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Abstract

Prior research has documented anomalous profits as high as 9% from participating in stock repurchase tender offers. The trading strategy is to buy shares in the market just before offer expiration and tender; it involves a trading horizon of just a few days. The large profits given a short trading horizon are puzzling, and this evidence raises serious questions about market efficiency. A possible reason inhibiting arbitragers from eliminating these profits is risk exposure. We examine whether trading profits are available in tender offer repurchases conducted by closed-end funds. Risk exposure concerns should be minimized for these offers, since the underlying assets of closed-end funds constitute a well-diversified portfolio of securities. We find significant tendering profits even in this sample, although the magnitude is much smaller at around 1%.

Keywords: Tender Offers, Closed-End Fund

JEL Codes: G30, G39

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1. Introduction

To allocate capital efficiently, it is crucial that financial markets correctly assess future payoffs and risks, and provide reasonable valuations of the financial instruments employed by issuers to raise capital. The periodic financial upheavals (Internet bubble, sub-prime credit crisis, etc.) generate considerable skepticism about the valuation prowess of financial markets. While hindsight always provides clarity, it is difficult to gauge whether, at the time of valuation, financial markets adequately reflect existing information about payoffs in the distant future. It is easier to evaluate whether markets can assess payoffs over a short horizon. For instance, Mitchell and Pulvino (2001), and Baker and Savasoglu (2002) assess whether arbitragers force stock prices to reflect the payoffs available to target shareholders in corporate mergers.

Lakonishok and Vermaelen (1990) analyze fixed-price stock repurchase tender offers and report perhaps the most striking piece of evidence on the mispricing of short-term payoffs. They examine the profits to a trading strategy of buying shares a few days before offer expiration and tendering; any shares not accepted in the repurchase offer are sold at the market price a few days after offer expiration. They document tendering profits of around 9% over the trading horizon of a few days. Peyer and Vermaelen (2008) update this evidence and find that these profits have not disappeared over time. It is hard to rationalize profits of such magnitude, and they constitute a serious challenge to our understanding of price formation in financial markets.

Kadapakkam and Seth (1994) examine Dutch auction repurchases and report smaller tendering profits of around 1%. They document a positive relationship between tendering profits and the unsystematic risk of the stock. This evidence suggests that arbitragers do not eliminate these profits because they do not want exposure to this risk. Mitchell, Pulvino and Stafford

(2002), addressing the issue in a broader context, provide additional evidence that risk exposure concerns deter arbitrage activities in equity markets.

Arbitragers seeking abnormal profits, in the context of tender offers and mergers, are exposed to event risk and unsystematic risk. To provide additional evidence on the striking tendering profits anomaly and understand the role of risk exposure in limiting arbitrage, we study repurchase tender offers made by closed-end funds. We evaluate a strategy of buying the day before offer expiration and tendering. Since stocks of closed-end funds represent claims on a broad, well-diversified portfolio of underlying assets, idiosyncratic or unsystematic risk exposure should be minimized.¹ Also, there is no event risk since none of the announced closed-end fund tender offer repurchases is cancelled; furthermore, buying one day before offer expiration ensures that event risk is a nonissue.

Our sample consists of 71 closed-end fund tender offer repurchases conducted in the 1994-2006 period. This strategy yields raw returns of 1.17%. When these returns are adjusted for changes in the fund's net asset value (NAV) unrelated to the offer, the mean abnormal profit is 1.57%. Both these numbers are statistically significant. Furthermore, there are significant profits in the second half of the sample period; thus, they have not disappeared over time. Tendering profits are significant for both equity and bond funds. The profits are reduced after adjustments for the impact of transaction costs (bid-ask spread), but they remain statistically significant. In the second half of the sample period, the bid-ask adjusted profits are 1.08%.

The tendering profits are smaller than the profits noted in fixed-price repurchase tender offers. This evidence is consistent with the reduced risk in closed-end fund tender offers

¹ However, a distinguishing feature of closed-end tender offers is that the tender price is set as a fraction of the fund's net asset value assessed on a specified date, typically on or shortly after the offer expiration date. Thus, even if all the tendered shares were repurchased by the fund, the investor is still exposed to the risk of fluctuations in the fund's NAV. This risk should mainly be systematic risk, given the diversified portfolio held by closed-end funds.

encouraging more aggressive arbitrage activity and reducing tendering profits. Overall, the evidence provides confirmation of the anomalous behavior of market prices around expiration of repurchase tender offers. It also provides additional evidence on the limits to arbitrage activity in equity markets. Although the unsystematic risk of a portfolio of securities should be considerably less than the unsystematic risk of investing in individual firms, arbitragers do not want exposure to even this level of risk.

We find support for the argument by Peyer and Vermaelen (2008) that tendering profits arise due to the market's overestimation of the fraction of shares tendered and the consequent underestimation of the proration factor. However, factors that significantly influence tendering behavior fail to explain cross-sectional differences in tendering profits. Thus, there is no predictable variation in these profits.

The rest of the paper is organized as follows. Section 2 provides a brief overview of the anomalies related to closed-end funds and stock buybacks. It also points out the unique features of closed-end fund tender offer repurchases. Section 3 describes the sample and methods used. Section 4 contains the results. Section 5 contains the conclusions of the study.

2. Literature Review

2.1. Closed-end fund anomalies

Closed-end fund shares are listed and traded on stock exchanges similar to other firms. The distinguishing feature of closed-end funds is that they invest in financial securities, which are typically traded. The observable market value of the fund's investments allows for the calculation of the net asset value of the fund on a per-share basis (NAV). The stock price of a closed-end fund is typically less than its underlying NAV; this puzzling discount has attracted much attention. Researchers have proposed various explanations such as unrealized capital gains

on the fund's holdings, illiquidity of underlying assets, and agency conflicts between fund managers and shareholders. However, a complete explanation remains elusive.²

2.2. Closed-end fund tender offer repurchases

Closed-end funds announce stock repurchases in an effort to alleviate the fund discount, and to allow shareholders to liquidate some of their holdings. In a repurchase tender offer, the closed-end fund offers to buy a certain percentage of outstanding shares and states the tender price as a fraction of the NAV on a certain date, typically the expiration date or the following day. If the tender offer is oversubscribed, shares are bought on a pro rata basis.

The specification of the tender price as a fraction of NAV is an important distinction of closed-end fund repurchases compared to fixed-price repurchases by other firms, which specify a dollar tender price. With a fixed dollar tender price, the selling shareholders effectively obtain a put on the shares. In the case of closed-end fund offers, the tendering shareholder has no protection against changes in the NAV; they are only offered a percentage of the NAV. However, since the underlying portfolio is a broad portfolio of securities, the idiosyncratic risk involved in tendering should be considerably less compared to tender offer repurchases by other types of firms. Nonetheless, the dollar price paid to tendering shareholders is unknown when a stockholder tenders the shares, since the NAV used to determine the tender price is typically ascertained on the expiration day or the day after.

² For a review of the literature see Lee Shleifer, and Thaler (1990), Dimson and Minio-Kozerski (1999), and Berk and Stanton (2007).

2.3. Prior evidence on tendering profits in stock repurchase offers

Lakonishok and Vermaelen (1990) examine tendering profits by studying 258 fixed-price tender offers during the period 1962-1986. They implement a trading rule of buying and tendering if the stock price is 3% less than the tender price. Any shares not accepted in the tender offer due to oversubscription are sold two days after the offer expires. The 3% filter rule is imposed to account for transaction costs; this filter rule generates trades in 109 offers, which translates into a 42% selection rate.³ The study reports average abnormal returns of 9.46%, with 97.2% of the transactions yielding positive profits. Lakonishok and Vermaelen (1990) study different trading windows but the results are not sensitive if the trading window varies from two to five days. When they examine the strategy of buying 6 days before the offer and selling unaccepted 12 days after expiration, they still find abnormal returns around 6%.. Analyzing a sample of 22 French fixed-price tender offers, Lucke and Pindur (2002) document similar profits of 8.33%.

Peyer and Vermaelen (2008) update the Lakonishok and Vermaelen (1990) study and report that the tendering profits have not faded with time. They test a strategy of buying six days before offer expiration and selling 12 days after offer expiration. When they impose the 3% filter rule, 56% (80/141) of the events qualify. They report abnormal profits of 8.6% during the 1987-2001 period; for the 29 events in the 1996-2001 period, the abnormal profits are 9.3%. They explore several possible explanations. Consistent with Ahn, Cao and Choe (2001), they find that the sample stocks have sufficient liquidity during the tender period; thus, illiquidity is not a plausible explanation. Capital gains taxes can inhibit tendering, but should be less important for institutional investors. However, Peyer and Vermaelen (2008) do not find supporting evidence for the tax hypothesis, since trading profits do not decrease with institutional ownership. They

³ Note that for shares accepted in the offer there is only a one-way transaction cost.

conclude that the profits are attributable to the market's underestimation of the proration ratio. Pre-expiration market prices are consistent with investors assuming that most, if not all, stockholders tender. In this case, the proration factor should be equal to the fraction purchased, which is 25.87% in their sample. However, since all shareholders do not tender, the actual proration factor is considerably higher at 79.98%. The systematic underestimation of the proration factor causes pre-expiration prices to be low relative to the value obtained by tendering shareholders.

Kadapakkam and Seth (1994) examine tendering profits in Dutch auction tender offers. In these offers, the firm specifies a dollar range and invites shareholders to submit bids specifying the price at which they are willing to sell their shares. Kadapakkam and Seth (1994) implement a trading rule of buying and tendering if the share price before offer expiration is less than the minimum tender price specified by the firm. This strategy should have more risk compared to the fixed price repurchases, due to the uncertainty about the final tender price determined through the auction. They document smaller but nonetheless statistically significant profits of 1.36% in Dutch auction stock repurchases. They find that the profits are related to the unsystematic risk of the stock during the tender offer period.

Gray (2005) examines a sample of 22 closed-end fund tender offers made by 11 NYSE listed funds during the period 1999-2003 and reports abnormal profits of 1.79% (t -statistic – 1.68). The small sample size of the study inhibits reliable inferences. We examine a much larger sample covering a more comprehensive sample period. We also explicitly account for the bid-ask spreads in assessing the trading profits.

3. Data and methods

3.1. Sample design

We searched Security Exchange Commission (SEC) Edgar Archives, Lexis-Nexis, and Bloomberg databases for tender offer stock repurchases by closed-end funds during the period 1994–2006. The following pieces of information are collected from these sources: announcement and expiration dates; extension of tender offer, if any; number and percentage of outstanding shares that the fund is intending to purchase; total number of shares tendered; tender price; and proration factor. Price and return data are collected from CRSP files. Bid-ask quotes are obtained from CRSP files and the Trade and Quote (TAQ) database. Net asset values and discounts or premiums around offer expiration are collected from Bloomberg and supplemented using the Wall Street Journal, if needed.

The search yields a sample of 72 tender offers. In order to be able to profit from tendering, the pre-expiration discount has to be less than the discount implied in the tender price. One offer is excluded, because of this requirement. The time distribution of the remaining 71 offers is given in Table 1. There is a concentration of offers in 2000, 2001 and 2005.⁴ Of the 71 offers, 46 offers are made by equity funds, and the remaining 25 offers are made by bond funds. Many of the equity funds are country funds or regional funds such as the Asia Pacific fund.

3.2. Descriptive statistics

Table 2 provides a summary of the key characteristics of the tender offers in the sample. The average market value of the funds is almost \$200 million. The smallest fund has a value of \$36 million, while the largest fund has a value exceeding \$1.2 billion. The funds sell at an average discount of 13.4% before the offer announcement; the median discount is 12.38%. This

⁴ Since we include all listed funds, our sample size during 1999-2003 is 45 offers compared to 22 offers in Gray (2003) who considers only NYSE listed funds.

is not surprising, since the repurchase offers are typically announced in response to such discounts. Due to the positive reaction to the tender offer, the average (median) discount just prior to offer expiration narrows to 11.05% (10.33%).

The repurchase price ranges from 90% to 100% of the NAV as of the day specified in the offer. The median tender price is 98% of NAV; most funds earmark 2% of NAV to cover the fund's transaction costs incurred in executing the offer. The tender price represents, on average, a premium of 9.59% relative to the pre-expiration value of the shares expressed as a fraction of NAV.

The fraction of outstanding shares sought in the tender offer is, on average, 16.71%; it ranges from 5% to 80%. The average fraction of shares purchased is 15.52%, since some tender offers are undersubscribed. Only 47.72% of the shares are tendered, on average; 10 tender offers (14%) in our sample are undersubscribed and the remaining 61 (86%) are oversubscribed, where the total number of shares purchased by the fund is determined on a pro rata basis. The average proration factor is 43.11 %.

3.3. Computation of tendering profits

We consider a strategy of buying shares the day before offer expiration and tendering. Shares not accepted in the tender offer are sold three days after offer expiration. The short trading horizon minimizes concerns about risk exposure. Lakonishok and Vermaelen (1990) find that tendering profits are not sensitive to slight variations in this window. Tendering profits are computed as follows:

$$\text{Raw Profit} = (\alpha * P_t + (1 - \alpha) * P_e - P_m) / P_m \quad (1)$$

where

α = proration factor is fraction of tendered shares accepted in offer

P_t = tender price

P_e = price 3 days after offer expires

P_m = purchase price is the price on the day before offer expiration day

The prices are assessed using actual observed dollar values rather than as a fraction of NAV. The abnormal profit is calculated as

$$\text{Abnormal Profit} = \text{Raw Profit} - (a + b R_m) \quad (2)$$

where R_m is the return on value-weighted NYSE/AMEX index, and the market model coefficients, a and b , are estimated using a control period of 120 days starting 31 days after offer expiration.⁵

The appropriate market index benchmark is a matter of concern, since many of the equity funds are international funds; we also have 25 repurchase offers carried out by bond funds. For this reason, we also calculate profits adjusting for changes in the specific fund's NAV.

$$\text{NAV adjusted profits} = (\alpha * P_t^N + (1 - \alpha) * P_e^N - P_m^N) / P_m^N \quad (3)$$

where the tender, pre-expiration and post-expiration prices are measured as a fraction of NAV.⁶ This measure abstracts away from changes in the value of the fund's underlying assets due to market movements.

The tender offer could potentially have a slight impact on NAV around the expiration date for two reasons. NAV could decrease due to expenses incurred in executing the offer; offsetting this decrease, the NAV will increase due to repurchased shares being bought at a discount relative to NAV (Porter, Roenfeldt, and Sicherman (1999)). Empirically, this is not a concern; in our sample, the NAV return from pre-expiration to post-expiration is uncorrelated

⁵ The post-offer period is chosen so that the estimates are not affected by the reaction to offer announcement as well as potentially poor performance that could have motivated the offer. Also, the reported results are essentially similar, if the abnormal profit is calculated as raw profits less the market index return.

⁶ Some funds do not report NAV on a daily basis; in this case, the last available NAV before offer expiration and the first available NAV after offer expiration are used to assess P_m^N and P_e^N , respectively. For these funds, the effective trading horizon will be more than the typical trading horizon of 4 days.

with fraction purchased (F_p) and the recaptured discount ($1 - P_t^N$). The offer execution costs should be proportional to F_p and will be borne by the fraction of remaining shares, $(1 - F_p)$; hence, we checked correlations with $F_p / (1 - F_p)$. Along similar lines, we measured discount recapture as $(1 - P_t^N) * F_p / (1 - F_p)$. We found no correlation between NAV return and these variables as well.

4. Results

4.1. Tendering profits

Table 3, Panel A presents the tendering profits available for the entire sample of closed-end fund repurchase offers. The raw profits have a mean of 1.17% and a median of 1.15%. Both these values are statistically significant. However, these profits are considerably lower than the profits reported for fixed-price tender offers.⁷ The lower profits are consistent with arbitragers trading more aggressively given the assets underlying the fund shares consist of a broad portfolio of stocks/bonds. Adjusting for market movements, the average abnormal profit is 1.28%. When we control for NAV changes, the average profit increases to 1.57%.

If we require that the tender price should be 3% higher than the pre-expiration price expressed as a percentage of NAV, 62 events (86%) qualify. This rate is sharply higher than the qualifying rates in Lakonishok and Vermaelen (1990) and Peyer and Vermaelen (2008). The higher qualifying rates reflect the fact that closed-end funds trade at large discounts to NAV just before offer expiration and the tender price is set at 97.22%, on average, of the NAV. The average (median) NAV adjusted profits for the set of 62 offers qualifying under the 3% filter rule

⁷ Gray (2005) reports similar profits of 1.79% for his sample of 22 closed-end fund tender offers. The tendering profits resemble in magnitude the tendering profits reported by Kadapakkam and Seth (1994) for Dutch auction repurchase offers. Like closed-end fund tender offers, the dollar amount paid to tendering shareholders is determined after the conclusion of the tender offer.

is 1.58% (1.21%). These profits are very similar to the entire sample of 71 offers; thus, the filter rule is not very useful in selecting the more profitable trades.

Panels B and C report the tendering profits separately for equity and bond funds, respectively. The average raw profit for equity funds is 0.97%, compared to 1.52% for bond funds. The difference is driven largely by differences in marketwide returns between the two samples: the average market index return during the tendering period is -0.79% for equity fund offers compared to 0.08% for bond funds.⁸ The average abnormal profit, adjusted for index returns, for equity funds is 1.22% compared to 1.40% for bond funds; there is a similar difference in median abnormal returns. The average (median) NAV adjusted profits for equity funds is 1.67% (1.60%). The average (median) NAV adjusted tendering profits for bond funds is 1.40% (1.42%). The evidence indicates that bond funds, despite reduced risk, yield similar abnormal profits when compared with equity funds.⁹

4.2. Tendering profit behavior over time

Next, we examine whether the tendering profits have disappeared, or at least diminished over time. Mitchell, Pulvino and Stafford (2002) point out that uncertainty about the payoff distribution for a trading strategy may cause arbitrageurs to avoid that strategy. Since it was not common for closed-end funds to engage in tender offer repurchases during the nineties, it is possible that traders may have learned over time about the distribution of tendering profits. If so, we expect the market to become more efficient in pricing tender offers in later years. We calculate profits separately for offers before 2001 and offers since 2001. The results are reported in Table 4. For the 39 offers in the period 2001-2006, the average raw profit is 1.27%, compared

⁸ The median returns are -0.75% and 0.26% for equity and bond fund offers, respectively.

⁹ During the post-offer control period, the average (median) standard deviation of daily stock returns for bond funds is 0.90% (0.93%) compared to 1.46% (1.64%) for equity funds.

to raw profits of 1.04% for earlier offers. Though profits adjusted for market changes are slightly lower for later offers, they are nevertheless highly statistically significant. Thus, there is no evidence that the tendering profits have disappeared during more recent years. These results are consistent with Lakonishok and Vermaelen (1990) and Peyer and Vermaelen (2008).

4.3. Tendering profits after accounting for transaction costs

In addition to the risk exposure, arbitragers seeking tendering profits also face transaction costs such as bid-ask spreads. In Table 5, we explore the impact of buying shares at the ask price and selling shares not accepted in the tender offer at the bid price.¹⁰ Panel A reports that for the entire sample, raw profits and NAV adjusted profits become insignificant when we account for the impact of the bid-ask spread. Given the small magnitude of the tendering profits reported in Table 3, this is not surprising.

In the presence of large bid-ask spreads, tendering cannot be expected to yield profits net of transaction costs. Some of the funds exhibit very large spreads. Hence, we impose a filter that the bid-ask spread on the day before offer expiration should be less than or equal to 1%. This filter restricts the number of events to 45. Panel B of Table 5 reports that average raw profit is 0.66%, and the average NAV adjusted profits is 0.75%. These profits are lower compared to those reported in Table 3 due to the impact of the bid-ask spreads; nonetheless, they are statistically significant at the 5% level.

We also examine whether bid-ask adjusted profits disappear over time. When we segment the sample by time, we find a significant, positive mean return in later years (1.08%), while in early years the tendering profit net of bid-ask spreads is negative (-1.2%). Most of the offers with large bid-ask spreads occur in the earlier half of the sample, consistent with the

¹⁰ For NAV adjusted profits, we account for transaction costs by subtracting the bid-ask spread on the purchase day.

decline in the bid-ask spread in recent years following reductions in minimum tick size. Of the 45 offers with bid-ask spreads less than 1%, 36 offers occur during the period 2001-2006. Panel C of Table 5 reports the profits for this sub-sample; they are very similar to the profits reported in Panel B. Thus, there is no evidence that profits net of transaction costs have disappeared. The negative bid-ask adjusted profits in the early period may have dissuaded traders from exploring the trading strategy. The lack of active attention to this strategy may have allowed the trading strategy to be profitable in later years when bid-ask spreads shrank. It would be interesting to see if the strategy continues to yield profits net of transaction costs in future years.¹¹

4.4. Source of tendering profits

While the magnitude of the tendering profits documented thus far is of the order of only 1%, their existence is puzzling nonetheless. These returns can be earned over a short trading horizon of 4 days, and hence on an annualized basis they will amount to substantial rates of return. In an attempt to understand the source of these profits, we start with the simple correlation of these profits with several variables; Table 6 contains these correlations. For the sake of brevity, we report correlations only for abnormal profits; correlations based on raw profits and NAV adjusted profits yield a similar picture. Panel A contains the correlations for the entire sample. To reduce noise induced by large bid-ask spreads, we restrict the sample in Panel B to the 45 offers which had a bid-ask spread of less than 1% on the day before offer expiration. The following discussion is based on Panel B, although the main features of the correlations are revealed in Panel A as well.

The abnormal profits are highly correlated with the bid-ask spread adjusted measure of these profits. We would expect that profits may be larger for smaller funds, because they may

¹¹ There are significant, positive tendering profits for the 16 offers announced at the end of the sample period (2005 and 2006).

attract less attention from investors. However, there is no evidence for that conjecture; fund size is not correlated with the profits. The abnormal profits do not have a significant relationship with the bid-ask spread. Profits are positively related to offer size (F_s), but the correlation is not significant. Tendering shareholders can earn abnormal profits only if there is a substantial premium in the tender price. Surprisingly, the profits are negatively related to the tender premium, assessed as the excess of the tender price relative to pre-expiration price when both are measured as a fraction of NAV. Hence, the filtering variable used by Lakonishok and Vermaelen (1990) and Peyer and Vermaelen (2008) is not positively related to tendering profits in the case of closed-end fund tender offers. The negative relationship between premium and tendering profits is driven by the strong correlations between the tender premium, fraction of shares tendered and the proration factor. Peyer and Vermaelen (2008) conclude that tendering profits are primarily driven by the market's overestimation of the fraction tendered and the consequent underestimation of the proration factor. They present evidence consistent with the market prices being set as if all shares are tendered. This misjudgment is less serious in the case of offers where the tender premium is high, since a large premium tends to attract more tendering and thus reduces the proration factor.

Risk exposure could hinder arbitragers' willingness to buy shares and participate in the tender offer. However, the standard deviation of the fund's stock returns is not significantly related to tendering profits or the proration factor. Another potential explanation for profits is stock illiquidity, which may cause trades to have a significant price impact and evaporate any potential profits. We use Amihud's (2002) illiquidity measure which is defined as the ratio of the absolute daily return to the daily volume. Data during the tender offer period is used to compute the illiquidity measure, which should be highly correlated with the price impact of trades during

this period. We find that the correlation of the illiquidity measure with tendering profits is actually negative and not significant.

Most of the offers in the sample are oversubscribed, although there is not a single offer where all the shares are tendered. The maximum fraction tendered is 84.8%. We examine the Peyer and Vermaelen (2008) argument more directly by replicating their approach and calculating profits if the proration factor is equal to the fraction purchased. This calculation assumes that all fraction shares are tendered.¹² Panel A of Table 7 reports the impact for the entire sample; the profits are wiped out (compare with Table 3, Panel A). We also examine the impact on the profits net of bid-ask spread in Panel B (compare with Table 5, Panel B); in this case, all profit measures turn negative and significant. This evidence provides additional support for Peyer and Vermaelen's (2008) contention that the tendering profits are driven by less than full participation in the tender offer leading to a higher than anticipated proration factor.

Table 6 contains the simple correlations of the fraction tendered and proration factor with other offer and fund characteristics. Given the strength of the relationship of these two variables with tendering profits, we examine factors influencing these two variables employing a multivariate approach. Table 8 reports the results of this analysis. The fraction tendered has a significant, positive relationship with the tender premium; higher tender premium attracts more participation. Correspondingly, the higher participation translates into a lower proration ratio, as seen by the negative relationship between the proration factor and the tender premium. A large offer size attracts more shares; however, it makes it more likely that the offer will be heavily oversubscribed. Thus, we observe a weak positive relationship between proration factor and offer

¹² If all shares are tendered, for undersubscribed offers the fund would have been able to purchase the fraction sought rather than being constrained by the fraction tendered. However, there are only 10 undersubscribed offers. Setting the proration factor equal to fraction sought made very little difference to the reported numbers.

size. One potential explanation for shares to be not tendered is the capital gain tax burden faced by selling shareholders; we proxy for this burden by the return on the fund's shares in the 200 days preceding the offer expiration. The capital gains proxy is not significantly related to tendering. We also include the unsystematic risk of the fund, bid-ask spread and illiquidity as control variables. None of these variables is significant.¹³

Next, we directly examine the impact of the independent variables on tendering profits; Table 9 contains the regression results. Abnormal tendering profits have a weak positive relationship to bid-ask spread suggesting that transaction costs hinder arbitrage activity. However, bid-ask spreads are not significantly related to the other measure of profits - NAV adjusted profits. Overall, there is limited explanatory power for the models. Thus, abnormal profits cannot be predicted by variables known at the time of tendering.

5. Conclusions

It is difficult to evaluate whether financial markets correctly value financial securities, based on available information about the distribution of future cash flows. It is easier, however, to evaluate the correctness of relative valuations and valuations of cash flows over a short horizon. We examine whether markets correctly assess the outcome of stock repurchase tender offers made by closed-end funds. Previous research documents significant tendering profits in repurchase offers made by other firms. One argument cited as an explanation of these profits is the limit to arbitrage activity imposed by risk limitations.

Closed-end funds represent a diversified portfolio of securities. Hence, risk exposure concerns should be reduced. However, we find significant tendering profits of the order of 1%. These profits are earned over a four day trading horizon, and hence will lead to excess returns of

¹³ Replacing unsystematic risk with total risk yielded similar insignificant coefficients for the risk variable.

over 50% on an annualized basis. There does not seem to be a good explanation for the existence of these profits. We find evidence to support the Peyer and Vermaelen's (2008) contention that the market price just before offer expiration reflects the assumption that all outstanding shares will be tendered and consequently underestimates the proportion of tendered shares accepted in the offer.

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Table 1
Time distribution of closed- fund repurchase tender offers

There are 72 tender offer repurchases announced by closed-end funds during the period 1994-2006. One offer was dropped from the sample because of the requirement that the discount in the tender price should be less than the discount in the pre-expiration price, where both prices are measured as a fraction of NAV.

Year	Number of events
1994	2
1995	0
1996	2
1997	3
1998	2
1999	8
2000	15
2001	13
2002	5
2003	3
2004	2
2005	10
2006	6
Total	71

Table 2
Descriptive statistics for closed- fund repurchase tender offers

Sample consists of 71 tender-offer repurchases by closed-end funds during the period 1994-2006. Tender offer premium is calculated as the premium in tender price relative to pre-expiration prices, where both are expressed as fraction of NAV.

	Mean	Median	Min.	Max.
Market value of equity (\$ 'million)	199.28	139.06	35.90	1227.95
Pre-announcement discount (%)	14.10	12.28	2.54	31.91
Pre-expiration discount (%)	11.05	10.33	0.62	25.35
Repurchase price as % of NAV	97.18	98	90	100
Repurchase price (\$)	13.40	12.38	6.53	38.14
Tender offer premium (%)	9.59	8.66	0.33	27.25
Fraction of shares sought (%)	16.88	10	5	80
Fraction of shares tendered (%)	47.72	53.69	3.91	84.84
Fraction of shares purchased (%)	15.72	10	3.91	71.22
Proration factor (%)	42.30	29.23	6.74	100

Table 3
Tendering profits in closed-end fund repurchase tender offers

Raw profits are the returns to a strategy of buying the closed-end fund shares on the day before offer expiration and tendering. If the offer is oversubscribed, unaccepted shares are sold three days after offer expiration. Abnormal profits are calculated by using the market model based on the CRSP value-weighted NYSE/AMEX index. The NAV adjusted profits report the raw profits less the percentage change in the fund NAV.

Panel A: Entire sample (N=71)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	1.17	3.47	1.15	0.00	-8.62	8.39
Abnormal profits	1.28	3.74	1.18	0.00	-9.72	10.24
NAV adj. profits	1.57	5.54	1.44	0.00	-2.55	8.38

Panel B: Equity funds (N=46)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	0.97	2.06	1.03	0.01	-8.63	8.39
Abnormal profits	1.22	2.47	1.24	0.00	-9.72	10.24
NAV adj. profits	1.67	4.42	1.60	0.00	-2.55	8.38

Panel C: Bond funds (N=25)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	1.52	3.90	1.41	0.00	-1.48	5.97
Abnormal profits	1.40	3.66	1.07	0.00	-1.71	5.53
NAV adj. profits	1.40	3.33	1.42	0.00	-2.27	5.62

Table 4
Tendering Profits over time

Raw profits are the returns to a strategy of buying the closed-end fund shares on the day before offer expiration and tendering. If the offer is oversubscribed, unaccepted shares are sold three days after offer expiration. Abnormal profits are calculated by using the market model based on the CRSP value-weighted NYSE/AMEX index. The NAV adjusted profits report the raw profits less the percentage change in the fund NAV.

Panel A: Early period (1994-2000; N=32)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	1.04	1.83	0.98	0.05	-4.98	8.39
Abnormal profits	1.32	2.24	1.59	0.03	-4.51	10.24
NAV adj. profits	1.88	4.40	1.66	0.00	-1.65	8.38

Panel B: Later period (2001-2006; N= 39)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	1.27	3.15	1.32	0.00	-8.63	5.96
Abnormal profits	1.26	3.03	1.10	0.00	-9.72	5.54
NAV adj. profits	1.32	3.40	0.99	0.00	-2.55	6.96

Table 5
Tendering profits after adjusting for bid-ask spread

Raw profits are the returns to a strategy of buying the closed-end fund shares at the ask price on the day before offer expiration and tendering. If the offer is oversubscribed, unaccepted shares are sold at the bid price three days after offer expiration. Abnormal profits are calculated by using the market model based on the CRSP value-weighted NYSE/AMEX index. The NAV adjusted profits report the raw profits less the percentage change in the fund NAV; the bid-ask spread on the purchase day is subtracted in the numbers reported below. Panel A reports the results for the entire sample. Panel B restricts the sample to funds with bid-ask spreads of less than 1% on the day before offer expiration; the remaining events are deemed to have high transaction costs which would make buying and tendering unprofitable.

Panel A: Entire sample (N=71)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	0.05	0.14	0.33	0.63	-8.63	8.39
Abnormal profits	0.17	0.48	0.51	0.50	-5.42	9.43
NAV adj. profits	-0.11	-0.29	0.32	0.91	-14.98	6.22

Panel B: Funds with bid-ask spreads less than 1% (N=45)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	0.66	1.93	0.61	0.02	-5.83	5.65
Abnormal profits	0.76	2.26	0.71	0.00	-5.35	5.25
NAV adj. profits	0.75	2.32	0.51	0.05	-2.98	6.22

Panel C: Funds in later period (2001-2006) with bid-ask spreads less than 1% (N=36)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	1.05	3.09	0.81	0.00	-3.28	5.65
Abnormal profits	1.13	3.42	0.79	0.00	-2.98	5.25
NAV adj. profits	0.74	2.02	0.47	0.09	-2.98	6.22

Table 6
Correlation of tendering profits with selected variables

Panel A presents the correlations for the entire sample. In Panel B, the sample is restricted to 45 offers with bid-ask spreads of less than 1%. Tender premium is the premium in the tender price relative to the pre-expiration price measured as a fraction of NAV. Risk is measured as the standard deviation of stock returns during days +31 to +150 relative to offer expiration. Illiquidity is constructed following Amihud (2002) using data from two days after offer announcement to the day before offer expiration.

Panel A: Entire sample (N=71)

	Abnormal Profit (AP)	AP - bidask	Fund size	Bid-ask spread	Tender premium	F _s	F _t	Proration factor	Risk
Profit net of bid-ask	0.70	0.00							
Fund size	0.06	0.13							
	0.60	0.28							
Bid-ask spread	0.20	-0.31	-0.17						
	0.10	0.01	0.16						
Tender premium	-0.25	-0.30	-0.26	0.26					
	0.03	0.01	0.03	0.03					
Fraction sought (F _s)	0.13	0.03	0.08	0.19	-0.19				
	0.27	0.82	0.50	0.12	0.11				
Fraction tendered (F _t)	-0.39	-0.52	-0.18	0.21	0.61	0.26			
	0.00	0.00	0.13	0.07	0.00	0.03			
Proration factor	0.45	0.47	0.21	0.03	-0.62	0.45	-0.63		
	0.00	0.00	0.08	0.80	0.001	0.00	0.00		
Risk	-0.02	-0.25	0.02	0.32	0.30	0.22	0.35	0.01	
	0.84	0.03	0.87	0.01	0.01	0.06	0.00	0.92	
Illiquidity	0.07	-0.10	-0.37	0.07	0.57	-0.04	0.41	-0.25	0.29
	0.55	0.42	0.00	0.58	0.00	0.73	0.00	0.04	0.01

Panel B: Funds with bid-ask spreads less than 1% (N=45)

	Abnormal Profit (AP)	AP - bidask	Fund size	Bid-ask spread	Tender premium	F_s	F_t	Proration factor	Risk
Profit net of bid-ask	0.73 0.00								
Fund size	0.14 0.36	0.14 0.35							
Bid-ask spread	-0.12 0.42	-0.11 0.47	-0.34 0.02						
Tender premium	-0.52 0.00	-0.34 0.02	-0.24 0.11	0.08 0.59					
Fraction sought (F_s)	0.21 0.16	0.16 0.28	0.07 0.64	0.30 0.05	-0.25 0.09				
Fraction tendered (F_t)	-0.43 0.00	-0.40 0.01	-0.19 0.21	0.06 0.70	0.61 0.00	0.25 0.10			
Proration factor	0.47 0.00	0.47 0.00	0.24 0.12	0.21 0.17	-0.64 0.00	0.55 0.00	-0.54 0.00		
Risk	-0.10 0.52	-0.12 0.43	0.24 0.11	-0.03 0.84	0.16 0.29	0.35 0.02	0.40 0.01	0.14 0.37	
Illiquidity	-0.03 0.82	-0.01 0.94	-0.36 0.02	0.23 0.13	0.65 0.00	-0.05 0.72	0.41 0.00	-0.24 0.11	0.33 0.03

Table 7
Tendering profits if all shares are tendered

We examine the Peyer and Vermaelen (2008) argument that the tendering profits are driven by the market price reflecting an assumption that all outstanding shares are tendered in the offer. Profits are calculated setting the proration factor to equal fraction purchased.

Panel A: Profits for entire sample (N=71)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	-0.57	-1.74	-0.58	0.11	-8.95	7.66
Abnormal profits	-0.45	-1.42	-0.57	0.14	-10.04	7.23
NAV adj. profits	-0.12	-0.46	-0.36	0.32	-4.32	6.86

Panel B: Bid-ask adjusted profits for low bid-ask spread sample (N=45)

	Mean (%)	t-stats	Median (%)	p-values	Min. (%)	Max. (%)
Raw profits	-1.10	-2.91	-0.93	0.01	-8.53	3.51
Abnormal profits	-1.00	-2.81	-0.71	0.01	-8.05	3.24
NAV adj. profits	-0.87	-3.03	-0.84	0.00	-4.52	4.15

Table 8
Cross-sectional analysis of tendering behavior

The dependent variables are fraction tendered and the proration factor; proration factor measures the extent of tendering adjusting for tender offer size. Tender premium is the premium in the tender price relative to the pre-expiration price measured as a fraction of NAV. Capital gain is the fund return over the 200 days preceding the offer expiration date. Unsystematic risk is measured as the standard deviation of market model residuals estimated during the control period of days +31 to +150 relative to offer expiration. Bid-ask spread is the measured on the purchase date, the day before offer expiration. Illiquidity is measured using Amihud's (2002) measure; this measure is computed as the average daily ratio of absolute return to trading value over the 15 days prior to the expiration day. Parentheses contain *t*-statistics; ***, **, * denote significance levels of 1%, 5% and 10%, respectively.

	Fraction tendered	Proration factor
Intercept	0.05 (0.83)	0.54*** (6.00)
Tender premium	2.69*** (6.53)	-4.01*** (-6.55)
Fraction purchased	1.00*** (5.93)	0.49* (1.93)
Capital gain	-0.46 (-0.97)	0.43 (0.62)
Unsystematic risk	1.77 (0.39)	9.81 (1.46)
Bid-ask spread	-0.81 (1.06)	1.57 (1.38)
Illiquidity	0.01 (0.27)	0.03 (1.20)
Adjusted R^2	0.58	0.46
F Value	17.18***	10.83***
N	71	71

Table 9
Cross-sectional analysis of tendering profits

Abnormal Profit is the tendering profit after adjusting for market index returns using a market model. NAV adjusted profits are assessed measuring the purchase price, tender price and the post-expiration price as a percentage of NAV; this measure adjusts for changes in the underlying NAV of the closed-end fund. Tender premium is the premium in the tender price relative to the pre-expiration price measured as a fraction of NAV. Capital gain is the fund return over the 200 days preceding the offer expiration date. Unsystematic risk is measured as the standard deviation of market model residuals estimated during the control period of days +31 to +150 relative to offer expiration. Bid-ask spread is the measured on the purchase date, the day before offer expiration. Illiquidity is measured using Amihud's (2002) measure; this measure is computed as the average daily ratio of absolute return to trading value over the 15 days prior to the expiration day. Parentheses contain *t*-statistics; ***, **, * denote significance levels of 1%, 5% and 10%, respectively.

	Abnormal profits	NAV adjusted profits
Intercept	1.52 (1.40)	0.82 (0.88)
Tender premium	-0.12 (-1.59)	-0.10* (-1.65)
Fraction purchased	-0.01 (-0.38)	0.00 (0.11)
Capital gain	-0.01 (-0.16)	0.09 (1.22)
Unsystematic risk	1.01 (1.24)	1.14 (1.64)
Bid-ask spread	0.25* (1.81)	0.13 (1.09)
Illiquidity	-0.58* (-1.71)	-0.02 (-0.08)
Adjusted R^2	0.11	0.04
F Value	2.42**	1.48
N	71	71