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Testing a Closed-End Fund Investment Strategy

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1 Introduction

Closed-end funds that intend to buy back shares with self-tender offers give investors the opportunity to make profits from these tender offers. A tender offer differs from the open-market repurchase in the way that in a tender offer the purchase price is determined by multiplying a fixed percentage with the net asset value of the fund on the pricing day, which is usually higher than the market price of the fund. Bhanot, Martinez, Kadapakkam & Yildirim (2008) concluded that without any hedges, the average return in closed-end fund self-tender offers from 1994 to 2006 was 1.17%. This return is comparable to the 1% return in Dutch-auction stock tender offers discovered by Kadapakkam and Seth (1994), but is much lower than the 9% return from fixed-price stock tender offers found by Peyer and Vermaelen (2008). Bhanot et al.(2008) theorized that the fixed-price stock tender offers generate much higher returns because the investor is compensated for bearing the substantial risk of holding a single security if the tender offer is oversubscribed and tendered shares are accepted on a pro-rata basis.

While holding a closed-end fund portfolio can eliminate much of the idiosyncratic risk, the portfolio is still susceptible to the market risk. In fact, if the investor can predict the pro-rata rate, he is able to hedge the market risk and possibly generate returns comparable to the unhedged case. The author would like to discuss how the investor can predict the pro-rata rate based on the public-avilable information about the close-end funds self-tender offers and how much return this strategy can generate. The author identified 82 closed-end fund self-tender events in the SEC EDGAR database. The SEC EDGAR database also provides the information on the odd-lot priority, percentage of shares repurchased, and the final pro-rata rate of the tender offers. The price, NAV, and volume data are collected from Morningstar.com. The author has run regressions to determine which factors are most useful in explaining the pro-rata rate in closed-end fund tender offers. The author came to a conclusion that is it impossible to predict the pro-rata rate based on the public-available information the author collected. Therefore, the strategy aiming at earning riskless profits in the closed-end fund self-tender offer events is not feasible.

2 Background

The net asset value (NAV) per share of a closed-end fund (CEF) is calculated by dividing the total value of all the securities in its portfolio by the number of fund shares outstanding. Usually, the market price of a CEF is less than its NAV, in other words, it trades at a discount. Sometimes, the discount can be as large as 40%. This phenomenon is often referred to as the closed-end fund premium puzzle.

Some investors invest in closed-end funds when a CEF announces a tender offer to buy back a percentage of CEF shares at a price close to the NAV. The trade uses two accounts and involves simultaneously entering a long position in the CEF, a short position in the CEF in another account and a short position in an Exchange-Traded Fund (ETF) that holds a similar portfolio. As ETFs always trade at par value to the net asset value, they are widely used to hedge the market risk. When the deadline of the tender offer expires, all the shares participating in the offer will be accepted on a pro-rata basis if the offer is oversubscribed. The unaccepted shares are usually returned in 7 calendar days. The discount at which the CEF trades after the tender offer expires will typically return to the ex-tender offer announcement level. The short position in the CEF cancels out the long position in the CEF that will be returned, and the short position in the ETF makes sure that the investor gets riskless profit from the discount spread.

If the investors simply enter a long position in the CEF, they will always end up with too much long exposure to the market unless the tender offer is undersubscribed. This simple strategy was discussed by Bhanot et al.(2008) and they concluded that the strategy generates an average return 1.17 percent. Ideally, with a precise prediction of the pro-rata rate, the investors will have no net exposure to the NAV risk. Then, the investor can possibly reap the NAV-adjusted 1.57 percent return discovered by Bhanot et al.(2008).

I will illustrate the importance of hedging with a hypothetical example. Suppose a fund trades at \$18 when the NAV is \$20. In other words, it trades at 10% discount. Then, the fund announces a tender offer for 30% of shares at 99 percent NAV and the repurchase price is determined based on the NAV on the expiration day of the tender offer. After the announcement, the NAV remains at \$20, but the price rises to \$19, or 5% discount in anticipation of

Table 1

After-tender NAV	Post-tender Price	Total Profit	Percentage Profit
22.0	19.8	80.0	4.21
20.0	18.0	-28.0	-1.47
18.0	16.2	-136.0	-7.16
After-tender NAV	Post-tender Price	Total Profit	Percentage Profit
22.0	19.8	48.0	1.47
20.0	18.0	48.0	1.47
18.0	16.2	48.0	1.47

a possible arbitrage opportunity. We buy 100 shares at \$19 a week before the offer expires. Suppose 50% of the shares are tendered, the pro-rata rate is 30%/50%=60%. Further suppose that the discount rate returns to 10% after the tender offer. The accepted shares are sold at \$20*99%=\$19.8. The investor who can predict the pro-rata rate will buy 100 shares of CEF at \$19 and tender all 100 shares, short sell 40 shares of CEF at \$19, and short sell 60 shares of ETF at \$20. The investor that engages in the simple strategy will simply buy 100 shares of CEF and tender all of them. We assume here that the short interests for CEF and ETF are zero, and the short selling margin is 50% of the total short amount.

Table 1 shows the different return characteristics of the two strategies. For example, suppose that the after-tender NAV is \$22. If we used the simple strategy, the profit is calculated by \$22*(1-10%)*40+\$20*99%*60-\$19*100=\$80. If we used the hedging strategy, the profit is simply 60*(\$20*99%-\$19)=\$48. As we can see, if the portfolio is not fully hedged, the percentage profit can range from -7.16% to 4.21% when the after-tender NAV moves up or down 10%. When the portfolio is hedged, however, the percentage profit is always 1.47% no matter how much the after-tender NAV moves. It is easy to see that an unhedged strategy will generate returns that are highly dependent on the market environment, while a fully hedged strategy is not at the mercy of favorable market environment at all. Therefore, coming up with the prediction model that can help determine the hedging ratio is essential in realizing market-neutral returns.

3 Data

The author searched the SEC database for the SC TO-I filing for CEF tender offers. Initially, the author found 271 CEF repurchase filings from 2000 to 2013. Of the 271 events, 92 were from the funds that were liquidated, 2 were from funds that were open-ended. No data were available on these funds. One of the events was a fix-price tender offer, and this observation is also dropped. 6 events were preferred shares tender offers instead of common stock tender offers. Further excluding the mistake filings and the replicate filings, a total of 82 self-tender offers events were included in the dataset. The price, NAV, and volume data of the 82 deals were then collected from Morningstar.

The following data were collected. Pro-rata rate measures what percentage of shares was accepted by the fund. Odd-lot priority tells whether the fund company accepted all the shares if the shareholder tendering holds 99 shares or less. It is a 0-1 variable. Percentage of shares repurchased, which specifies what percentage of shares the fund was going to repurchase. Volume ratio is the ratio of the average daily volume in the first two weeks of the tender offer period and the average daily volume a month before the tender offer announcement. Liquidity is measured by the average daily turnover in the six months prior to the tender offer announcement, which is calculated by dividing the daily volume by the total number of shares outstanding. Pre-deal discount is the discount to NAV on the day before the announcement of the tender offer. Purchase discount is the discount to NAV a week before the expiration of the tender offer. Offer discount is the discount at which the fund repurchased shares. Post-deal discount refers to the discount to NAV seven trading days after the expiration of the tender offer. Institutional ownership is the percentage of closed-end fund shares held by institutional investors before the expiration of the tender offer.

4 Model Setup

In order to fully hedge the market risks, the ability to precisely predict the pro-rata rate when the self-tender offers are oversubscribed is essential. Predicting the pro-rata rate might be hard since the investor can hardly control

how many shares are tendered. I run the following regression to predict the pro-rata ratio:

$$P = \beta_0 * OL + \beta_1 * R + \beta_2 * V + \beta_3 * L + \beta_4 * D + \beta_5 * I + \beta_6. \qquad (1)$$

Where
P=pro-rata rate
OL=odd-lot priority
R=percentage of shares repurchased
V=volume ratio
L=liquidity
I=Institution ownership
D=discount differential between the share price and the purchase price a week before the expiration of the offer

In theory, the odd-lot priority has a small negative effect on the pro-rata rate because the fund is obliged to purchase all the shares tendered by the odd-lot shareholders. After the fund repurchased shares from all the odd-lot holders, the shares from round-lot holders are accepted by pro-rata basis. Therefore the more odd-lot shares tendered, the fewer shares a round-lot holder can successfully tender. Percentage of share repurchase should have a positive effect because the more shares the fund repurchases, holding other variables the same, the more shares are successfully tendered by each individual shareholder. Volume ratio should have a negative effect on the pro-rata rate because the increasing popularity of the fund implies more arbitragers participate in the deal. Liquidity should also have a negative impact on the pro-rata rate since the investors are compensated by investing in illiquid securities. Institutional ownership should have a negative effect since institutional investors are assumed to be smart and actively follow the corporate actions of their holdings. Finally, the discount differential should have a negative effect because the larger the differential, the more attractive the deal is to arbitragers who will buy and tender.

5 Results and Discussion

5.1 Descriptive Data

The following are descriptive data on the dependent variable and the independent variables.

	Max	Min	Mean	Median
Repurchase %	100%	5%	16%	10%
Volume Ratio	3.48	0.18	1.29	1.19
Liquidity	0.55	0.02	0.24	0.24
Pre-deal Discount	30.11%	1.54%	10.91%	9.73%
Purchase Discount	21.45%	0.66%	8.92%	8.37%
Tender offer discour	10.00%	0.00%	2.91%	2.00%
Institution %	91.40%	0.43%	35.35%	34.05%
Post-deal discount	25.23%	2.62%	10.74%	9.87%
Pro rata rate	100.00%	6.91%	39.20%	33.93%
Profit%	9.33%	-0.75%	2.01%	1.72%

In the dataset, 42 out of 82 closed-end fund tenders had odd-lot priority provisions, showing that there is a protection mechanism for small investors. The percentage of shares a closed-end fund repurchased varied from 5% to as high as 100%. The median number, however, was 10%. This statistics shows that most of the funds are reluctant to dramatically shrink the scale of the fund because the management fees are charged as a certain percentage of the size of assets under management(AUM). The volume ratio had a very large range. Some of the tender offers, such as that of Morgan Stanley Asia Pacific Fund, received extremely popularity among arbitragers and saw an increase of average volume by 3 times. Some deals, such as that of JF China Region Fund, did not receive much attention and the fund saw the daily average volume shrink to less than 20% of the pre-deal level. On average, the self-tender offers received 20% higher volume in the tender period, showing the additional publicity the tender offer brought about. The liquidity measured by the average daily turnover ratio ranged from 0.02 in the case of Korea Fund to 0.55 in the case of Neuberger Berman Real Estate Income

Fund. Funds with poor liquidity often have large bid-ask spreads, and the large bid-ask spread makes it hard for institutions to establish a sizable position in the fund. Before the deal, the discount to NAV range from 30% to 1.5%. People would think the size of discount should have high correlation with liquidity. Surprisingly, the correlation between the liquidity and the pre-deal discount is -0.02, or very close to zero. On average, the funds that conducted self-tender offers traded at 9.7% discount prior to the announcement of the deal. Once a deal is announced, the discount shrinks a little to price in the potential arbitrage opportunity. The average discount decreased by 1.3% one week before the expiration of the tender offer. The terms of the self-tender exhibited great diversity, with the largest purchase discount being 10% and the smallest purchase discount being on par to NAV. The median purchase discount was 2%. After the expiration of the tender offer period, the discount of the closed-end fund returned to around the pre-deal level. The median post-deal discount was 9.9%, 0.2% higher than the median pre-deal discount. Closed-end funds also had different institutional ownership characteristics. The most popular fund among institutional investors, Latin American Discovery Fund, had 91.4% institutional ownership in 2005. The least popular fund, Delaware Group Dividend & Investment Fund, had only 0.4% institutional ownership back in 2000. The median pro-rata rate in all of the closed-end fund tender offers was 33.9%, and the median return assuming the NAV risks are fully hedged was 1.7%. This return is comparable to the 1.57% average return in Bhanot et al (2008).

5.2 Original Regression

$$P = -0.23 * OL + 1.57 * R + 5.39 * V - 16.90 * L - 0.10 * D - 0.11 * I + 34.11 \qquad (2)$$

When running the original regression, none of the independent variables are statistically significant at 10% level. Although the R^2 is 0.08, the adjusted R^2 is extremely low at 0.0078, implying that the model has very poor explanatory power. Moreover, the regression suffers from heteroskadesticity as the Bruce-Pagan test result shows the probability of constant variances is 1.2%.

To deal with the heteroskasticity problem, independent variables take the log-transformation whenever appropriate. Also, an interaction term is added

to account for the fact that a big discount difference with a large repurchase percentage could be particularly attractive to arbitragers.

5.3 Modified Regression and Discussion

$$P = 0.57 * OL - 3.03 * R + 6.76 * lg(V) - 17.88 * L - 0.45 * D - 0.08 * I + 5.51 * Interaction + 51.08 \quad (3)$$

Discount difference, repurchase percentage, and the interaction term are all significant at the 10% level in this modified model. If the discount difference increases by 1%, the pro-rata rate should decrease by 0.45%. If the fund plans to repurchase an additional 1% of shares, the pro-rata rate should drop by about 3%. The adjusted R^2 is considerably higher than the original regression at 8%. The model does not suffer from heteroskadesticity as the Bruce-Pagan test shows the probability of constant variances is 13.7%.

The regression also has a number of insignificant independent variables. For example, the odd-lot priority provision has little influence on the pro-rata rate. This may be due to the fact that the number of shares held by individual investors who owns 99 shares or less are too small to make any impact. It is worth mentioning, though, that it is possible to set up a number of brokerage accounts and use each account to participate CEF self-tender offers with the odd-lot priority. Investors can circumvent the pro-rata procedure and catch the whole discount difference, whose average is as large as 6% in the past 82 self-tender events. If, however, this source of profit is going to shrink, the profit on the round-lot tender offers which is subject to the pro-rata procedure will also decrease and may wipe out the possibility of arbitrage in the end. Also surprising to the author is the fact that the volume ratio, which measures the popularity of the deal, turns out to be insignificant. This may be due to the fact that the closed-end fund self-tender arbitrage is not well-researched among institutional investors. As the result, the volume in the tender period does not really reflect the accumulation of shares by arbitragers. It is not surprising that the institutional ownership is not statistically significant. Since Bloomberg does not have this data prior to 2010, the author had to use the quarterly ownership statistics provided by Thomson One, which is very noisy. A lot of things can happen to institutions' portfolio decisions within a quarter, and this variable is only the best estimation available. Moreover, some institutions are passive investors trying

to use a basket of CEFs to replicate a certain index at a discount, while other activist shareholders would like to remain a large shareholder in the fund and prepare for proxy fights. In either case, the institution investor may choose not to tender their shares to the fund. The uncertainty of institution behaviors makes it hard for this institution ownership variable to predict the pro-rata rate. The liquidity variable has poor predicting power as well, but the author does not have a good explanation for this.

In conclusion, the current model is still unable to explain most of the variances in the pro-rata rate using all the data available to investors. Maybe some other variables are able to provide a better predictive power. Before a powerful independent variable is found, however, we cannot expect to earn a riskless profit in the CEF self-tender offers with a portfolio of long and short positions in CEF and ETF.

6 References

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