

## **Portfolio Liquidity and Share Turnover of Closed-end Mutual Funds**

**Charles Cullinan**  
**Bryant University**

**Xiaochuan Zheng**  
**Bryant University**

**Elena Precourt**  
**Bryant University**

*We examine the relationship between the liquidity of the portfolios of closed-end mutual funds and the share turnover of closed-end funds' shares. We find that the portfolio liquidity/share turnover relationship is contingent upon the nature of the funds' shareholders. For funds with mainly smaller shareholders, there is a negative relationship between portfolio liquidity and share turnover, suggesting that smaller investors are more likely to hold shares of these funds to avoid the transaction costs associated with trading. However, as more institutional investors hold fund shares, portfolio liquidity is positively associated with share turnover.*

### **INTRODUCTION**

Mutual funds' assets consist almost exclusively of financial securities. The shares of open-end mutual funds are issued and redeemed directly by the fund. Portfolio holdings that are highly illiquid can be a concern for open-end mutual funds because they may need to sell portfolio securities to meet redemption requests from shareholders. For example, the Third Avenue Focused Credit Fund was forced to freeze redemptions in January of 2016 because the fund could not sell the illiquid securities in its portfolio quickly enough to meet redemption requests (Thomas, 2016). Closed-end mutual funds issue fund shares which are traded among investors. Therefore, these funds do not need to redeem fund shares on demand, and thus may be able to hold more illiquid securities in their portfolios (Cherkes et al., 2009).

Research related to the trading volume and share turnover of the shares of closed-end mutual funds is rather limited (e.g., An et al., 2012; Yang, 2012; Barnhart and Rosenstein, 2010). These studies have examined the potential influence of share repurchase programs (An et al., 2012; Yang, 2012) or the introduction of exchange-traded funds (Barnhart and Rosenstein, 2010) on the trading volume of closed-end fund shares. Previous research has not considered the potential influence of portfolio liquidity and type of the shareholders on the share turnover of closed-end funds.

The securities held by closed-end fund are reported at fair value and US accounting standards require companies to disclose the inputs used to value these assets (Accounting Standards Codification 820). Level 1-valued assets are actively traded securities and thus represent liquid securities held in closed-end

funds' portfolios. Other securities (those valued using level 2 and level 3 inputs) are not actively-traded, and thus represent less liquid securities held in a fund's portfolio. Using the funds' disclosures of their valuation inputs, we are able to develop measures of the liquidity of the securities held by closed-end mutual funds and to assess the potential relationship between portfolio liquidity and the share turnover of closed-end fund shares. We also consider the type of the fund's shareholders, categorized into institutional and non-institutional (i.e., smaller) shareholders.

We obtain data on the share turnover, portfolio liquidity and institutional shareholdings of 1,657 fund-year observations from 2010 to 2012. Based on our analyses, we find that funds with less liquid portfolios have higher share turnover, but this result is mainly limited to funds in which institutional investors hold larger portions of the outstanding shares. Portfolio illiquidity is negatively related to share turnover when the fund is held more extensively by smaller investors. These results suggest that smaller investors may perceive the value of closed-end funds in allowing them to access less-liquid securities and may hold the fund shares longer to reduce transaction costs.

Our study contributes to the literature in a number of ways. First we contribute to the limited literature on the trading volume<sup>1</sup> of closed-end fund shares (e.g., An et al., 2012; Yang, 2012; Barnhart and Rosenstein, 2010) by considering the potential influence of portfolio illiquidity and shareholder type. Second, we contribute to the limited literature on mutual fund portfolio liquidity (e.g., Cullinan and Zheng, 2014; Lesmond and Nishiotis, 2016) by considering whether portfolio liquidity may relate to share turnover. Finally, we consider the generalizability to closed-end funds of existing literature that indicates that institutional investors tend to trade shares more frequently than smaller investors (e.g., Chordia et al., 2011; Utama and Cready, 1997; Bougatef and Missaoui, 2014).

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### Portfolio Illiquidity and Share Turnover

Cherkes et al. (2009) note that closed-end funds may be of particular benefit to smaller investors. The closed-end fund structure may permit smaller investors to access illiquid portions of the financial markets. Closed-end funds can invest in these securities at lower transaction costs than would be incurred by the investors if they were to acquire illiquid securities directly. Therefore, funds investing in illiquid securities may experience lower share turnover as investors interested in acquiring illiquid securities seek to minimize transaction costs through purchasing the fund shares. We will refer to this notion as the "transaction costs" theory.

Research has noted that the fund's determination of the fair value of illiquid securities may be more difficult (e.g., Lee et al., 1991; Cullinan and Zheng, 2014; Thomas, 2016). The difficulty of valuing these illiquid securities could lead to a lack of consensus about the fund's NAV and fund mis-valuation, either unintentionally (due to the difficulty of valuation of underlying securities) or intentionally (due to the opportunity to intentionally mis-value the securities due to the more subjective nature of the valuation process). The difficulty in valuing the fund's illiquid securities could lead to differences in opinion about the market value of the fund's shares,<sup>2</sup> and hence the price to be paid for the shares. Different perceptions of the appropriate price for the fund shares can lead to higher trading volume (e.g., Beaver, 1968; Bamber et al., 1997; Bamber et al., 2011; Cho and Kwon, 2014). As Beaver, (1968), p.69 notes that "volume reflects a lack of consensus regarding the price."

If investors have different perceptions of the appropriate value of fund's securities (and therefore the fund's Net Asset Value (NAV), an investor who thinks the securities are overvalued is more likely to sell and an investor who thinks the securities are undervalued may be more inclined to buy the fund shares. If both the buyer and the seller agree on the appropriate valuation, the potential buyer would only be willing to pay what the current owners think the security is worth, making the trade less likely to occur when there is consensus among the investors. The subjectivity of valuing illiquid securities could lead to differing investor value perceptions, resulting in higher share turnover. We will refer to this notion as the "lack of valuation consensus" theory.

In summary, there are two opposing theories for the relationship between the liquidity of the securities in the fund's portfolio and the liquidity of the fund's shares. The transaction costs theory posits that investors in closed-end funds holding illiquid securities seek to reduce the transaction costs of directly investing in illiquid securities, which could lead to decreasing fund share turnover, as investors try to reduce transaction costs related to the funds' shares. Alternatively, the lack of valuation consensus theory implies that investors have different perceptions of the underlying value of the illiquid securities held by the fund, resulting in increasing share volume. Which of the two competing theories is more predictive of the actual conditions is an empirical question we attempt to answer as part of this study. We thus propose the following non-directional hypothesis:

**H1:** There is no relationship between the liquidity of the securities held in the fund's portfolio and the fund's share turnover.

### **Type of Investors and Share Turnover**

There are a limited number of studies examining the share turnover or trading volume of closed-end fund shares. Yang (2012) analyzes the trading volume of UK closed-end fund shares<sup>3</sup> surrounding the announcement of share repurchase plans, and finds that these repurchase plans are associated with significantly higher trading volume. Barnhart and Rosenstein (2010) assess the effects of the introduction of an exchange-traded fund (ETF) on the trading volume of the closed-end fund shares in the same asset class. They find that when such ETFs are introduced, trading volume for closed-end funds investing in the same asset class experiences a significant decline.

The studies examining closed-end fund trading volume (e.g., An et al., 2012; Yang, 2012; Barnhart and Rosenstein, 2010) do not control for type of ownership (individual vs. institutional). Studies of other types of stocks generally find evidence that trading volume is higher for stocks with more institutional share ownership (e.g., Utama and Cready, 1997; Chordia et al., 2011; Bougatef and Missaoui, 2014). The institutional ownership/trading volume relationship is robust among different types of investments. Hence, we expect the institutional ownership/trading volume relationship to be higher for closed-end fund shares. Because small investors are the majority owners of most closed-end fund shares, we focus on *non-institutional* investors, and propose the following hypothesis:

**H2:** There is a negative relationship between non-institutional shareholdings and the share turnover of closed-end fund shares.

### **Type of Investors, Portfolio Illiquidity, and Fund Share Turnover**

Closed-end funds are required to meet a variety of qualifications tests to be treated as tax free entities. As a qualified investment company, the fund passes income and gains through to the shareholders, who then pay tax on the income. These qualification tests include requirements that the fund be sufficiently diversified (AICPA, 2014; ICI 2015). Thus, a closed-end fund may permit a smaller investor to build a more diversified portfolio with lower transaction costs than if the small investor were to buy the same securities in the portfolio in small lots due to the limited investment dollars available to a small investor. Thus, all mutual funds (including closed-end funds) can provide portfolio-diversification benefits.

Cherkes et al. (2009) proposes that one of the main reasons for the existence of closed-end funds is to permit small investors to access illiquid securities without incurring excessive transaction costs. Investors in *open-end* mutual funds buy and sell shares directly from the fund. If faced with a large number of net redemption, an open-end fund may need to sell securities in the portfolio to provide liquidity to the fund's investors. Closed-end funds are able to access illiquid securities because they have a fixed number of publicly traded shares, so they would not have to sell securities to meet redemption requests from investors. Due to the opacity of the markets for illiquid securities, selling these securities could result in higher direct transaction costs. If the portfolio securities are illiquid, selling these securities would also be more likely to result in a decrease in the price of stock (Amihud, 2002), bringing about higher indirect transaction costs.

Consistent with Cherkes et al.'s (2009) notion that closed-end funds are of particular use for smaller investors who wish to access illiquid securities, Cullinan et al. (2016) find that small investors are more

likely to hold shares of mutual funds that invest larger portions of their portfolio in illiquid securities. Hypothesis 1 posits that there is a negative relationship between the percentage of small investors in the fund and share turnover. Smaller investors who hold funds that invest primarily in liquid securities may be willing to trade these securities more frequently, because they would not provide the same transaction cost benefits; the smaller investors could access the liquid securities more readily themselves. So, while a fund investing primarily in liquid securities can provide portfolio-diversification benefits, such a fund would not provide as many transaction costs benefits. If closed-end funds allow smaller investors access to illiquid markets at lower transaction costs, these small investors may be more likely to hold onto fund that invests more heavily on illiquid securities. This leads to the following interaction hypothesis:

**H3:** The relationship between smaller investor ownership and share turnover is stronger when the fund's portfolio contains a higher percentage of illiquid investments.

## DATA AND METHODS

### Sample

We obtained data on all of the closed-end mutual funds in the Morningstar Direct database for 2010 to 2012. There were a total of 1,894 funds in the database for these three years. We then hand-collected data from the funds' financial statements on the liquidity of the funds' portfolio. We also obtained data from Mergent on the percentage of the funds' shares held by institutional investors. Due to missing data, the number of observations available was reduced by 237 fund-years to a total of 1,657 fund-years.

### Variable Measurements

We measured share turnover as the average daily trading volume of the shares in the relevant year divided by the total number of shares outstanding (Yang, 2012; Barnhart and Rosenstein, 2010). This is the dependent variable in our models.

We measured the illiquidity of the fund's portfolio based on the disclosures in the financial statements about the inputs used to determine the value of the securities in the fund's portfolio. Accounting Standards Codification (ASC) 820 requires the disclosure of the types of valuations inputs based on a hierarchy ranging from level 1 to level 3. Level 1 valuation inputs are directly observable inputs for actively traded securities. Level 2 inputs are indirectly observable inputs for securities. An example of a level 2 input is a yield curve on bonds used to determine the fair-value of a bond that is not actively-traded. Level 3 inputs are unobservable inputs because there is no market data available to assist in determining the value of the security in the portfolio. Level 3-assets are often valued using estimated future cash flows. We use level 2 and 3 assets (as a percentage of total assets) to measure the liquidity of the funds' portfolios.<sup>4</sup>

We measured the percentage of shares held by smaller investors based on data obtained from Mergent on the percentage of shares held by institutional investors. Because we were interested in the potential influence of smaller investors, we subtracted the percentage of shares held by institutional investors from one to measure the percentage of shares held by smaller investors.

### Testing Technique

To examine our hypotheses, we developed and tested an OLS regression model with share turnover as the dependent variable. To test H1, we included the percentage of the fund's assets held in illiquid securities as a measure of the fund's portfolio liquidity; due to the competing hypotheses discussed previously, we do not posit a sign on this variable. The percentage of shares held by non-institutional shareholders was included in the model to test H2, and we expect a negative sign on this variable. H3 was tested by incorporation of the interaction between the fund portfolio liquidity and a negative sign is expected for this interaction variable.

Based on the limited literature on closed-end fund share turnover (e.g., An et al., 2012; Yang, 2012; Barnhart and Rosenstein, 2010), we also included a variety of control variables in our model of share turnover. These variables included: fund size (in dollars) (SIZE) whether the fund is traded in the New

York Stock Exchange (NYSE), total annual return (RETURN), the fund's leverage (LEVERAGE), the price of the shares at year end (PRICE), the dividend yield of the fund (DIVIDEND), the fund age (AGE), expense ratio (EXPENSE), and the average premium or discount on the fund for the year (DISCOUNT/PREMIUM).

## **RESULTS**

### **Descriptive Statistics and Regression Results**

Table 1 presents the descriptive statistics for the observations in our study. The mean fund has a share turnover of 0.28%, indicating that average daily trading volume for the funds in our sample is 0.28% of the total shares outstanding. Small (i.e., non-institutional investors) hold 88.5% of the outstanding shares. The mean fund has 74.5% of its assets in illiquid securities, with level 2 assets being the most common type of security held by the funds. The mean fund has \$470.7 of assets, an annual return of 35.2% and leverage of 23.2%. Funds traded on the NYSE comprise 77.4% of the sample. The mean price is \$13.90, which is 1.59% less than the Net Asset Value (NAV). The dividend yield for the mean fund is 5.67%.

**TABLE 1**  
**DESCRIPTIVE STATISTICS**

**Number of observations=1,657**

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev</b>	<b>Median</b>	<b>Minimum</b>	<b>Maximum</b>
SHARE_TURNOVER	0.280%	0.124%	0.253%	0.059%	1.095%
%NON_INSTITUTIONAL_HOLDINGS	88.486%	11.054%	92.119%	32.900%	99.996%
%ILLIQUID	74.476%	38.618%	98.744%	0%	100%
%LEVEL2	72.427%	39.149%	97.647%	0%	100%
%LEVEL3	2.049%	8.731%	0%	0%	100%
SIZE(in millions)	\$470.68	\$510.71	\$292.09	\$4.13	\$4,497.80
NYSE	0.774	0.419	1.000	0.000	1.000
RETURN	35.204%	33.525%	32.846%	-74.117%	233.642%
LEVERAGE	23.215%	15.531%	28.560%	0%	53.495%
PRICE	\$13.895	\$5.477	\$14.010	\$2.145	\$57.560
DIVIDEND	5.671%	2.877%	5.998%	0%	19.316%
AGE	14.280	10.460	11.000	1.000	85.000
EXPENSE	1.577%	0.698%	1.480%	0%	9.700%
PREMIUM/DISCOUNT	-1.591%	15.227%	-2.408%	-32.467%	66.850%
YEAR2011	0.342	0.475	0.000	0.000	1.000
YEAR2012	0.333	0.471	0.000	0.000	1.000

**Variable definitions:**

SHARE\_TURNOVER is the fund's average daily trading volume (over a year) divided by its number of outstanding shares.

%NON\_INSTITUTIONAL\_HOLDINGS is the percentage of shares held by non-institutions investors.

%ILLIQUID is the percentage of fair value of less liquid assets.

%LEVEL2 is the percentage of fair value of level2 assets.

%LEVEL3 is the percentage of fair value of level3 assets.

SIZE is the fund's total assets.  
NYSE is a dummy variable which is coded as one if the fund is listed in NYSE, and zero otherwise.  
RETURN is the fund's three year compounded market return.  
LEVERAGE is measured as the total liabilities divided by total assets.  
PRICE is the fund's average daily market price over a year.  
DIVIDEND is the fund's yearly dividend yield.  
AGE is the fund's age.  
EXPENSE is the fund's yearly gross expense ratio.  
PREMIUM/DISCOUNT is the fund's average monthly premium (positive) or discount (negative) over a year.  
YEAR2011 is a dummy variable which is coded one for year 2011 observations, and zero otherwise.  
YEAR2012 is a dummy variable which is coded one for year 2012 observations, and zero otherwise.

Table 2 displays the correlation matrix among the variables of our study. As predicted by H1, there is a negative relationship between non-institutional shareholdings and share turnover. There is also a negative relationship between portfolio illiquidity (%ILLIQUID) and share turnover. The large number of significant correlations between non-institutional shareholders, portfolio illiquidity and the control variables support the use of regression analysis.

TABLE 2  
PEARSON CORRELATIONS

	SHARE_	%NON_	%	SIZE	NYSE	RETURN	LEVERAGE	PRICE	DIVIDEND	AGE	EXPENSE	PREMIUM/	YEAR
	TURNOVER	INSTITUTIONAL_	ILLIQUID									DISCOUNT	2011
		HOLDINGS											
%NON_													
INSTITUTIONAL_	-0.322***	1.000											
HOLDINGS													
%ILLIQUID	-0.361***	0.425***	1.000										
SIZE	0.071***	-0.109***	-0.109***	1.000									
NYSE	0.149***	-0.196***	-0.104***	0.371***	1.000								
RETURN	-0.087***	0.020	0.079***	0.128***	0.033	1.000							
LEVERAGE	-0.378***	0.433***	0.498***	0.089***	-0.154***	0.157***	1.000						
PRICE	-0.004	-0.259***	-0.162***	0.153***	0.035	-0.001	-0.075***	1.000					
DIVIDEND	-0.044*	0.405***	0.466***	0.129***	0.024	0.249***	0.470***	-0.291***	1.000				
AGE	-0.401***	-0.020	0.089***	-0.034	0.029	0.110***	0.006	-0.117***	-0.109***	1.000			
EXPENSE	0.113***	-0.074***	-0.133***	-0.127***	-0.170***	0.072***	0.286***	0.006	0.024	-0.148***	1.000		
PREMIUM/	-0.072***	0.243***	0.169***	0.030	-0.005	0.088***	0.198***	-0.077***	0.283***	-0.019	0.012	1.000	
DISCOUNT													
YEAR2011	-0.092***	0.004	0.013	-0.024	-0.002	0.583***	0.022	-0.009	0.042*	-0.010	-0.013	-0.046*	1.000
YEAR2012	-0.011	-0.033	-0.005	0.054**	0.018	-0.002	-0.027	0.059**	-0.066***	0.055**	0.076***	0.028	-0.510***

All variables are defined in Table 1. SIZE and AGE are logged. (\*), (\*\*), (\*\*\*) indicates significance at the 0.10, 0.05, and 0.01 levels, respectively.

Table 3 presents the OLS Regression results with share turnover as the dependent variable. The overall model F is 93.64, which is significant at <0.0001. The adjusted is 0.4392, indicating that the variables in the model explain about 44% of the variation in share turnover.

**TABLE 3**  
**THE ASSOCIATION BETWEEN THE LIQUIDITY OF A FUND'S PORTFOLIO AND**  
**TURNOVER OF THE FUND'S SHARES**

**Dependent variable = SHARE\_TURNOVER**

Variable	Coeff. Est.	p-value
INTERCEPT	0.46510	<0.0001***
%ILLIQUID	0.00294	<0.0001***
%NON_INSTITUTIONAL_HOLDINGS	-0.00477	0.8978
%ILLIQUID * %NON_INSTITUTIONAL_HOLDINGS	-0.00404	<0.0001***
SIZE	0.00163	0.5310
NYSE	0.01754	0.0040***
RETURN	0.00020	0.0547*
LEVERAGE	-0.00239	<0.0001***
PRICE	-0.00183	<0.0001***
DIVIDEND	0.00718	<0.0001***
AGE	-0.05654	<0.0001***
EXPENSE	0.02109	<.0001***
PREMIUM/DISCOUNT	-0.00001	0.9469
YEAR2011	-0.04444	<0.0001***
YEAR2012	-0.02589	<0.0001***
Observations	1,657	
Adjusted R <sup>2</sup>	0.4392	
F-stat	93.64	
Prob. > F-stat	<0.0001	

All variables are defined in Table 1. SIZE and AGE are logged in the models. (\*), (\*\*), (\*\*\*) indicates significance at the 0.10, 0.05, and 0.01 levels, respectively.

H1 sought to examine whether portfolio illiquidity is related to share turnover. The results indicate that portfolio illiquidity (%ILLIQUID) is positively related to share turnover, and this difference is significant at  $< 0.0001$ . This finding indicates that funds with portfolios that are less liquid tend to be traded more frequently than funds with more liquid portfolios. These results are consistent with the lack of valuation consensus notion, which suggests that the different perceptions of the valuations of illiquid securities can result in more trading. Contrary to H2, there is no significant relationship between non-institutional shareholdings and share turnover.

The interaction between portfolio liquidity and smaller investors (%ILLIQUID \* %NON\_INSTITUTIONAL\_HOLDINGS) is negative and significant at  $< 0.0001$  and provides evidence regarding H3. This finding indicates that funds with portfolios that are less liquid experience are traded **less** frequently than funds with more liquid portfolios. These results are consistent with the transaction costs benefits notion, which suggests that funds holding illiquid securities provide lower transaction costs to investors, who will trade less frequently due to their concern with minimizing their transaction costs.

Taken together, the results presented in Table 3 suggest that the portfolio liquidity/trading volume relationship may be contingent on the nature of the shareholders. Institutional shareholders are more likely to actively trade fund shares if the fund invests in less liquid securities. This trading may be designed to take advantage of potential differences of opinion in the appropriate valuations of the funds' securities. Conversely, smaller shareholders are less likely to actively trade shares of funds that invest heavily in illiquid securities to avoid transaction costs.

### **Sensitivity/Robustness Analyses**

To assess whether our results are sensitive to the distinction between level 2 and level 3 assets, we also ran our share turnover model with assets segregated into those valued using the two levels of valuation inputs. The results of this testing are presented in Table 4. The results for both level 2 assets and level 3 assets are consistent with those presented in Table 3: the level 2(3) assets are significant and positive, and the interactions between the asset valuation levels and level 2(3) assets are significant and negative. These findings indicate that our results are robust to this alternative specification of the liquidity of the securities in the fund's portfolio.

**TABLE 4**  
**SENSITIVITY ANALYSIS: LESS LIQUID ASSETS SEGREGATED INTO THOSE VALUED**  
**USING LEVEL 2 AND LEVEL 3 VALUATION INPUTS**

<b>Dependent variable = SHARE_TURNOVER</b>	
Variable	Coeff. p-value Est.
INTERCEPT	0.46048 <.0001***
% LEVEL 2	0.00270 <.0001***
% LEVEL 3	0.00607 0.0002***
%NON_INSTITUTIONAL_HOLDINGS	-0.00079 0.9829
% LEVEL 2* %NON_INSTITUTIONAL_HOLDINGS	-0.00378 <.0001***
% LEVEL 3* %NON_INSTITUTIONAL_HOLDINGS	-0.00696 0.0003***
SIZE	0.00234 0.3691
NYSE	0.01629 0.0076***
RETURN	0.00022 0.0298**
LEVERAGE	-0.00235 <.0001***
PRICE	-0.00183 <.0001***
DIVIDEND	0.00671 <.0001***
AGE	-0.05698 <.0001***
EXPENSE	0.01791 <.0001***
PREMIUM/DISCOUNT	0.00000 0.9945
YEAR2011	-0.04534 <.0001***
YEAR2012	-0.02594 <.0001***
Observations	1,657
Adjusted R <sup>2</sup>	0.4417
F-stat	82.89
Prob. > F-stat	<0.0001

All variables are defined in Table 1. SIZE and AGE are logged in the model. (\*), (\*\*), (\*\*\*) indicates significance at the 0.10, 0.05, and 0.01 levels, respectively.

We also added a variable measuring the type of fund into our model to further assess the robustness of our results. Stock and Bond funds are the two main types of funds in the closed-end fund business. We

developed two dummy variables measuring whether the funds' investment objective primarily related to stock or bonds and included these in our models presented in Table 5.<sup>5</sup> These findings are consistent with our other results, suggesting that our results are robust to the inclusion of these other control variables.

**TABLE 5**  
**ROBUSTNESS CHECK: CONTROL THE FUND TYPE**

**Dependent variable = SHARE\_TURNOVER**

---

Variable	Coeff. Est.	p-value
INTERCEPT	0.42250	<.0001***
%ILLIQUID	0.00313	<.0001***
%NON_INSTITUTIONAL_HOLDINGS	0.00024	0.5261
%ILLIQUID * %NON_INSTITUTIONAL_HOLDINGS	-0.00004	<.0001***
SIZE	0.00029	0.9166
NYSE	0.01372	0.0313**
RETURN	0.00019	0.0775*
LEVERAGE	-0.00229	<.0001***
PRICE	-0.00165	0.0005***
DIVIDEND	0.00814	<.0001***
AGE	-0.05276	<.0001***
EXPENSE	0.02441	<.0001***
PREMIUM/DISCOUNT	-0.00002	0.9041
STOCK	0.02056	0.0863*
BOND	-0.02011	0.0793*
YEAR2011	-0.04341	<.0001***
YEAR2012	-0.02642	<.0001***
Observations	1,545	
Adjusted R <sup>2</sup>	0.4296	
F-stat	73.69	
Prob. > F-stat	<0.0001	

---

STOCK is a dummy variable which is coded as one if a fund primarily invests in stocks and zero otherwise; BOND is a dummy variable which is coded as one if a fund primarily invests in bonds and zero otherwise. All other variables are defined in Table 1. SIZE and AGE are logged in the models. (\*), (\*\*), (\*\*\*) indicates significance at the 0.10, 0.05, and 0.01 levels, respectively.

## Limitations

Our measure of illiquid securities was based on the inputs used in the valuation process. In particular, the assets valued using level 2 inputs were the most predominant securities in the funds' portfolios. Level 2 assets are valued using indirectly observable inputs, in which the security is not actively traded, but there is other market data indirectly related to the security, such as yield to maturity on a bond with a certain rating and maturity period. However, there could be variation in liquidity within level 2, which may have different transaction costs.

## SUMMARY AND CONCLUSIONS

The liquidity of a closed-end fund's portfolio may be related to the share turnover of the fund's shares. Cherkas et al. (2009) propose that a primary purpose of closed-end funds is to allow small investors to access less-liquid portions of the securities markets. Investors may therefore be less likely to frequently trade fund shares when funds have material portions of their portfolios invested in illiquid securities. Non-institutional (i.e., smaller) investors may also be less likely to trade frequently due to their objective of reducing transaction costs.

We examined 1,657 closed-end fund years from 2010 to 2012. We obtained data on the illiquidity of the fund's portfolio based on recently-required disclosure of the inputs used to value the securities in the fund's portfolio for financial reporting purposes. Level 2 and level 3 inputs relate to portfolio securities that are not actively traded, and used to measure illiquid securities in the fund's portfolio. We find that portfolio illiquidity is positively related to share turnover, but this result was mainly limited institutional shareholders. These results imply that institutional investors hold closed-end fund shares for a shorter period of time when the fund primarily invests in illiquid securities. The results also indicate that smaller investors may trade less frequently and thus have longer holding periods for funds with highly liquid portfolios, possibly to reduce transaction costs.

## ENDNOTES

1. Many researchers in the cited literature use the term "trading volume" when describing share turnover that is determined as the number of shares traded divided by the total shares outstanding and we utilize this terminology when analyzing findings of the existing literature. We use the term "share turnover" (which refers to *fund* share turnover and not portfolio turnover).
2. Cho and Kwon, (2014), p.9 refer to the lack of certainty about share value as investors' "differential interpretation of information."
3. Note that institutional ownership is more common among UK closed-end funds than among US funds (Dimson and Kozerski, 1999).
4. Level 2 and level 3 valued assets would be called "good-faith" valued securities under the Investment Company Act of 1940, which is the relevant US federal regulation for closed-end funds.
5. The excluded base category is other types of investments objectives, mainly balanced funds.

## REFERENCES

- American Institute of Certified Public Accountants (AICPA). (2014). *Industry audit guide: investment companies, with conforming changes to May 1, 2014*, New York: AICPA
- Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. *Journal of Financial Markets*, 5(1), 31 - 56.
- An, J., Genmill, G., & Thomas, D. C. (2012). The agency effects of repurchases on closed-end funds. *European Financial Management*, 18(2), 240 - 270.
- Bamber, L., Barron, O. E., & Stober, T. L. (1997). Trading volume and different aspects of disagreements coincident with earnings announcements. *The Accounting Review*, 72(4), 575 - 597.
- Baber, L. S., Barron, O. E., & Stevens, D. E. (2011). Trading volume around earnings announcements and other financial reports: Theory, research design, empirical evidence, and directions for future research. *Contemporary Accounting Research*, 28(2), 431 - 471.
- Barnhart, S. W., & Rosenstein, S. (2010). Exchange traded fund introductions and closed-end fund discounts and volume. *The Financial Review*, 45(4), 973 - 994.
- Beaver, W. H. (1968). The information content of annual earnings announcements. *Journal of Accounting Research*, 6 (Supplement), 67 - 92.
- Bougatef, K., & Missaoui, S. (2014). Institutional ownership, liquidity and firm performance. *American Journal of Finance and Accounting*, 3(2/3/4), 109 – 127.
- Cherkes, M., Sagi, J., & Stanton, R. (2009). A liquidity theory of closed end funds. *The Review of Financial Studies*, 22(10), 258 - 297.
- Cho, M., & Kwon, Q. Y. (2014). Trading volume and investor disagreement around management disclosure forecasts. *Journal of Accounting, Auditing & Finance*, 29(1), 3 - 30.
- Chordia, T., Roll, R., & Subrahmanyam, A. (2011). Recent trends in trading activity and market quality. *Journal of Financial Economics*, 101(2), 243 - 263.
- Cullinan, C. P., & Zheng, X. (2014). Valuation scepticism, liquidity benefits and closed-end fund premiums/discounts: evidence from fair value disclosures. *Accounting & Finance*, 54(3), 729–751.
- Cullinan, C. P., Zeng, X., & Precourt, E. (2016). Is there a relationship between the liquidity of closed-end funds' portfolios, fund ownership by smaller investors and the liquidity of the funds' shares? *Research in Finance*, 32, 185 - 205.
- Dimson, E., & Kozerski, C. (1999). Closed-end funds: A survey. *Financial Markets, Institutions & Instruments*, 8(2), 1 - 41.
- Investment Company Institute (ICI). (2015). *ICI Factbook*. [online]  
[http://www.icifactbook.org/fb\\_appa.html](http://www.icifactbook.org/fb_appa.html)
- Lee, C. M., Schleifer, C. A., & Thaler R. H. (1991). Investor sentiment and the closed-end fund puzzle. *The Journal of Finance*, 46(1), 75 - 110.
- Lesmond, D. A., & Nishiotis, G. (August 25, 2016) 'Closed-end funds.' [online]  
<https://ssrn.com/abstract=2695109> or <http://dx.doi.org/10.2139/ssrn.2695109>
- Thomas Jr., L. (January 12, 2016). A new focus on liquidity after a fund's collapse. *The New York Times*, p. B1.
- Utama, S., & Cready, W. M. (1997). Institutional ownership, differential predisclosure precision and trading volume at announcement dates. *Journal of Accounting and Economics*, 24(2), 129 - 150.
- Yang, T. (2012). Essays on closed-end funds, PhD dissertation, Manchester Business School.