

**THE INFLUENCE OF ILLIQUID ASSETS ON PRICES**

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**ABSTRACT**

There are fundamental differences between assets held by closed and open-end funds. Past research indicates that closed-end funds are less liquid than open-end funds. For example, a larger percentage of closed-end funds hold less liquid international securities. This paper surveys the existing evidence of the impact of illiquid assets on the prices of open and closed-end funds. Specifically, it surveys existing literature on whether the price discount typically observed on closed-end funds is the expected result given the inescapable costs associated with managing relatively illiquid assets in closed-end funds. This paper synthesizes the various observations into one coherent theme: illiquid assets appear to be a significant source of the differences in the behavior we observe between open and closed-end funds. For a broader audience, this sheds light on valuation issues related to illiquid assets by looking at the case study of closed-end funds.

**INTRODUCTION**

This paper reviews the existing literature on the pricing differences between open and closed-end funds. After reading this literature, our conclusion is that illiquid assets appear to be a significant source of these pricing differences. In addition to the long-standing issue of why closed-end funds do not sell at net asset value, the issue and valuation problems of illiquid assets are important to a wider audience. This is the reason for our emphasis on the problem of pricing illiquid assets, and what we can learn about this topic from the closed-end fund literature.

The structure of the paper is as follows. First, we provide a brief history and comparison of open and closed-end mutual funds. Second, we draw the connection between manufacturing corporations and closed-end funds, and why the pricing problems of closed-end fund may be applicable to manufacturing firms. Third, we review the literature about illiquid assets with regard to closed-end funds. Fourth, we discuss illiquid assets and management costs. Fourth, we discuss illiquid assets and methods to collect transaction costs. Finally, we draw some conclusions.

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## **THE HISTORY AND FEATURES OF CLOSED AND OPEN-END MUTUAL FUNDS**

Closed-end mutual funds were the first investment companies, and their history dates back to an investment trust created by King William I of the Netherlands in 1822 (Herzfeld, 1992). A closed-end fund is similar to a corporation that restricts the assets on its balance sheet to marketable securities only. Developing in Britain in the nineteenth century, these specialized corporations were called investment trusts, and from their beginning, they advertised their diversification services to small investors. Although many nineteenth century British investment trusts invested in American stocks, the first American investment trust was the closed-end Boston Personal Property Trust created in 1893. It was not until the 1920s that the U.S. experienced a boom in closed-end investment trusts.

The great bull markets of the 1920s -- and 1980s -- provided fertile soil for mutual funds. In their first incarnation and heyday, mutual funds played a central role in the robust stock market of the 1920s. After the 1929 stock market crash -- and in American history textbooks today -- these closed-end investment trusts were characterized as the "evil trusts" that manipulated the stock market and had a hand in causing the Great Crash of 1929. These charges added to the flourish of securities regulation that took place in the 1930s, which created the Securities and Exchange Commission (SEC).

Until the advent of "open-end" funds in 1924, all mutual funds were modeled after the traditional corporation. These new open-end funds distinguished themselves from the traditional corporate form by offering an innovative new feature: the continuous redemption of shares at net asset value (net asset value is defined as the book value of a firm's assets minus its liabilities). Although novel, the idea of redeemable shares did not catch on until the 1930s. In more recent times, however, the popularity of open-end funds has far outstripped the popularity of closed-end funds.

Besides the continuous redemption feature, two other features distinguish closed-end funds from open-end funds: the use of leverage and fixed capitalization. Open-ended funds stress simple equity-based capital structures, prohibitions on bank borrowing, and the provision of detailed audited financial reports at regular intervals to investors. Like a corporation, closed-end funds are frozen with a fixed amount of capitalization until they formally issue or redeem stock or bonds. Open-end funds, on the other hand, issue and redeem shares continuously at net asset value and can grow or decline quickly according to recent sales or redemptions.

## **CLOSED-END FUND SIMILARITIES TO MANUFACTURING FIRMS**

Fundamental differences exist between open-end funds and closed-end funds. Arbitrage-based pricing theories have thus far suggested that the appropriate pricing model for closed-end funds should be one based on net asset value.<sup>1</sup> Since market prices exist for all the assets of a closed-end fund, arbitrage dictates that the price of a closed-end fund should at least equal its net asset value.

Arbitrage, however, is not the only method to value assets, and the prices of many assets do not match the prices suggested by arbitrage techniques. For example, because arbitrage is considered a poor valuation model for manufacturing corporations, few people expect the prices of manufacturing firms to equal book or net asset value. For example valuation techniques for manufacturing firms include future

earnings, as well as asset values. Physical assets and financial assets present different valuation problems. However, when financial assets are illiquid, they begin to take on some of the characteristics of physical assets. The closed-end fund with illiquid assets begins to behave like a hybrid of a manufacturing firm and an open-end fund with liquid assets. Illiquid financial assets have some of the same characteristics as physical assets. As such, they should be valued based on their future earnings and how they are employed -- not strictly on the current value of the assets.

If closed-end funds share these similarities with traditional corporations, closed-end funds need different valuation methods than the pricing models used for open-end funds. In areas such as asset illiquidity, institutional organization and government regulation, corporations and closed-end funds have similar structures. Like traditional corporations, closed-end funds cannot be accurately valued by looking solely at net asset value. In contrast, open-end funds *can* be accurately valued and priced by looking solely at the net asset value as recorded on the fund's balance sheet. We suspect this is possible because of the unique characteristics of the assets in an open-end fund, and the legal mandate that these funds sell for their net asset value. In contrast, closed-end funds are more difficult to price because of their illiquid assets, more expensive management services, transaction costs, and uncertainty over asset values. This framework suggests that closed-end fund discounts are the expected result given the inescapable costs associated with managing illiquid assets.

### **THE CLOSED-END FUND LITERATURE ON ILLIQUID ASSETS**

Malkiel (1977) and Anderson and Born (1987a and 1987b) report a positive connection between illiquid assets and closed-end price discounts. In a test of seven explanations of closed-end fund discounts, Malkiel found significantly positive correlations among four explanations. Two of these four explanations involved potentially illiquid investments: foreign stocks and restricted stock. Similarly, Anderson and Born (1987a) construct an illiquid asset index and a restricted asset index which are found to exhibit a significantly positive association with closed-end fund discounts. Patro (2001) finds evidence that the *risk-adjusted* performance of 45 international closed-end funds matches the performance of respective local market indices. This is consistent with the notion of rational investors properly adjusting for (illiquidity) risk and using valid valuation and pricing fundamentals.

A concentration of illiquid assets in closed-end funds is also seen in Baur, Benkato and Sundaram (1994), who document statistical differences in the types of assets held by open and closed-end funds. Table 1 reproduces their results. First, this table shows -- at a 99 percent probability level -- that open-end funds hold different assets than closed-end funds. Second, the table suggests that open-end funds do not specialize. They hold "diversified" portfolios much more frequently than would be expected from a random selection. Closed-end funds, on the other hand, tend to hold far fewer "diversified" portfolios and far more non-diversified specialty portfolios (senior securities, international, government securities, etc.) than random selection would predict.

Table 1

Panel 1: Types of Assets in Open-End Funds

Observed versus Expected Frequency

	<u>Observed</u>	<u>Expected</u>
Diversified Funds	427 (66%)	338 (52%)
Senior Security Funds	94 (15%)	120 (19%)
Specialized Funds	53 (8%)	54 (8%)
International Funds	28 (4%)	53 (8%)
Gov't Security Funds	45 (7%)	76 (12%)
Dual-Purpose Funds	0 (0%)	6 (1%)
Total Number of Funds	647	647

Chi-square = 59\*

Probability = 0.0001

Panel 2: Types of Assets in Closed-End Funds

Observed versus Expected Frequency

	<u>Observed</u>	<u>Expected</u>
Diversified Funds	23 (11%)	111 (52%)
Senior Security Funds	65 (31%)	39 (19%)
Specialized Funds	19 (9%)	18 (8%)
International Funds	40 (19%)	17 (8%)
Gov't Security Funds	57 (27%)	25 (12%)
Dual-Purpose Funds	8 (4%)	2 (1%)
Total Number of Funds	212	212

Chi-square = 177\*

Probability = 0.0001

\*Indicates that the observed frequencies are significantly different from the expected frequencies at a 95% confidence level.

The expected frequencies are calculated from the percentage of all funds in each Weisenberger (1990) category. For example, the expected percentage of diversified funds(52%) is calculated from adding the total number of open and closed-end diversified funds(427+23), and dividing by the total number of all open and closed-end funds(647+212). The expected number of, say, closed-end diversified funds(111) is then calculated by multiplying the total number of closed-end funds(212) by the expected percentage(52%). The categories include the following types of assets:

- Diversified funds include: maximum capital gain funds, long-term growth funds, growth and current income funds, balanced funds, and stock (and bond) income funds.
- Senior security funds are funds that concentrate in bonds and preferred stock.
- Specialized funds include technology funds, gold and precious metals funds, industry specific funds, and "other" funds.
- International and government security funds include international and government securities, respectively. Among the closed-end government security funds, 40 of the 57 are municipal bond funds.
- Dual-purpose funds are funds with two types of stock. Income shares receive all dividends, and capital shares receive all capital gains.

Source: Baur, Benkato and Sundaram (1994).

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Other non-statistical evidence of differences between open and closed-end funds includes the composite balance sheets of these two different types of funds. For purposes of comparison between an individual firm and the industry average, Dun and Bradstreet provides composite balance sheets for many industries based on SIC codes. Table 2 presents these composite balance sheets for open and closed-end funds. Of particular note is the larger number and bigger size of open-end funds. On average, open-end funds are five times the size of closed-end funds, and three open-end funds exist for every closed-end fund.

### **ILLIQUID ASSETS AND MANAGEMENT COSTS**

Rational investors should be expected to price the shares of closed-end funds *net* of management costs (and other expenses). This price may not be net asset value. Since management costs cannot be avoided by people who buy and sell individual securities to form their own portfolios, comparing closed-end fund share prices to net asset values is an inappropriate comparison. Investigating managerial costs and benefits, Chay and Trzcinka (1999) find that closed-end price premiums are positively correlated with future managerial performance. Akhigbe and Madura (2001) and Bers and Madura (2000) address the unique managerial characteristics of closed-end funds and why these characteristics may lead to a persistence of price performance.<sup>2</sup> Other researchers have documented a statistical relation between closed-end fund discounts and management fees, see Malhotra and McLeod (2000), Kumar and Noronha (1992), Anderson and Born (1987a, 1987b), and Crawford and Harper (1985). However, Malkiel (1977) found no relation between management fees and closed-end fund discounts.

Table 2

## Composite Balance Sheets of Open and Closed-end Funds

	Open-end Funds (164 funds)		Closed-end Funds (57 funds)	
	\$ (in thousands)	%	\$ (in thousands)	%
Cash	4,348	7.6	502	4.7
Accounts Receivable	6,407	11.2	438	4.1
Notes Payable	57	0.1	214	2.0
Inventory	57	0.1	150	1.4
Other Current Assets	27,003	47.2	5,022	47.0
<b>Total Current Assets</b>	<b>37,873</b>	<b>66.2</b>	<b>6,325</b>	<b>59.2</b>
Fixed Assets	2,746	4.8	673	6.3
Other Non-current Assets	16,591	29.0	3,686	34.5
<b>Total Assets</b>	<b>57,210</b>	<b>100.0</b>	<b>10,686</b>	<b>100.0</b>
Accounts Payable	3,719	6.5	214	2.0
Notes Payable	457	0.8	737	6.9
Other Current Liabilities	6,464	11.3	1,047	9.8
<b>Total Current Liabilities</b>	<b>10,641</b>	<b>18.6</b>	<b>1,998</b>	<b>18.7</b>
Long-term Liabilities	3,947	6.9	449	4.2
Deferred Credits	458	0.8	53	0.5
Net Worth	42,163	73.7	8,185	76.6
<b>Total Liabilities and Net Worth</b>	<b>57,209</b>	<b>100.0</b>	<b>10,685</b>	<b>100.0</b>

Source: Dun and Bradstreet Credit Services, *Industry Norms and Key Business Ratios*, 1987-1988 Edition, p. 169. The SIC codes for open-end and closed-end investment companies are 6722 and 6723, respectively.

Brauer (1984) presents evidence that assets with uncertain market values require more management and transaction costs than assets with readily available market prices. If this illiquidity indirectly causes increased management and other transaction costs, this adds to the explanation of the pricing differences of open versus closed-end funds. If the different funds hold different assets, the services provided by open-end managers are different than the services provided by the closed-end fund manager.

Some investment companies hold extremely liquid asset portfolios. For example, unmanaged index funds advertise superior returns to shareholders from low management expenses and a random selection of representative issues. Because of free and competent oversight by a presumed efficient capital market, index fund promoters believe there is little diminution in the quality of stock selection from the more expensive stock selection techniques that employ costly portfolio managers. In this light, less extensive in-house oversight structures are needed for assets that have active markets and extensive market-based oversight. Indeed, Malhotra and McLeod (2000) find that U.S. closed-end funds -- which hold relatively liquid portfolios -- have notably lower expense ratios than foreign closed-end funds.

Traditional manufacturing corporations hold less liquid assets than open and closed-end investment companies. These investment companies (or mutual funds) limit their holdings to one asset (i.e., financial securities). Manufacturing corporations need extensive oversight structures to monitor their (illiquid) asset portfolios. If all physical assets had well-functioning liquid secondary markets like those for many financial assets, the concept of an unmanaged "index" corporation might be plausible. However, because of the lack of market-based oversight of most (illiquid) assets, there remains the need for extensive management oversight in traditional manufacturing corporations.

Given their relatively illiquid assets, closed-end funds need more expensive management oversight than open-end funds. Brauer (1984) presents evidence of this. Brauer compared the expense ratios of both closed and open-end funds and found statistically significant differences. Brauer's results are reproduced in Table 3. He found that closed-end funds had systematically higher expense ratios than open-end funds in his sample of 826 fund pairs during the 1965-1981 time period.

### **ILLIQUID ASSETS AND METHODS TO COLLECT TRANSACTION COSTS**

At some cost, investors can duplicate the diversification, management, and brokerage services provided by an open-end fund manager. Taking into account these transaction costs, arbitrage pricing models suggest that an open-end fund should sell at a price close to net asset value. If arbitrageurs are less able to duplicate the management services of closed-end funds, then arbitrage pricing models suggest that closed-end funds should sell at a price further removed from net asset value. In other words, arbitrage will force the price of open-end funds to net asset value *plus transaction costs*. The arbitrage of the less liquid, less marketable assets of closed-end funds becomes more difficult and costly.

If one includes transaction costs, the statement that open-end funds trade at net asset value is misleading. A trade at net asset value implies arbitrage pricing and zero transaction costs. This statement creates an unrealistic benchmark when comparing the prices of open and closed-end funds. A better

Table 3  
A Paired Comparison Test of the Hypothesis that Closed-End Funds have on Average the Same  
Expense Ratios as Similar Open-End Funds

Years	Number of closed-end fund and open-end fund pairs <sup>1</sup>	Average of closed-end fund expense ratio minus open-end expense ratio (in percent)	t-score	Significance level <sup>2</sup>
1965	42	0.0929	0.99	0.1631
1966	42	0.0612	0.76	0.2266
1967	41	0.0527	0.61	0.2741
1968	37	0.0549	0.62	0.2706
1969	39	0.1167	1.13	0.1322
1970	39	0.0664	0.82	0.2093
1971	36	0.1939	2.09	0.0218
1972	32	0.1322	1.29	0.1035
1973	51	0.2525	2.67	0.0051
1974	67	0.3199	2.92	0.0024
1975	66	0.2895	2.92	0.0024
1976	61	0.3236	2.50	0.0075
1977	56	0.3070	2.90	0.0027
1978	54	0.1863	2.02	0.0240
1979	57	0.2632	2.35	0.0112
1980	55	0.2744	2.01	0.0249
1981	51	0.2541	2.83	0.0034
1965-1981	826	0.2088	8.05	0.0001

<sup>1</sup>Number of closed-end funds for which a 'meaningful' expense ratio was reported in Weisenberger's *Investment Companies*.

<sup>2</sup>To reject the null hypothesis of no difference in expense ratios in favor of the alternative hypothesis that closed-end fund expense ratios are greater.

Source: Brauer (1984).

comparison would compare prices *net of transaction costs* for both open and closed-end funds. Including transaction costs for closed-end funds but not for open-end funds magnifies the perceived pricing differences between the two types of funds. According to the Investment Company Act of 1940, only open-end funds must sell for net asset value. This legal restriction, however, does not prohibit open-end funds from charging fees or loads in addition to net asset value. This load percentage varies. There are also no load funds. An open question is whether -- in the absence of the SEC regulation to sell at net asset value -- open-end funds would have developed alternative fee mechanisms to pay for transaction costs. The 1940 law largely codified the pricing practices of the 1930s. If effectively enforced, the 1940 law (and 1970 amendments) may have limited the development of new methods to collect transaction fees.

Discounts that fall within the bounds of transaction costs cannot be profitably exploited and may persist for long periods. For example, for funds charging loads on the date of the sample, the average load on 200 open-end funds was 5 percent of net asset value with a standard deviation of 1.5 percentage points. This suggests that transaction costs typically fell within a range of 3.5 to 6.5 percent for these funds. If these costs are similar for closed-end funds, discounts ranging up to 6.5 percent fall within the bounds of transaction costs. If one includes other fund management fees and annual 12b-1 fees, discounts in closed-end funds beyond this 6.5 percent could persist for long periods.

If the typical load or bid-ask spread for open-end funds is about 5 percent of net asset value, the ask price for an open-end fund would be \$100, and the average bid price would be \$95.<sup>3</sup> Because of these load or bid-ask spread charges, one could say that open-end funds are typically bought at net asset value and sold at a discount. In contrast, with a closed-end fund, an investor typically buys the fund at the typical 8 percent discount and pays a brokerage commission. When selling the closed-end fund, the investor will sell the fund at the same 8 percent discount and pay another brokerage commission. For example, to *sell* \$100 of net asset value in a closed-end fund, an investor would get \$90.50 (i.e., \$100 in net asset value minus the typical \$8 discount minus a \$1.50 brokerage commission).<sup>4</sup> Also note that to *buy* a closed-end fund, the investor pays \$93.50 (\$100 - \$8 + \$1.50) to purchase \$100 in net asset value. From an investor's perspective, it is ambiguous whether the selling price discounts of closed-end funds are preferable to high purchase prices and load charges of open-end funds. After transaction costs, neither fund is bought and sold at net asset value.

While some closed-end fund discounts are exploited through liquidation or open-ending, Herzfeld (1992) suspects that the cost of liquidating many funds exceeds the benefits. Liquidation requires terminating the management. This can be a costly procedure in view of management's control over the portfolio. Herzfeld (1992, p. 9) notes that "I have seen some funds . . . oppose open-end proposals for every cockeyed reason they can dream up. It is obvious that management is looking out for itself, not shareholders." Studies indicate that successful liquidations have occurred when discounts reached the neighborhood of 25 percentage points. Porter, Roenfeldt and Sichertman (1999) find that share repurchases -- when selling at a discount to NAV -- cause share prices to rise. This suggests that management intransigence can add significantly to transaction costs.

### ***Interval Funds***

A recent innovation to address the transaction costs of fund liquidation is the introduction of interval funds. This hybrid between an open and closed-end fund allows for shareholders to redeem shares at specified intervals. When shareholders are allowed to redeem their funds daily, funds cannot invest a large portion of their portfolios in illiquid assets. For example, daily liquidations effectively prohibit funds from investing in securities such as privately placed bonds and foreign stocks on thinly-traded exchanges. The traditional method to participate in these illiquid securities is through closed-end funds, since these funds are not obliged to redeem securities daily at net asset value.

Interval funds would allow shareholders to redeem fund shares at net asset value on a monthly or quarterly basis. This restriction on redemptions would allow funds adequate time to calculate an accurate assessment of net asset value and put less constraints on their investments in illiquid assets. These new interval funds allow investors to buy funds that invest in illiquid portfolios, while also allowing them to cash in their investment for their full net asset value.

### **CONCLUSIONS**

This paper explores the consequences of closed and open-end funds having systematically different assets in their portfolios. Earlier studies have found statistically significant differences in the types of assets held by open and closed-end funds. These studies indicate that closed-end fund portfolios are illiquid relative to open-end fund portfolios. If this is true, it is not surprising that rational investors will pay different prices for (liquid) open and (illiquid) closed-end funds.

Open and closed-end funds collect for transaction and management costs using various methods. Open-end funds charge fees and loads. Closed-end funds charge fees. From the investor's standpoint, it is unclear whether the price discounts of closed-end funds are preferable to high purchase prices and extra load charges of open-end funds. After transaction costs, neither type of fund sells at net asset value. These transaction costs partially explain the anomalous and persistent discounts observed in closed-end funds. Specifically, the price discount typically observed on closed-end funds is consistent with the transaction costs associated with managing illiquid assets. A relatively new twist in fund innovation is the introduction of interval funds, which allow share redemptions at net asset value at specific intervals. As with other funds, the management costs of these new funds will depend on the types of assets these new funds hold. The collection methods for the fees needed to manage the fund will undoubtedly have an impact on the pricing of these new funds.

In contrast to open-end funds, corporations and closed-end funds have similarities in areas such as illiquid assets, institutional organization, and government regulation. By investigating the valuation issues of closed-end funds, we also shed light on the valuation of manufacturing and service firms. In particular, the presence of liquid or illiquid assets requires different valuation models and pricing fundamentals. Manufacturing and service firms and closed-end funds are more difficult to price because of their illiquid assets, more expensive management services, transaction costs, and uncertainty over

asset values. If this is true, the pricing fundamentals of manufacturing and service firms -- and closed-end funds -- arise from the cost of managing illiquid assets.

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#### ENDNOTES

1. See Chopra, Lee, Shleifer and Thaler (1993), Chen, Kan and Miller (1993), Kumar and Noronha (1992), and Anderson and Born (1992) for a partial review of this literature.
2. A reviewer of this paper points out that asymmetric information may partially explain the differing behavior of closed and open-end funds. The paper does not investigate specifically the different asymmetric information consequences of liquid and illiquid assets. However, one would suspect that more significant asymmetric information problems are associated with illiquid assets. By their nature, illiquid assets are difficult to sell in secondary markets because on information compactness. That is, the buyers and sellers have different information about the assets.
3. The transaction costs to the fund manager of buying or selling more assets may occur on the front-end of the transaction or the rear-end of the transaction. If the ask price reflects market value, the bid price may reflect market value minus a commission. See Tinic and West (1979) for a discussion of the transaction costs incurred by brokers and dealers when making a market in financial or physical assets.
4. A 1.5% brokerage commission may be high or low depending on the dollar volume of the transaction. Not including negotiated discounts, typical full-service stock brokerage commissions (post 1989) range as follows:

<u>Dollar Volume</u>	<u>Commission</u>
Under \$1000	\$5 + 3% of Dollar Volume (minimum charge of \$45)
\$1000-\$2000	\$15 + 2% of Dollar Volume
\$2000-\$3000	\$20 + 1.75% of Dollar Volume
\$3000-\$5000	\$27.50 + 1.5% of Dollar Volume
\$5000-\$20000	\$35 + 1.35% of Dollar Volume
\$20000-\$30000	\$125 + 0.9% of Dollar Volume
Over \$30000	\$230 + 0.55% of Dollar Volume