywords: Closed-end Funds, Discounts
JEL Codes: G3, G30

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[a] This is a work in progress. Please do not cite without permission from the authors. Misra gratefully acknowledges partial research support from US Global Investors Inc. Correspondence may be directed to: Lalatendu Misra, Department of Finance, University of Texas at San Antonio, One UTSA Circle, San Antonio, TX 78249-0637. *(210) 458-5349, fax (210) 458-6320*, lalatendu.misra@utsa.edu.

**The behavior of discounts of closed-end funds undergoing open-ending**

## 1. Introduction

We examine the pricing behavior and the discount of U.S. closed-end funds that undergo open-ending. Our study of discounts in the context of open-ending provides insight in to the nature of observed discounts on closed-end funds in general.[1] Earlier studies report that open-ending of closed-end funds eliminates the discount, and thus generates an increase in value which is captured by shareholders. The greater prevalence of open-ending in recent years necessitates a reexamination of the issue of open-ending. We employ a larger sample spanning a longer time-period and obtain new insights into many aspects of the closed-end discount puzzle.

The persistence of closed-end fund discounts and its disappearance at the time of fund termination is a puzzle as Lee, Shleifer and Thaler (1990) note. A possible explanation for closed-end funds discounts is the miscalculation of net asset value due to tax liabilities and unrealized capital gains or illiquidity of the assets held in the fund.[2] Malkiel (1977) provides evidence that the discount is related to the amount of restricted stock in the portfolio - lending credence to the view that asset illiquidity is a primary reason for fund discount. Lee, Shleifer and Thaler (1990), however, note that 'when funds are open-ended the price rises to net asset value' and they argue that asset illiquidity as an insufficient explanation for the observed discount.

We decompose the closed-end fund discounts into two components - a systematic and an idiosyncratic component. The systematic component is the predictable part of discount based on the type of the fund, its trading pattern, liquidity, risk, age since inception, and similar variables. The idisyncratic part of discount is the difference between the observed discount and the predictable

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[1] The term "open-ending" refers to any of the events that terminate a closed-end fund: liquidation of the fund, conversion to an open-end fund, or merger with an open-ended fund.

[2] Other economic explanations include agency costs and managerial performance (Boudreaux, 1973; Deaves and Krinsky, 1994; Gemmill and Thomas, 2002); and market segmentation (Bonser-Neal, Brauer, Neal, and Wheatley, 1990; Chang, Eun and Kolodny, 1995; Bekaert and Urias, 1996). These explanations are unable to account for all the anomalies related to the pricing of closed-end funds. The inability to explain the persistence of discounts within a rational framework has lead to behavioral explanations (Zweig, 1973; De Long, Shleifer, Summers and Waldman, 1990; Lee, Shleifer and Thaler, 1991; Gemmill and Thomas, 2002; Dimson and Minio-Kozerski, 1999).

component of discount. The abnormal return response at the time of the announcement is related to the size of the discount – the larger the pre-announcement discount the higher the announcement period abnormal returns. Additionally, we present evidence that at the time of the announcement, the abnormal return responds to close the idiosyncratic discount rapidly. However, only a smaller part of the sytematic discount is eliminated at that time. The remaining part of the systematic discount is subsequently eliminated or reduced by the date of open-ending.

We employ a large sample of 113 open-ending events during the 1973 – 2005 period, with particular focus on open-ending announcements made in recent years - 92 events in the post-1990 period. We document average abnormal return of 6.6% to the announcement of the open-ending. The average discount of the closed-end funds in the sample reduces from 11.25% prior to the open-ending announcement to 6.22% following the announcement. Cross-sectional analysis shows that the abnormal returns are directly related to the pre-announcement discount, although these discounts are not completely eliminated subsequent to the announcement. We examine the nature and determinants of the post-announcement discount and the discount observed just prior to the open-ending.

Brickley and Schallheim (1985) speculate that the reaction to open-ending announcements of closed-end funds is likely to be stronger in subsequent years, as the market learns from the early cases of open-endings. Contrary to this prediction, we find that the discount reduces by an additional 3.81% in the period between announcement and the actual conversion to open-ending. The reorganization activity from the announcement date to the actual open-ending date results in an overall reduction in discount of 7.61%.

The rest of the paper is organized as follows: a brief discussion of previous studies with emphasis on the relationship between the discounts and open-ending is discussed in the next section, and descriptive statistics for the sample is given in section 3. Sections 4 and 5 present the results with concluding remarks in section 6.

## 2. Open-ending of closed-end funds

### *2.1. The open-ending process*

In a typical open-ending, the board of directors requests an open-ending proposal from the management. Once the board approves the restructuring proposal, shareholders vote is sought. The terms and conditions of open-endings by closed-end funds are declared via press releases and become public. Usually this occurs in a period five to seven months before the open-ending occurs.

Alternative to the management inititated proposal, the fund may announce that according to the fund's prospectus a shareholder vote on open-ending is triggered in the event that a sufficiently large discount exists for a specified time period. An example is provided in the following statement contained in the announcement by the Dessauer Global Equity Fund:

*"…The Fund's prospectus provides that after 18 months from the date of the fund's initial public offering, the fund will automatically convert to an open-end investment company if its shares close at a market price that is at a 5% or greater discount to the net asset value of the fund on the last business day of any week and for each of the next 14 business days."* (LexisNexis Archives, Open-ending Announcement, January 6, 1999).

There are certain drawbacks in reorganizing the closed-end fund into an open-ended entity. The legal structure of closed-end funds provides a stable asset base. This enables the manager of the closed-end fund to make longer-term investment decisions based on the fund's investment strategy without being unduly affected by the shareholders' buying or selling sentiments or activities, or being overly concerned about potential redemption considerations. Conversely, open-end funds tend to have a fluctuating asset base due to purchase and redemption requests by shareholders. Therefore, investor sentiment might affect the portfolio structure rather than the investment philosophy of the fund. Another disadvantage of converting into an open-end fund is that closed-end funds can add leverage to their portfolio whereas open-end funds do not have such opportunities.

Furthermore, closed-end funds are better able to direct more investments into illiquid securities compared to open-ended mutuals.[3]

### *2.2. Empirical evidence on open-ending*

Malkiel (1977) suggests that closed-end funds may carry illiquid assets on their books at higher than their realizable value. This explanation implies that on open-ending, the NAV should decrease. Lee, Shleifer, and Thaler (1990) state that the available evidence reveals the opposite: on liquidation, prices rise to the NAV, as shown in the studies discussed below.

Brauer (1984), and Brickley and Schallheim (1985) provide evidence that positive abnormal returns generated by reorganizing closed-end funds allow shareholders to obtain the market value of the fund's assets. Their evidence rests on relatively small samples - 14 funds in the Brauer study, and 10 funds in the Brickley and Schallheim study. Brauer documents an abnormal return of 9.3% during the announcement month and the following month, although most of the positive abnormal return associated with open-ending is incorporated into the market price by the end of the announcement month. Such timely market response is consistent with a market for closed-end funds that is generally efficient. Dimson and Minio-Paluello (2002) state that Draper (1989) reports similar results for U.K. based closed-end funds.

Brauer (1988) examines the valuation effects of the potential for open-ending. He states that a trading strategy governed by the size of the discount and the management expense ratio can be profitable if it can identify likely candidates for open-ending. Thus closed-end funds' discounts may contain information that can be used in a predictive model to capture open-ending activity. Brickley and Schallheim (1985) report an average abnormal return of 15.3% by investing on the last day of the month in which the announcement is made and holding until the fund is reorganized.

Deaves and Krinsky (1994) investigate the relationship between discounts and managerial performance. Specifically, they argue that investors may attach an increased probability to open-

[3] Deli and Varma (2002) examine the choice of organizational form for investment funds and report that closed-end funds tend to hold less liquid securities and their security prices are less transparent than that of open-ended funds.

ending for funds with poor managerial performance causing the price to move toward the NAV. Thus, the discount may narrow as managerial performance declines.

The role of block ownership and governance in the open-ending decision is examined by Barclay, Holderness and Pontiff (1993) who show a relationship between discounts and the concentration of stock ownership. As the fraction of stock owned by management increases, the discount to net asset value becomes larger. They argue that blockholders' resistance to the open-ending decision may be largely driven by the private benefits that accrue to them.

Del Guercio, Dann and Partch (2003) find evidence that board independence and structure are associated with the effectiveness of the board representing shareholders interests. Using discounts and expense ratios as measures of board effectiveness, they report that more independent boards are more likely to restructure the fund in the face of large discounts from net asset value. However, contrary to the evidence presented in Barclay, Holderness and Pontiff (1993), they do not find a relation between blockholdings and fund discounts and blockholdings and the probability of a restructuring event.

## 3. Data

### *3.1. Sample*

We used the investment company funds listed on the Center for Research in Security Prices (CRSP) files, and scrutinized delisting codes for closed-end funds.[4] There were 307 closed-end funds which were delisted between the period 1973 and 2005. We read all press releases associated with these incidences in Lexis-Nexis, Bloomberg and Wall Street Journal Indexes. We obtained an initial sample of 114 conversions to open-ending announcements for closed-end funds. The final sample consists of 113 cases after dropping one contaminated case.[5]

[4] We examined nine different delisting codes under the mergers category, two delisting codes under the exchanges category, four delisting codes under the liquidations category, and ten delisting codes under the dropped category.

[5] The board of director of one fund (Alliance New Europe Fund) approved a program of open-market repurchase for the fund's common stocks a week surrounding the open-ending announcement date.

We present the time distribution of the announcements and types of the funds in Panel A of Table 1. We have only fourteen cases between 1973 and 1985. Open ending activity appears to pick up pace during the 1990s with approximately 1/3$^{rd}$ of the cases observed in the 1996 to 2000 period. Fifty-three funds in the sample converted to an open-end investment company, thirty-three of the funds merged into exisitng open-end funds, and the remaining twenty-seven cases ceased to be closed-end funds through either liquidation or acquisition by other open-end funds.

The *Wall Street Journal* in its weekly closed-end fund price quotation column classifies the funds into several categories. We present a summary of the fund types in Panel B based on the *Wall Street Journal* classification. Broadly categorized, there are sixty-nine equity funds consisting of forty-three international equity funds and twenty-six domestic equity funds. There are forty-four bond funds out of which thirty-six are domestic bond funds and eight are world bond funds. Thus, there are fifty-one international or global funds and sixty-two domestic funds in the sample.

Among the bond funds, we have many different types of funds including mortgage funds, muni bond funds, high yield bond funds, government bond funds, etc. Similarly, among the equity funds there are country funds, world industry funds, international and global funds, dual-purpose funds, equity and convertible funds, etc. These funds invest in different asset classes which may exhibit time varying degrees of marketability, liquidity, and investor interest over the sampling period.

### *3.2. Descriptive statistics*

We provide summaries of size and price related variables in Table 2. The average (median) market value of the funds is $140.99 million ($75.30 million) on the announcement date. The average number of shares outstanding is 14.13 million (median of 6.52 million). Share prices range from $0.79 to $144.80 with a mean of $13.06 (median of $10.00). The average net asset value on the announcement date is $14.26 with a median of $11.10.[6] The average number of trading days

[6] The use of low priced funds in the sample has no effect on our results and conclusions. There are three funds with price below $1.00 and three funds with price below $3.50. All other funds in the sample are priced above $5.00. The event study and the cross-sectional results, reported subsequently, are robust with regard to the inclusion or exclusion of these three funds.

between announcement and open-ending is 171.49 days (median of 151 days). The average age of the funds is 11.38 years (median of 9 years) at the open ending date.

We split the sample six-ways into equity, dual and bond funds, and into domestic and international funds. We show the pre-announcement discounts corresponding to the sub-samples in Table 3. Domestic equity funds' discount averages 14.23% and it is higher than both domestic dual funds (8.03%) and domestic bond funds (8.94%). Foreign equity funds exhibit an average discount of 12.92%. Equity funds, both domestic and foreign, trade at a greater discount than do dual funds or bond funds. However, with the exception of equity funds, foreign funds' discount exceeds their domestic counterparts.

## 4. Results

### *4.1 Measurement of abnormal returns*

We employ the standard event study approach. We use the open-ending announcement as day 0, and estimate the market model with equally-weighted returns for the period, –250 to –31 in event time. We obtain daily abnormal return as the difference between the actual returns and the expected returns.[7] The portfolio average daily abnormal return of the sample is given by:

$$AAR_t = \frac{1}{n}\sum_{i=1}^{n} AR_{i,t}$$

where n is the sample size, and $AR_{i,t}$ is the abnormal return of the $i^{th}$ closed-end fund at time *t*. We compute $\overline{SAR_t}$ as the average standardized abnormal return on day *t*. We compute the significance of the abnormal returns using a ***z***–statistic, $z = \sqrt{n}\,\overline{SAR_t}$. The cumulative average return over a period

[7] Our results are robust when we employ the CRSP value weighted index. To the extent that the share of a closed-end fund responds to the broad market movement, irrespective of the nature of the fund portfolio, our use of the CRSP index is reasonable. However, there is a possibility of an omitted index in the context of international funds and bonds funds by only using the CRSP index.

is obtained by summing the *AAR*. The percentage of observations with positive returns is also computed for robustness. We also report a binomial ***z***-statistic.[8]

### *4.2 Abnormal returns results*

We present the abnormal portfolio returns for the sample of 113 open-endings in Table 4. The announcement day average abnormal return is 3.80% with a highly significant ***z***-statistic of 37.60. Abnormal return ranges from a low of –3.58% to a high of 21.66%. Eighty-five funds (75%) exhibit positive abnormal returns with a highly significant binomial ***z***-statistic of 5.36. For the day following the announcement date, we find an average abnormal return of 2.82% with a significant ***z***-statistic of 21.89. Since the actual time of the announcement is not known with accuracy, days 0 and day 1 together constitute the announcement period. The announcement period abnormal return is 6.63% with a significant ***z***-statistic of 42.07 whereas the 10-day pre- and post-periods do not show statistically significant cumulative abnormal returns.

The abnormal return observed during the announcement period is consistent with the market expectation that eventual open-ending will help eliminate the discount. Since the actual open-ending date is far in the future, and there may be some uncertainty attached to the actual open-ending, all the discount is not immediately eliminated upon the announcement.

We present the announcement period abnormal returns by fund types in Table 5. Domestic equity funds return of 8.83% is higher than the foreign equity funds return of 7.20%. Domestic dual funds return of 3.91% is lower than the foreign dual fund return of 4.60%. Equity funds respond to the reorganization announcement is 7.66% on average and is higher than both dual funds' and bond funds' abnormal returns which are 5.46% and 5.63%, respectively. We can summarize results thus: equity funds have higher abnormal return than bond funds and dual funds; and domestic funds exhibit lower abnormal return than international funds. These results lend support to the asset liquidity argument presented earlier, with bond funds and international funds perhaps being less liquid than domestic equity funds.

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[8] The binomial ***z***-statistic is: $z = (PPOS - \overline{p}) \Big/ \sqrt{[\overline{p} \cdot (1 - \overline{p})] / N}$ , where $PPOS$ is the percentage of positive observations, $\overline{p}$ is the expected percentage positive (50%) under the null, and $N$ is the sample size.

## 5. Cross-Sectional Analysis

### *5.1. Variables*

We examine the cross-sectional variation in the information content revealed by the announcement of the reorganization. The selection of some of the variables is motivated by previous research on closed-end funds open market stock repurchases. A fund trading at a discount from the NAV is expected to go up by a like amount. Consider a fund trading at a price of $8.00 and NAV of $10.00, with a discount of 20% from the NAV. After the announcement, assume that the stock goes up to the NAV of $10.00, then the investor would realize a return of 25% ($10.00 / $8.00 - 1). The abnormal return is likely to be related to the 25% return computed above.

The observed pre-announcement discount of the fund is composed of a structural part and an idisyncratic part: $OD = SD + ID$, where *OD* is the observed pre-announcement disocunt, *SD* is the structural component of the discount and *ID* is the idiosyncratic part of the discount. The structural component of the discount depends on a number of variables described, and it is estimated from a regression equation. The idiosyncratic part of the discount is the residual. We first estimate the two components by a regression of the following type:

$$OD_i = \beta_0 + \sum_{k=1}^{n} \beta_k \cdot X_{k,i} + ID_i$$

where; the subscript *i* refers to the individual funds and the $X_k$ refers to the characterestics such as turnover of fund shares, size of fund, volatility of discount, type of fund, exchange traded, age of fund, unrealized loss, portfolio turnover, time period of transaction. These variables have been used in the literature as explanatory variables in discount estimation. The $ID_i$ is estimated as a residual from the estimated equation by fund. Next, we employ the estimates of $OD_i$ and $ID_i$ in our estimation of the abnormal return equation. Specifically, we employ the following general equation in four specifications and report the results in Panel A of Table 6.

$$OD = \beta_0 + \beta_1 Turnover + \beta_2 Size + \beta_3 Volatility\ of\ Discountize + \beta_4 Equity\ Fund + \beta_5 Foreign\ Fund + \beta_6 Equity*Foreign + \beta_7 NYSE + \beta_8 Unrealized\ Loss + \beta_9 Fund\ Age + \beta_{10} Portfolio\ Turnover + \beta_{11} Net\ Realized\ Loss + \beta_{11} Pre\text{-}1998 + \beta_{12} Early + \beta_{13} Late$$

The trading volume of the shares of a fund may be related to the discount. For funds with shares subject to low trading volume, there may be an illiquidity premium implicit in the price. Investors may bid up the price of these fund shares upon announcement since open-ending provides a less expensive exit strategy than encountering illiquid price in the market. We expect trading *Turnover* to be negatively related to the observed discount. We measure the market trading activity or *Turnover* of a fund as the ratio of daily volume divided by number of outstanding shares averaged over the estimation period.

We examine the size of the fund, because it may proxy for informational asymmetry and response to information. The size of the fund is measured as the average of the market value of equity over -10, -5 before the announcement. Fund Size is the log of the average market value of equity. Larger funds are expected to have lower discounts.

We expect that if a fund exhibits a relatively high level of variation in discount over time, such variations may be due to relative uncertainty in the valuation of assets. That is, a high degree of discount variation may suggest a high degree of illiquid assets in the closed-end fund's portfolio. We expect a negative relationship between discounts and discount volatility. The type of funds is indicative of the quality of assets and the relative ease of valuation of these assets. It is expcted that equity assets may be more difficult to value and foreign equity even more difficult to value. Disocunts are expected to be higher for equity funds and for foerign funds.

We include a variable 'Early' to capture the potential for time varying abnormal returns, as might arise by the changing nature of the market and the participants. We split the sample by the announcement date, which cases prior to 12/31/1996 taking a value of Early equal to 1 (53 cases), and the 76 post-December 1996 cases being assigned a value of 0. If the market exhibits learning, then the coefficient for Early should be negative. We also introduce unrealized loss, net realized loss, portfolio turnover, and fund age as variables that capture the staleness of prices and the tax consequences of trading transactions.

Based on $OD = SD + ID$, we estimate the *Structural Discount* and the *Idiosyncratic Discount* part by funds. We define a variable *Expected Return* as $OD_i$ /(1 – $OD_i$). If there is a discount of 20%, the abnormal return is likely to go up by 25% = 20% / (1-20%). We define a

variable *Return Surprise* as $ID_i/(1 - ID_i)$ similarly. We expect in the following regression that the coeeficient attached to *Return Surprise* should be greater than the coefficient attached to *Expected Return*, with both being positive. The abnormal return is likely to be influenced by size of the fund, by illiquidity (positive) and time to completion. We hypothesize that the idiosyncratic discount can be reduced more easily by the announcment information event whereas the structural component is reduced by the actual act of open-ending.

$$AR_i = \gamma_0 + \delta_1 \cdot Expected\ Return + \delta_2 \cdot Return\ Surprise + \sum \lambda_k \cdot V_k$$

where, the variables with the *k* subscripts refer to other control variables. Our primary interest is in the sign and relative magnitudes of the $\delta$ variables, i.e., $\delta_2 > \delta_1 .> 0$.

We employ a variety of control variables, including Size, an alternative measure of the illiquidity of the fund shares by employing an ILLIQ measure developed by Amihud (2002). We include the Time to Completion and Time dummies in the AR equation. The results are presented in Panel B of Table 6.

We summarize the hypotheses of interest in Panel C. In each of the specifications, we find that the abnormal return is positively related to the *SD* and the *ID* parts. Both coefficeints $\delta_1 .> 0$, and $\delta_2 > 0$. Of greater interest, we find that $\delta_2 > \delta_1$. Discussion of results to follow.

### *5.3. Changes in discount following open-ending announcement*

A substantial reduction in the discount occurs at the time of announcement. Following the reorganization announcement, the gap between the net asset value and the share price narrows even further. Table 7 describes the behavior of the discounts more explicitly. Descriptive statistics at three points of time prior to announcement and for the average discount prior to open-ending announcement are provided in Panel A.

Panel B shows that the average discount just before the reorganization announcement is 11.25% (median of 10.12%). Following the announcement, it shrinks to 6.22% with a median of 6.15%. The last observable discount has an average of 2.29% (median of 2.30%).

The percent change values in NAV and in Price from post-announcement to the open-ending are presented in Panel C along with the change in discount for the same period. Accordingly the discount shrinks on average by 4.29% from the week following the reorganization announcement to the open-ending. Average NAVs for the same period drops by 0.80% whereas the market prices increase by 5.63%.

The reorganization decisions of the sample firms are all management-sponsored proposal with the exception of two funds (Templeton Value Fund and Dessauer Global Equity Fund) where the conversion to open-ending is required by the prospectus of the fund if the average discount from NAV stays at a certain level for a specified time period. An important point to note is that a substantial drop occurs in the discount in the week following the announcement without any exception. Consistent with Lee, Shleifer and Thaler (1991), discounts continue to shrink even further until the fund cease to exist.

In order to achieve a better understanding of the discount reduction, we decompose the discount values before open-ending into the ratio of the difference between distribution amount and market price to the NAV and the ratio of the difference between NAV and distribution amount to the NAV. Summary statistics are presented in Table 8.[9] Significant positive values in Panel B indicate that the distribution amounts exceed the market price for both domestic and foreign equity funds. These results suggest the existence of transaction costs since the funds are distributing more than their market prices. On the other hand, negative values for equity funds presented in Panel B signal that NAVs are smaller than the distribution amount suggesting market inefficiency. Again, these results are consistent with the illiquidity hypothesis of equity funds and international funds.

We do a regression analysis of the post announcement discounts and present the results in Table 9. The model specifications are similar to models relating abnormal returns except that we omit the Expected Return variable. The discounts are negatively related to the turnover, and not significantly related to the other variables. Thus, the less liquid funds are left with a higher level of

[9] We dropped 25 cases where (NAV – Distribution amount)/NAV exceeds 0.25 (6 observations) or the distribution amount was not available on CRSP (19 observations).

post-announcement discount. Conversely, more liquid funds have lower post-announcement discounts. *Dual Funds, Stock Fund*, and *Foreign Funds* variables in Model 2 are not significant.

## 6. Conclusion

The closed-end fund discount has attracted considerable attention from practitioners and academic researchers. The discount seems to suggest inefficient financial markets. Recently, researchers have sought to provide explanations relying on behavioral theory based notions such as investor sentiment index. The behavior of the closed-end prices during the open-ending process is a critical part of the closed-end fund discount puzzle.

Existing evidence on open-ending of closed-end funds relies on two early studies with very small sample sizes. Using a sample of 113 U.S. closed-end funds open-ending announcements between 1973 and 2005, this study documents a significant average abnormal return of 6.6 % during the announcement period. The average discounts of the closed-end funds in the sample is reduced from a discount of 11.25% prior to the announcement to a discount of 6.22% following the reorganization announcement.

Cross-sectional analysis reveals that the announcement return is positively related to the size of the discount. Further, announcement returns are larger for more recent open-endings. However, the announcement reaction is not related to the volatility of the discount.

After the announcement, there remains a discount of 6.22%. Cross-sectional analysis reveals that this discount is larger for illiquid funds. Also, the volatility is negatively related to the post-announcement discount. If the volatility is inversely related to the reliability of the fund's NAV, then the smaller reaction could be due to greater uncertainty about the liquidation value of the fund.

The average discount gradually decreases after the announcement reaching 2.30% just prior to the actual reorganization. This evidence raises several issues. First, is the gradual decline an indicator of market inefficiency. While this question has been addressed by the early studies, it is worthwhile to reexamine the issue using a larger sample. A related question is whether the decline in the discount is due to the market price gradually increasing or whether the fund management reduces NAV over time as they realize that some of the assets have smaller liquidation values than

they had anticipated. Finally, the discount of 2.30% in the week prior to the reorganization deserves closer scrutiny. It might be attributable to either NAV errors or delays in shareholders receiving the liquidating distribution. Further research should address the value of the actual distribution to the closed-end fund investors to verify whether this final discount represents errors in the reported NAVs or whether there are other costs such as redemption fees tacked on to the closed-end fund shares that may provide an explanation of the discount.

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**Table 1: Sample descriptive statistics**

The sample consists of 113 open-ending of exchange-listed closed-end funds from 1973 to 2005. The time distribution of the sample is shown in Panel A. Panel B indicates the number of funds belonging to different broad classes by investments.

| **Panel A** | |
|---|---|
| Year | Frequency |
| 1973 – 1980 | 7 |
| 1981 – 1985 | 7 |
| 1986 – 1990 | 7 |
| 1991 – 1995 | 14 |
| 1996 – 2000 | 42 |
| 2001 – 2005 | 36 |
| Total | 113 |
| **Panel B** | |
| Type | Frequency |
| **Bond Funds:** | **44** |
| Domestic Bond Funds Total | *36* |
| Investment Grade Bond Funds | 7 |
| US Mortgage Bond Funds | 6 |
| Single State Muni Bond Funds | 5 |
| National Muni Bond Funds | 5 |
| Other Domestic Bond Funds | 4 |
| US Government Bond Funds | 3 |
| High Yield Bond Funds | 3 |
| Bond Funds | 3 |
| World Bond Funds | 8 |
| | |
| **Equity Funds:** | **69** |
| World Equity Funds Total | *43* |
| Regional / Global Funds | 17 |
| Country Funds | 16 |
| World Industry Funds | 8 |
| Diversified | 2 |
| Domestic Equity Funds Total | *26* |
| Equity and Convertible Funds | 8 |
| Dual-Purpose Funds | 7 |
| Diversified | 6 |
| General Equity Funds | 5 |
| Total | **113** |

**Table 2: Fund shares trading statistics**

Summary statistics regarding the size, price, and NAV of the 113 close-ended funds that made open-ending announcement between 1973 - 2005 are shown in Panel A below. The values in Panel A are computed over the time period -10, -5 relative to the announcement date. Trading statistics for the funds are computed over the estimation period, days -250 to -21 relative to the announcement period. Illiquidity ratio is a measure of the trading illiquidity in the CEF shares and is computed as in Amihud (2002). The number of trading days between announcement and open-ending, and the age of the fund are reported in Panel C.

| | Mean | Median | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| **Panel A: Price and NAV** | | | | | |
| Market value of equity ($ million) | 139.0 | 70.0 | 176.8 | 7.0 | 1,172.2 |
| Shares outstanding (millions) | 14.1 | 6.5 | 18.5 | 0.8 | 126.5 |
| Price per share ($) | 12.9 | 9.9 | 14.7 | 0.8 | 146.2 |
| Net asset value ($) | 14.3 | 11.1 | 16.1 | 0.9 | 161.5 |
| **Panel B: Trading statistics** | | | | | |
| Average trading volume as % of shares outstanding | 0.21 | 0.18 | 0.11 | 0.01 | 0.52 |
| Illiquidity Ratio | 0.31 | 0.17 | 0.45 | 0. 00 | 2.48 |
| **Panel C: Time** | | | | | |
| Number of trading days between announcement and open-ending | 117.9 | 106.0 | 63.4 | 3.0 | 320.0 |
| Age of the fund (years) | 11.4 | 9.0 | 10.5 | 1.0 | 55.0 |

**Table 3: Summary fund financial data**

Summary financial statistics pertaining to the closed end funds are presented below. Data is collected from the financial reports closest to the announcement date.

| | *n* | *mean* | *median* | *std dev* |
|---|---|---|---|---|
| **Unrealized Appreciation as a % of Total Assets** | | | | |
| Non-Equity | 50 | -18.00% | 2.17% | 85.31% |
| Equity | 54 | 6.96% | 9.64% | 30.69% |
| Total | 104 | -5.04% | 2.79% | 64.06% |
| **Net Realized Gain as a % of Total Assets** | | | | |
| Non-Equity | 48 | -3.92% | 0.19% | 16.12% |
| Equity | 53 | 3.87% | 2.18% | 12.66% |
| Total | 101 | 0.16% | 0.35% | 14.86% |
| **Net Change in Unrealized Appreciation as % of Total Assets** | | | | |
| Non-Equity | 47 | 4.82% | 1.83% | 11.59% |
| Equity | 54 | -2.54% | 3.16% | 26.77% |
| Total | 101 | 0.89% | 1.90% | 21.34% |
| **Expense Ratio** | | | | |
| Non-Equity | 53 | 1.21% | 1.05% | 0.54% |
| Equity | 53 | 1.68% | 1.59% | 0.75% |
| Total | 106 | 1.45% | 1.26% | 0.69% |
| **Portfolio Turnover Ratio** | | | | |
| Non-Equity | 53 | 88.4% | 46% | 128.3% |
| Equity | 53 | 44.3% | 29% | 40.6% |
| Total | 106 | 66.4% | 37% | 97.2% |

**Table 4: Abnormal returns**

This table presents the event study results relative to the open-ending announcement day for a sample of 113 closed-ended funds that announced open-ending during the 1973 to 2005 period. The market model with equally-weighted market return is estimated over the period –250 to –21. Panel A presents the abnormal portfolio return, *z*-statistics, percentage of positive and negative observations, and binomial *z*-statistics for positive abnormal returns. Panel B shows the summary CAAR and the corresponding *z*-statistics; ***, **, * denote significance levels of 1%, 5% and 10%, respectively.

**Panel A**

| Day | AAR (%) | *z*-statistic | positive: negative (%) | *z*-statistic (% positive) |
|---|---|---|---|---|
| -10 | 0.020 | -0.02 | 46:54 | -0.94 |
| -9 | 0.028 | -0.06 | 48:52 | -0.38 |
| -8 | 0.101 | 1.01 | 49:51 | -0.28 |
| -7 | -0.040 | -1.03 | 47:53 | -0.57 |
| -6 | 0.186 | 1.33 | 50:50 | 0.09 |
| -5 | -0.045 | -0.58 | 41:59 | -1.98** |
| -4 | -0.232 | -1.24 | 36:64 | -2.94*** |
| -3 | 0.170 | 1.67* | 50:50 | 0.00 |
| -2 | -0.273 | -1.78* | 37:63 | -2.73*** |
| -1 | 0.048 | 0.56 | 52:48 | 0.38 |
| 0 | 3.807 | 37.58*** | 75:25 | 5.36*** |
| 1 | 2.818 | 22.28*** | 65:35 | 3.10*** |
| 2 | -0.067 | -0.53 | 44:56 | -1.22 |
| 3 | -0.017 | 0.02 | 45:55 | -1.14 |
| 4 | 0.003 | -0.53 | 48:52 | -0.38 |
| 5 | 0.092 | 0.60 | 49:51 | -0.19 |
| 6 | -0.012 | -0.40 | 44:56 | -1.23 |
| 7 | 0.133 | 0.53 | 48:52 | -0.48 |
| 8 | -0.105 | -0.32 | 46:54 | -0.77 |
| 9 | -0.019 | -0.60 | 48:52 | -0.38 |
| 10 | -0.012 | -0.05 | 53:47 | 0.58 |

**Panel B**

| Period | Cumulative Abnormal Return (%) | *z*-statistic |
|---|---|---|
| (-10, -1) | -0.037 | -0.04 |
| (0, 1) | 6.625 | 42.33*** |
| (2, 10) | -0.004 | -0.43 |

**Table 5: Discounts and abnormal returns by fund type**

The table shows the pre-announcement discounts and the two-day announcement period abnormal returns summarized by the type of fund for the 113 closed-ended funds that announced open-ending during the 1973 to 2005 period. Discounts are computed as: (Market Price – NAV) / NAV. A negative discount implies a premium. The discounts and the corresponding *t*-statistics are shown in Panel A. The two-day announcement period abnormal return and the corresponding *z*-statistic are presented in Panel B. ***, **, * respectively denote significance at better than 1%, 5%, and 10% levels.

| | **Panel A: Pre-announcement discount** | | | **Panel B: Abnormal return** | |
|---|---|---|---|---|---|
| | *cases* | *Discount (%)* | *t*-statistic | *AAR (%)* | *z*-statistic |
| *Domestic Funds:* | | | | | |
| Equity Funds | 16 | 14.23 | 7.25 *** | 8.81 | 16.18 *** |
| Dual Funds | 11 | 8.03 | 4.36 *** | 3.93 | 8.84 *** |
| Bond Funds | 37 | 8.94 | 17.72 *** | 5.64 | 30.54 *** |
| Total | 64 | 10.1 | 14.33 *** | 6.14 | 34.97 *** |
| *Foreign Funds:* | | | | | |
| Equity Funds | 41 | 12.92 | 12.46 *** | 7.20 | 21.05 *** |
| Dual Funds | 8 | 11.86 | 4.55 *** | 7.57 | 12.53 *** |
| Bond Funds | 0 | | | | |
| Total | 49 | 12.74 | 13.33 *** | 7.26 | 24.32 *** |
| *All funds:* | | | | | |
| Equity Funds | 57 | 13.29 | 14.43 *** | 7.65 | 26.43 *** |
| Dual Funds | 19 | 9.63 | 6.22 *** | 5.46 | 14.85 *** |
| Bond Funds | 37 | 8.94 | 17.72 *** | 5.64 | 30.54 *** |
| Total | 113 | 11.25 | 19.19 *** | 6.63 | 42.33 *** |

**Table 6: Cross-sectional analysis of pre-announcement discounts and announcement period abnormal returns**

Pre-announcement discount is the dependent variable in Panel A. From the regression structural discount (SD) and residual discount (ID) are decomposed and used to estimate Expected Return [ED / (1-ED)], and Return Surprise [ID / (1-ID)] employed in Panel B. The dependent variable in Panel B is the announcement period abnormal return. Estimated difference of coefficient between Return Surprise and Expected Return is shown in Panel C. Significance of the *t*-statistics of the estimates are indicated by ***, **, and * at 1%, 5%, and 10% levels respectively.

| **PANEL A: Discount Equation** | coeff | *t*-stat | | coeff | *t*-stat | | coeff | *t*-stat | | coeff | *t*-stat | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Turnover of Fund Shares in Market | 0.019 | 3.08 | *** | 0.018 | 2.71 | *** | 0.022 | 4.05 | *** | 0.022 | 3.18 | *** |
| Market Capitalization of Fund (log) | -0.016 | -2.45 | ** | -0.016 | -2.32 | ** | -0.024 | -3.70 | *** | -0.016 | -2.47 | ** |
| Volatility of Discount | -0.738 | -3.15 | *** | -0.729 | -3.34 | *** | -0.667 | -2.76 | *** | -0.773 | -3.23 | *** |
| Equity Fund (Dummy) | 0.074 | 3.73 | *** | 0.059 | 2.87 | *** | 0.037 | 1.88 | * | 0.071 | 3.58 | *** |
| Foreign Fund (Dummy) | 0.025 | 0.91 | | 0.043 | 1.65 | | 0.067 | 2.32 | ** | 0.022 | 0.81 | |
| Equity * Foreign | -0.082 | -2.50 | ** | -0.081 | -2.60 | ** | -0.098 | -2.91 | *** | -0.076 | -2.35 | ** |
| NYSE (Dummy) | 0.026 | 2.03 | ** | 0.025 | 1.95 | * | 0.037 | 2.50 | ** | 0.026 | 1.93 | * |
| Unrealized Loss (Dummy) | _.– | | | 0.005 | 0.52 | | _.– | | | _.– | | |
| Fund Age Since Inception (log) | _.– | | | 0.009 | 1.27 | | _.– | | | _.– | | |
| High Portfolio Turnover (Dummy) | _.– | | | _.– | | | -0.022 | -2.01 | ** | _.– | | |
| Net Realized Loss (Dummy) | _.– | | | _.– | | | 0.051 | 1.34 | | _.– | | |
| Pre 1998 Period (Dummy) | -0.012 | -1.08 | | -0.008 | -0.73 | | -0.006 | -0.43 | | _.– | | |
| Period: 1997 to 2000 (Dummy) | _.– | | | _.– | | | _.– | | | -0.004 | -0.30 | |
| Period: 2000 to 2005 (Dummy) | _.– | | | _.– | | | _.– | | | 0.007 | 0.54 | |
| Constant | 0.241 | 3.46 | *** | 0.224 | 2.72 | *** | 0.335 | 4.68 | *** | 0.239 | 3.16 | *** |
| *F*-statistic | | 7.51 | *** | | 5.94 | *** | | 7.24 | *** | | 6.13 | *** |
| R-squared | | 32.8% | | | 33.5% | | | 41.5% | | | 32.7% | |
| **PANEL B: Abnormal Return** | | | | | | | | | | | | |
| Expected Return | 0.290 | 3.04 | *** | 0.311 | 3.01 | *** | 0.311 | 2.83 | *** | 0.357 | 3.58 | *** |
| Return Surprise | 0.640 | 6.38 | *** | 0.658 | 6.14 | *** | 0.639 | 5.35 | *** | 0.638 | 6.96 | *** |
| Market Capitalization of Fund (log) | 0.003 | 0.51 | | 0.006 | 1.27 | | 0.002 | 0.32 | | 0.003 | 0.56 | |
| Trading Illiquidity (Dummy) | 0.029 | 2.73 | *** | 0.028 | 2.59 | ** | 0.034 | 2.74 | *** | 0.023 | 2.24 | ** |
| Time to Completion (log of days) | 0.011 | 1.43 | | 0.007 | 0.94 | | 0.009 | 1.21 | | 0.011 | 1.51 | |
| NYSE (Dummy) | 0.008 | 0.59 | | 0.011 | 0.91 | | 0.007 | 0.55 | | 0.005 | 0.42 | |
| Pre 1998 Period (Dummy) | -0.017 | -1.88 | * | -0.023 | -2.82 | *** | -0.010 | -0.93 | | _.– | | |
| Period: 1997 to 2000 (Dummy) | _.– | | | _.– | | | _.– | | | -0.002 | -0.23 | |
| Period: 2000 to 2005 (Dummy) | _.– | | | _.– | | | _.– | | | 0.025 | 2.45 | ** |
| Constant | 0.067 | -1.00 | | -0.095 | -1.49 | | -0.057 | -0.72 | | -0.091 | -1.30 | |
| *F*-statistic | | 11.09 | *** | | 11.01 | *** | | 8.09 | *** | | 11.25 | *** |
| R-squared | | 48.3% | | | 50.9% | | | 45.7% | | | 51.3% | |
| **PANEL C: Response Differential** | | | | | | | | | | | | |
| Return Surprise less Expected Return | 0.350 | 3.72 | *** | 0.347 | 3.34 | *** | 0.328 | 2.77 | *** | 0.281 | 3.33 | *** |
| Observations | 113 | | | 103 | | | 95 | | | 113 | | |

**Table 7: Behavior of discounts over time**

Summary statistics for 113 closed-end funds that made open-ending announcement during the 1973 to 2005 period is reported below. Discounts are computed as: (Market Price – NAV) / NAV. A negative discount implies a premium. The discounts for twelve prior months are shown in Panel A, and discounts for the weeks surrounding the announcement are shown in Panel B. Discount for the week prior to the actual open-ending is computed by using the latest observable NAV and market price. Panel C presents the changes in Discounts, NAV and Price from post-announcement date to the pre open-ending date.

| | Mean | Median | Std. Dev. | Minimum | Maximum |
|---|---|---|---|---|---|
| **Panel A: Behavior of discounts prior to open-ending announcement** | | | | | |
| Pre-announcement 12 month discount (%) | 11.88 | 14.10 | 9.51 | -19.29 | 33.03 |
| Pre-announcement 6 month discount (%) | 12.14 | 12.37 | 9.64 | -34.75 | 33.44 |
| Pre-announcement 1 month discount (%) | 11.39 | 11.04 | 6.41 | -6.17 | 30.56 |
| Pre-announcement average discount (%) for 12 months | 12.20 | 11.67 | 7.08 | -9.11 | 29.75 |
| Pre-announcement standard deviation of discount for 12 months in % | 3.42 | 3.00 | 2.00 | 1.02 | 11.10 |
| **Panel B: Discounts surrounding the announcement** | | | | | |
| Pre-announcement 1 week discount (%) | 11.25 | 10.12 | 6.23 | -1.27 | 31.51 |
| Post-announcement 1 week discount (%) | 6.22 | 6.15 | 5.48 | -21.69 | 34.72 |
| **Panel C: Behavior of discount from announcement to date of open-ending** | | | | | |
| Discount just prior to open-ending (%) | 1.93 | 1.95 | 4.91 | -35.8 | 10.32 |
| Change in Discount from post-announcement to pre open-ending | -4.29 | -3.89 | 4.75 | -33.07 | 6.12 |
| Percent change in NAV from post-announcement to pre open-ending | 0.80 | 0.00 | 14.79 | -38.72 | 55.34 |
| Percent change in Price from post-announcement to pre open-ending | 5.63 | 3.09 | 16.94 | -37.5 | 76.86 |

**Table 8: Decomposition of final discount prior to open-ending**

Summary statistics for close-ended funds that made open-ending announcement during the 1973 to 2005 period is reported below. The sample size is limited to 88 funds whose distribution data is available. The first column shows the percentage difference between NAV and Price before open-ending by fund types and is computed as (NAV – Price)/NAV; the second column shows the percentage difference between distribution amount and Net Asset Value before open-ending by fund types and is computed as (NAV – Distribution amount)/ NAV; and the third column shows the percentage difference between Price and distribution amount before open-ending by fund types and is computed as (Distribution amount – Price)/NAV. Median values are shown in parentheses. ***, **, * denote significance levels of 1%, 5% and 10%, respectively.

| | N | NAV – Price | NAV – Distribution | Distribution– Price |
|---|---|---|---|---|
| **Entire Sample** | 88 | 2.62%*** | 0.16% | 2.46%*** |
| | | (2.34%) | (-0.03%) | (2.03%) |
| **Equity Funds** | 45 | 3.18%*** | -0.92% | 4.11%*** |
| | | (2.96%) | (-0.20%) | (3.14%) |
| Domestic | 13 | 3.38%*** | -1.54% | 4.92%*** |
| | | (2.97%) | (1.49%) | (5.13%) |
| Foreign | 32 | 3.11%*** | -0.67% | 3.78%*** |
| | | (2.61%) | (-0.10%) | (3.09%) |
| **Dual Funds** | 16 | 2.46%*** | 2.36% | 0.11%*** |
| | | (2.34%) | (0.34%) | (0.80%) |
| Domestic | 10 | 3.00%*** | 2.71% | 0.30% |
| | | (2.70%) | (1.40%) | (0.83%) |
| Foreign | 6 | 1.57%** | 1.77% | -0.20% |
| | | (1.06%) | (0.27%) | (0.79%) |
| **Bond Funds** | 27 | 1.75%*** | 0.66% | 1.09% |
| | | (0.93%) | (0.18%) | (1.73%) |

**Table 9: Cross-sectional analysis of post-announcement and open ending discounts**

Post announcement discount is the dependent variable in Panel A. Pre open-ending discount is the dependent variable in Panel B. The regressors are similar to those employed in the earlier regression. Noise-to-signal ratio is computed the absolute value of the ratio of the idiosyncratic discount (ID) to the structural discount (SD) as computed in Table 6. Excluding outlier observations resulted in sample size smaller than the 113 cases in the two panels. ***, **, * denote significance levels of the *t*-statistics at 1%, 5% and 10%, respectively.

| | **Panel A: Post-announcement discount** | | | | **Panel B: Discount just prior to open-ending** | | | |
|---|---|---|---|---|---|---|---|---|
| | coeff | *t*-stat | coeff | *t*-stat | coeff | *t*-stat | coeff | *t*-stat |
| Noise-to-signal ratio | _._ | _._ | -0.005 | -0.52 | _._ | _._ | 0.001 | 0.19 |
| Turnover of Fund Shares in Market | 0.008 | 2.18 ** | 0.008 | 2.10 ** | 0.004 | 1.90 * | 0.004 | 1.87 * |
| Market Capitalization of Fund (log) | 0.000 | 0.10 | 0.001 | 0.13 | -0.001 | -0.31 | -0.001 | -0.32 |
| Equity Fund (Dummy) | 0.039 | 3.60 *** | 0.039 | 3.59 *** | 0.014 | 1.79 * | 0.014 | 1.79 * |
| Foreign Fund (Dummy) | -0.008 | -0.74 | -0.007 | -0.67 | 0.001 | 0.14 | 0.001 | 0.10 |
| Equity * Foreign | -0.028 | -1.76 * | -0.029 | -1.85 * | -0.006 | -0.63 | -0.006 | -0.62 |
| NYSE (Dummy) | 0.012 | 1.40 | 0.013 | 1.41 | 0.000 | -0.04 | 0.000 | -0.07 |
| Illiquidity (Dummy) | -0.003 | -0.38 | -0.003 | -0.39 | _._ | _._ | _._ | _._ |
| Time to Completion (log of days) | 0.008 | 2.37 ** | 0.008 | 2.42 ** | -0.007 | -1.24 | -0.007 | -1.24 |
| Pre 1998 Period (Dummy) | -0.008 | -1.22 | -0.007 | -1.09 | 0.013 | 2.89 *** | 0.012 | 2.59 *** |
| Constant | -0.009 | -0.18 | -0.010 | -0.19 | 0.021 | 0.58 | 0.021 | 0.57 |
| | | | | | | | | |
| F-statistic | | 6.26 *** | | 5.75 *** | | 4.45 *** | | 3.93 *** |
| R-squared | | 33.1% | | 33.2% | | 22.2% | | 22.2% |
| Number | | 106 | | 106 | | 109 | | 109 |