

# **MASTERSHARES: MARKET PRICES DIVORCED FROM FUNDAMENTALS**

by

Samir K Barua and Jayanth R Varma\*

## **Abstract**

The shares of a closed-end Mutual Fund may be regarded as derived securities because their value depends entirely on the prices of securities that comprise the fund portfolio. Therefore, the Net Asset Value (NAV) of these shares, after adjustments for winding up costs, can be regarded as their fundamental value. In an efficient market, the prices of these shares would move in line with the changes in their NAV. This paper examines the relationship between the price and the NAV of Mastershares, the first closed-end fund in India. The investigations revealed that there is excessive volatility in prices, not justified by the fluctuations in the NAV. The price also show a mean reverting behaviour. These observations are in line with recent works on irrationality in pricing of securities and emphasize the doubts raised about efficacy of standard test for market efficiency.

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## **Introduction**

It is well recognized that the usual statistical procedures for testing market efficiency test a joint hypothesis on market efficiency and models for valuation of securities. The procedures are based on the premise that market rationally values the securities to reflect the economic realities. There is mounting evidence however that prices may take persistent, wide excursions from the fundamental values. Shiller (1981a, 1981b, 1990), LeRoy and Porter (1981), LeRoy (1989) have focused attention on volatility and found that security prices tend to be far more volatile than what can be justified on the basis of changes in the fundamentals of the scrip. This kind of inefficiency in valuation is difficult to detect using the conventional testing procedures for efficiency.

To accommodate observed irrationalities, alternate models for decision making and valuation of securities have been proposed. Tversky and Kahneman (1981, 1986) have suggested psychological models for individual decision making, which could explain the behaviour of speculative markets. Summers (1986) proposed a "fads" model in which the valuation differs from the fundamental value by a multiplicative factor. This model which can also capture mean reversion was subsequently tested by Poterba and Summers (1988). Summers argues in his 1986 paper that the standard procedures for testing the Efficient Market Hypothesis (EMH), would be unable to detect persistent departures from fundamental values. Therefore, the inability to reject EMH by conventional methods should not lead to its automatic acceptance, without examining whether the securities are priced irrationally.

This paper reports an empirical research done in the same spirit as the works cited above. The setting for the work is the valuation of a closed-end mutual fund in the Indian capital Market. The conclusions from the study further establish the universality of the observations and some of the arguments being advanced in these works.

## **The Setting**

Despite being a developing economy, India has mature stock market, established well over a hundred years ago. The first stock exchange in India, established at Bombay in 1885, has more than 6200 listed companies (Emerging Stock Markets, 1990, published by IFC). This number is exceeded only by the NYSE and is much larger than number of listed companies in other stock markets in the world. With a market capitalization of about Rs.700 billion (Rs., rupees, is the Indian currency), an estimated equity investor base of about 20

million, the Bombay Stock Exchange compares well with the largest stock exchanges in the world.

The Indian stock market, as reported in the works of Ray (1976), Sharma and Kennedy (1977), Barua (1981), Ramachandran (1984), to name a few, has been found to be efficient in the weak and the semi-strong form. This conclusion, arrived at using the conventional methods of testing market efficiency is in line with similar works in markets in the developed economies. Evidence of inefficiency in some situations, reported in Barua and Raghunathan (1986, 1987), has primarily arisen from government regulations in the primary markets. The standard asset pricing models also apply well in the Indian market, as concluded, through rigorous testing by Varma (1988).

In 1986, after considerable debate on their utility, the government of India finally gave a green signal to establishment of Mutual Funds. Therefore, in September 1986, the Unit Trust of India (UTI) launched Mastershares, the first closed-end Mutual Fund in the Indian Market. The planned size of the fund was half a billion rupees. However, since the issue was oversubscribed, the Trust decided to retain the entire collection of about Rs.1.50 billion. In March 1989, about another Rs.0.80 billion was added to the corpus through a rights issue.

Mastershares was conceived as a growth fund. The Trust had made it clear at the time of issue itself that it would be under no obligation to distribute any fixed percentage of income as dividends. The benefits to the shareholders would primarily be in the form of capital appreciation. The Trust also announced that the redemption of Mastershares would commence after October 19, 1993, that is, seven years after the issue, on terms to be specified by the Trust. The redemption price would be based on the Net Asset Value (NAV). In line with the stated objectives, the fund has almost exclusively been invested in equity. To ensure liquidity, Mastershares has been listed in all the major stock exchanges in the country. The UTI computes and announces the NAV of Mastershares periodically, generally once a week, so as to keep the shareholders informed about how the fund is performing.

### **The Research Issue**

An analysis of performance of Mastershares by Barua and Varma (1991) concluded that while the performance of the fund on the basis of NAVs was impressive, its performance in the market, based on prices, could even be described as mediocre, because of a much higher systematic risk. The analysis revealed considerable divergence between prices and NAVs. Since the NAV, after some adjustments for winding up costs may be regarded as the fundamental value of a closed-end mutual fund, the observed divergence has important implications for the process of valuation and market efficiency.

This paper reports a deeper investigation of the nature of relationship between NAVs and prices. The analysis has been done in three distinct stages: a) estimation of the market model of NAV and

prices, b) assessment of the response of prices to unexpected changes in NAV, c) examination of the impact of the discount at which Mastershares is quoted below its NAV, on future returns. The details of the methodology used and the empirical results obtained for each stage of analysis are described separately in the following sections. The concluding section, discusses the results by drawing comparisons with similar results obtained in the U.S. capital markets, and offers some plausible explanations in the Indian context.

**The Market Model for NAV and Prices**

The estimable form of Capital Asset Pricing Model (CAPM), the Market Model specified below was applied to the NAV and the prices separately.

$$r_t = \alpha + \beta r_{m,t} + e_t \quad \dots \quad \dots \quad (1)$$

where  $r_t$  is the return in period  $t$   
 $r_{m,t}$  is the market return in period  $t$   
 $e_t$  is the error term  
 $\alpha$  is the constant term which according to the CAPM should equal  $r_f (1 - \beta)$

The All Industries All India Equity Index computed by the Economic Times (ET Index) was used as the Market Index. The returns were computed assuming continuous compounding:

$$r_{NAV,t} = \ln(NAV_t/NAV_{t-1}) \quad \dots \quad \dots \quad (2)$$

$$r_{MP,t} = \ln(MP_t/MP_{t-1}) \quad \dots \quad \dots \quad (3)$$

$$r_{m,t} = \ln(ET_t/ET_{t-1}) \quad \dots \quad \dots \quad (4)$$

where  $NAV_t$  is the NAV at the end of period  $t$   
 $MP_t$  is the market price at the end of period  $t$   
 $ET_t$  is the ET Index at the end of period  $t$

The ET Index, the NAV and the market price of Mastershares were collected for all the dates as on which the UTI computed the NAVs (hereafter called the computation dates). The period of analysis is from July 1987 to September 1990. as the UTI started computing and announcing the NAVs at an average interval of one week from June 1987 onwards. The coefficients estimated for the market model for NAV were as follows:

Period	N	$\alpha^*$	$\beta^*$	$R^2$	test $\alpha=R_f(1-\beta)$
Jul87-Sep90	167	0.490% (5.78)	0.813 (24.98)	0.791	F=29.065 P=0.000

\* The t-values are in the parentheses

The CAPM specifies that  $\alpha = R_f(1 - \beta)$ . The result of testing this hypothesis is reported in the last column. The testing has been done assuming an  $R_f$  of 12% per annum. The F value is the F-statistic with (1,N-2) degrees of freedom for this linear restriction on parameters, and the P value is the probability (significance level) corresponding to the F value. The hypothesis is rejected at a very high level of significance. The value of  $\alpha$  at 0.49 is far above the value 0.041% implied by the hypothesis. Thus Mastershares have earned a return that is significantly above the equilibrium return mandated by the CAPM.

The coefficients of the market model based on prices turned out to be as follows:

Period	N	$\alpha^*$	$\beta^*$	$R^2$	test $\alpha=R_f(1-\beta)$
Jul87-Sep90	154	0.125% (0.38)	1.166 (9.22)	0.359	F=0.255 P=0.614

\* The t-values are in the parentheses

The last column contains the result of testing for abnormal returns. The F-statistic and P value indicated that the hypothesized value of alpha cannot be rejected. Thus, unlike the case of NAV based returns, Mastershares has not earned abnormal returns, when returns are based on prices. A similar anomaly is observed in the variability of the returns also: while the standard deviation of returns on NAV is 2.3% per week, the returns on market prices show a standard deviation of 5.02%. This is in line with the excess volatility observed in the studies cited earlier.

**Relation between NAV and Price**

Since the NAV is computed using the market prices of shares, it represents the current market value of the portfolio held by Mastershares. As mentioned earlier, unlike the book value for an ordinary company, the NAV can, with some adjustments for liquidation costs and management expenses, be regarded as the "fundamental value" of the Mastershares. Hence, one would expect the market price to move in tandem with this fundamental value.

The preceding results, however, indicate that the actual behaviour does not conform to this theoretical expectation. As a first step towards understanding the actual NAV relationship, a simple linear regression of market prices on NAV was run. The result was as follows:

$$MP = -1.673 + 0.884 \text{ NAV} \qquad R^2 = 0.802$$

$$(-1.81) \quad (21.38)$$

The numbers in parentheses are the t-values. The  $R^2$  of 0.802 and a highly significant coefficient of 0.884 indicate a strong influence

of NAV on prices. However to confirm that the relationship was not spurious, a simple linear regression of prices on the market index was run. The result was as follows:

$$\begin{aligned} \text{MP} &= -5.417 + 0.059 \text{ ET} & R^2 &= 0.867 \\ &(-6.20) \quad (26.86) \end{aligned}$$

The high  $R^2$  and significant coefficient of market index indicate a possibility that the relationship between the NAV and price could be spurious, caused by both being related strongly to the market index. To complete the analysis, a regression was run with both the NAV and the index as independent variables.

$$\begin{aligned} \text{MP} &= -6.182 - 0.293 \text{ NAV} + 0.077 \text{ ET} & R^2 &= 0.871 \\ &(-6.43) \quad (-1.81) \quad (7.49) \end{aligned}$$

The regression estimates above indicate that the Index provides most of the explanation of variations in prices. The coefficient of NAV is not very significant and is of the wrong sign. However, this result could have arisen from multicollinearity. A more sophisticated methodology based on examining the impact of unanticipated changes in NAV on the prices was used for further investigation.

#### **Impact of Unanticipated Changes in NAV on Prices**

As mentioned earlier, the NAV is published only at weekly intervals, and even on the date of publication is a few days old. Theoretically, the market should use the latest published NAV to estimate the current NAV and price the Mastershares accordingly. When a new NAV is announced, the market price should be affected only if the announced NAV diverges from the previous estimate. In other words, the market price would respond only to unanticipated changes in NAV. Some notations are introduced to explain the proposed methodology .

a(n) = first trading date after announcement of the n'th NAV  
a'(n) = last trading date before announcement of the n'th NAV  
c(n) = the date as on which the n'th NAV is computed

The behaviour of the prices between a(n) and a'(n) is modelled as follows in terms of the logarithmic returns:

$$\text{MPRET}_1 = b_0 + b_1 \text{ ETRET}_1 + b_2 \text{ UNEXP} \quad \dots \quad (5)$$

where

$\text{MPRET}_1 = \text{return on the market price} = \ln[\text{MP}_{a(n)} / \text{MP}_{a'(n)}]$   
 $\text{ETRET}_1 = \text{return on the market index} = \ln[\text{ET}_{a(n)} / \text{ET}_{a'(n)}]$   
 $\text{UNEXP} = \text{unexpected NAV return}$   
 $= \ln[\text{NAV}_{c(n)} / \text{NAV}_{c(n-1)}] - (\alpha + \beta \ln[\text{ET}_{c(n)} / \text{ET}_{c(n-1)}]),$

the second term being the NAV return expected using the market model

The model states that the return on prices on the announcement of NAV depends on two factors: the market return on that day and the

unexpected component of the NAV return. This model was estimated using data from July '88 onwards. The regression results were as follows:

$\text{MPRET}_1 = 0.042\% + 1.030 \text{ ETRET}_1 + 0.062 \text{ UNEXP}$ $(0.16) \quad (4.52) \quad (0.54)$	$R^2 = 0.197$
$\text{MPRET}_1 = 0.015\% + 1.046 \text{ ETRET}_1$ $(0.06) \quad (4.68)$	$R^2 = 0.194$
$\text{MPRET}_1 = 0.364\% + 0.134 \text{ UNEXP}$ $(1.29) \quad (1.07)$	$R^2 = 0.013$

\* The t-values are in the parentheses

The results show that the unexpected component of the NAV has no impact on the market prices. The conclusion is in line with the earlier conclusion suggested by the simple linear regression of prices on NAV. It now stands confirmed that the market does not take NAVs into account while pricing Mastershares.

This conclusion is inconsistent with the joint hypothesis that Mastershares are rationally priced in the market, and that the NAV represents the intrinsic worth of the Mastershares. In other words, it can be concluded that either the market price is irrational, or that the NAV does not, for some reason represent the intrinsic worth of the Mastershares. Further tests were carried out to determine which of these alternative conclusions is correct.

**An Alternate Model for Relationship between Price and Nav**

A preliminary examination of prices and NAVs indicated that Mastershares is always quoted at a discount. At times, the price is at a deep discount from NAV, and at other times the discount is very narrow. The discount appeared to fluctuate around a mean value, and whenever the discount moved too far away from the mean, there was a tendency to return to the mean level. Technically, the discount appeared to follow a mean reverting random walk.

$$\text{DIS}_t = (1 - \alpha) \text{AVGDIS} + \alpha \text{DIS}_{t-1} + v_t, \quad 0 \leq \alpha \leq 1 \quad (6)$$

Where

- DIS<sub>t</sub> = -ln(MP<sub>t</sub>/NAV<sub>t</sub>)
- = -ln(1 - proportional discount)
- = -ln(1 - [NAV<sub>t</sub>-MP<sub>t</sub>]/NAV<sub>t</sub>), is the discount at time t
- AVGDIS is the mean value to which discount tends to revert
- α is the parameter determining the speed of reversion
- v<sub>t</sub> is a serially uncorrelated mean zero disturbance.

The above is an autoregressive model. For α close to unity, the mean reversion might not be immediately apparent, and the discount

might appear to follow a simple random walk. The model was estimated and the regression result was as follows:

$$\text{DIS}_t = 2.809\% + 0.886 \text{ DIS}_{t-1} \quad R^2 = 0.804$$

(3.12) (24.85)

implying  $\alpha = 0.886$  and  $\text{AVGDIS} \approx 24\%$   
 (The t-values are in the parentheses)

The value of  $\alpha$  being close to unity would make the process look like a simple random walk, but the hypothesis that  $\alpha = 1$  is convincingly rejected (t-statistic = 3.20). Thus, mean reversion is taking place, implying that either the price or the NAV adjust to eliminate abnormally high or abnormally low discount. A further examination needs to be carried out to determine which of the two does the adjustment.

Subtracting  $\text{DIS}_{t-1}$  from both sides of equation (6) and then substituting the definition of discount, would give the following equation:

$$\ln \frac{\text{MP}_t}{\text{MP}_{t-1}} - \ln \frac{\text{NAV}_t}{\text{NAV}_{t-1}} = (1-\alpha) (\text{DIS}_{t-1} - \text{AVGDIS}) - v_t \quad (8)$$

This is the same as

$$r_{\text{MP},t} - r_{\text{NAV},t} = (1-\alpha) (\text{DIS}_{t-1} - \text{AVGDIS}) - v_t \quad (9)$$

This implies that when there is a deep discount making the right hand side strongly positive, either there will be a high market price return or a low NAV return (or both) to keep the left hand side also strongly positive. Similarly, a low discount implies that either the price return will be low or the NAV return will be high.

The empirical question now is whether it is the market price or the NAV that does the adjusting. If it is found that it is the market price that adjusts, then we could conclude that the market price was irrational, and that as investors gradually recognize this they are correcting the earlier error.

The price return and the NAV return were regressed separately on the discount at the beginning of the period. In both cases, possible impact of the market index was eliminated by including the market return as an additional explanatory variable. The regression results were as follows:

$$\text{MPRET} = -2.505\% + 1.193 \text{ ETRET} + 0.110 \text{ DIS}\%$$

(-2.77) (9.68) (3.10)  $R^2 = 0.397$

$$\text{NAVRET} = 0.938\% + 0.814 \text{ ETRET} - 0.018 \text{ DIS}\%$$

(3.90) (24.68) (-1.87)  $R^2 = 0.799$

(The t-values are in the parentheses)

where,

$$\text{MPRET} = \text{return on market price} = \ln [\text{MP}_{c(n+1)} / \text{MP}_{c(n)}]$$



$$\begin{aligned}
\text{NAVRET} &= \text{return on NAV} &&= \ln [\text{NAV}_{c(n+1)}/\text{NAV}_{c(n)}] \\
\text{ETRET} &= \text{return on market index} &&= \ln [\text{ET}_{c(n+1)}/\text{ET}_{c(n)}] \\
\text{DIS\%} &= \text{percent discount beginning of period} \\
&= -100 * \ln(\text{MP}_{c(n)}/\text{NAV}_{c(n)})
\end{aligned}$$

The results very clearly show that it is the price which does all the adjustment. The coefficient of discount in the regression equation for the market return is large and significant. In the case of the NAV return, the coefficient, though of the right sign, is small and statistically insignificantly different from zero. The inference that can be drawn therefore is that the market prices deviate irrationally from the NAVs but correct themselves gradually in subsequent periods. The fluctuations in spread are not due to any distortions in NAVs.

It would be instructive to link the above model with the "fads" model proposed by Summers (1986) to capture a situation in which market prices are irrational and fail to reflect fundamental values. Summers' model is:

$$\begin{aligned}
p_t &= p_t^* + u_t \\
u_t &= \alpha u_{t-1} + v_t
\end{aligned} \tag{10}$$

where  $p$  is the logarithm of market price,  $p^*$  is the logarithm of fundamental value,  $0 \leq \alpha \leq 1$ , and  $v$  is a serially uncorrelated mean zero disturbance.

Substituting  $p = \ln(\text{MP})$ ,  $p^* = \ln(\text{NAV}) - \text{AVGDIS}$ ,  $u = \text{AVGDIS} - \text{DIS}$ , would reduce equations (6) and (7) to (10).

Thus, the conclusion about the behaviour of market price of Mastershares is in line with the mean correcting behaviour of share prices reported by Poterba and Summers (1988). The method in this paper however arrives at that conclusion after testing as to which of the two, the price or the fundamental value does the adjusting. In the earlier works, there is always an implicit (questionable) assumption that fundamental values are correct.

### Conclusion

The conclusions of the current study may be summarized as follows:

1. On applying the market model to NAVs and market prices, we find that the market prices have a sharply higher beta than the NAVs. The market prices also have a higher variance. All these indicate that the market prices fluctuate far more wildly than justified by fundamentals.
2. Though the prices are highly correlated with NAVs, the correlation is due only to the common influence of the market index. The prices are, in fact, more closely related to the market index than to the NAV indicating that the market does not take the NAV into account in pricing Mastershares.

3. Lending further support to this conclusion is the sharper result that the information content of the NAV announcement (i.e. the unexpected change in the NAV) has no impact on the market prices.
4. Deep discount of the market price from NAV is associated with significantly higher returns in future periods demonstrating that the pricing is irrational and indicating that, perhaps, a profitable trading rule can be found to exploit this irrationality.
5. On the other hand, there is no evidence to suggest that the observed discount is a rational adjustment for any accounting or other deficiencies in the NAV computation. There is no significant association between the discount and subsequent changes in the NAV.

The fact that market prices do move irrationally only to correct themselves subsequently raises the intriguing possibility of a profitable trading rule which would try to buy Mastershares when they are quoting at a deep discount and sell it when the discount narrows. Identification of the actual parameters of such a rule would need further research.

Another puzzling issue is the large mean discount of 24% (logarithmic discount) which corresponds to a proportional discount of 21%. Why should the mean discount be so large? Factors like liquidation costs cannot account for such a large value. Of course, there are some situations where holding Mastershares is not a substitute for physical possession of the shares that comprise the Mastershares portfolio. In a takeover struggle, an individual investor may be able to earn a windfall return by selling proxies, while UTI may not wish to get involved in such takeovers and may not exploit such an opportunity; similarly, possession of shares of individual companies allows an individual to engage in "margin" trading in the market. But whether these disadvantages of holding Mastershares can justify such a deep discount is an open question.

These conclusions must be seen in the light of the considerable literature that exists on the efficiency of the Indian stock markets. Studies, using the standard procedures for testing the EMH, have shown the market to be efficient in the weak form and the semi-strong form. However, the conclusions arrived at in this paper are counter to what one would expect in an efficient market dominated by rational investors, and suggest that the market may indeed be governed by irrational considerations. Price movements appear to be divorced from fundamentals and bring into question the methodology that is used for investigating market efficiency. The results are in line with some of the recent work being done on irrationalities in developed economies.

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