

**Examining the size effect on the performance of closed-end funds
in Canada**

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Abstract

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This paper investigates the relationship between fund size and mutual fund performance. We focus the relationship between closed-end fund size and closed-end fund performance since research work done in this area is very thin.

Our sample consists of 161 closed-end funds registered in Canada and currently actively traded. The result suggests that there is no conclusive evidence regarding the relationship between closed-end fund size and closed-end performance. However, evidence shows management style and management expense ratio may have effects on closed-end fund size, while other factors, such as premium offered by closed-end funds, investors sentiments, and risk level of closed-end fund are unrelated with fund size.

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Chapter 1: Introduction

1.1 Background

In 1997, Fidelity Magellan Fund, one of the world's largest actively managed mutual funds announced its closure. The primary reason for the fund's closure is described as "too big to serve its shareholders' best interests" (Indro, Jiang, Hu, & Lee, 1999). While the public became shocked about this unexpected event, this also brought about a debate on whether fund size matters or not for the mutual fund industry.

A lot of researches have been done to examine the relationship between fund size and mutual fund performance. "Mutual funds must attain a minimum fund size in order to achieve sufficient returns to justify their costs of acquiring and trading on information." (Indro, Jiang, Hu, & Lee, 1999) Some researchers suggest that fund size has negative effect on mutual fund performance (Chen, Hong, Huang, & Kubik, 2004). Analysts also believe that an optimal amount fund size can be determined by estimating economies of scale for mutual fund industry. (Collins & Mack, 1997)

The purpose of this research paper is to examine fund size effect on the performance of closed-end funds (CEFs). According to data from Bloomberg, there are 6207 actively traded funds available in Canada. Among these funds, there are only 290 closed-end funds. A closed-end fund is a pool of assets like an open-end fund and is usually sponsored by a fund management company. Investors can trade their shares of CEFs on the stock exchange. As a result, a closed-end fund's price usually differs from its NAV since the price of a closed-end fund is completely determined by the market. This is also the reason why closed-end fund traded at a discount or premium. A closed-end fund can

be traded at a premium at one time, and traded at a discount at other times. This phenomenon is also described as the closed-end fund puzzle.

Unlike open-end mutual funds, closed-end funds exhibit some unique characteristics. Closed-end funds do not have cash inflow or outflow once the fund starts to trade on the exchange. In the other word, CEFs are managed portfolios trade like an individual stock. (Barnhart & Rosenstein, 2010) CEFs, however, still exhibit the fund characteristics, such as portfolio investment goals, investment concentration and different management style. These unique characteristics may contribute to the performance persistence of CEFs (Bers & Madura, 2000). In addition, these characteristics could also be the factors that should be considered for examining the size effect on the performance of closed-end funds.

1.2 Statement of the problem

When we say CEFs behave like stocks, it is possible for CEFs have “size effects” like stocks. The phenomenon was first discovered by Banz (1981), due to higher systematic risk for smaller firms, “smaller firms have higher returns than larger firms, on average over long horizons.” (Grain, 2011) Even though the statement is not conclusive, we can still assume that this phenomenon may exist in CEFs. Since larger fund size expose the portfolio to higher risk, a reasonable assumption can be made, which is CEFs with larger fund size tend to have higher abnormal returns than CEFs with smaller fund size, vice versa.

In addition, since CEFs also exhibit fund characteristics just like mutual fund, “The perception that fund size can impede performance is a valid concern in a financial market

where information acquisition and trading are costly and security prices are noisy reflection of intrinsic value.” (Indro, Jiang, Hu, & Lee, 1999) Larger-sized fund may perceive positive economies of scale rather than smaller sized fund. Thus, the same assumption could be made, which is larger sized CEFs may obtain higher abnormal returns than smaller sized fund.

This paper investigates the effect of fund scale on the performance of Canadian closed-end funds. Since closed-end funds partly exhibit characteristics of stocks and mutual funds, the research model used for analysis focuses on factors such as risk level, investor confidence, primary exchange, management style, discount or premium offered and fund expense ratio. Based on these factors, this paper investigates whether the larger sized closed-end funds perform better than smaller sized closed-end funds, and some the possible reasons behind the phenomenon.

1.3 Purpose of Study

Most research papers provide empirical analyses related to fund size effects on open-ended funds instead of CEFs. However, the potential existence of the size effect on the performance of closed-end funds is also a significant issue. In Canada for example, CEFs control \$27.91 trillion assets. Poor asset management of CEFs has immediate consequences in the Canada’s investment funds industry. This study helps to test if fund size affects CEFs’ performance, and investigates how to improve the problem of scale-related inefficiencies in CEFs.

1.4 Structure of the Research Paper

The body of this paper will be divided into four parts, which are literature review, methodology, results and conclusions. Related studies will be discussed first in order to briefly review insights and findings from the existing literature on related topics. In the methodology section, the dataset and research model used in the empirical analysis will be described. The following section reports results of the computer output. In the end, the paper concludes with findings based on the results.

Chapter 2: Literature Review

2.1 Does fund size matter?

Some researchers have explored the problem, which is whether fund size affects fund performance. Indro, Jiang, Hu, & Lee (1999) suggest that fund size matters. The research model used in their paper includes six independent variables, which are beta, residual risk, P/E, P/B, expense ratio and turnover rate. The dependent variable is the average return of each fund. They sorted the full sample into 10 groups by fund size. By comparing the regression results for each size group, they found four reasons why fund size matters. First of all, the growth in the size of net assets may provide cost advantages because the costs of information and brokerage commissions do not rise in direct proportion to fund size. Second, large sized funds make outsiders more carefully examine the details of the fund. "As a consequence, the fund manager's ability to trade without signaling his or her intentions is greatly curtailed." Third, a large sized fund may cause extra administrative costs. Forth, a fund manager may use different strategies or select different securities with increasing size. Thus, the performance of the fund may differ for different fund size.

However, since fund size matters, another problem has raised, which is either large sized funds perform better than small sized funds or small sized funds perform better than large sized funds. Collins & Mack (1997) believe that the optimal amount of a fund complex can be estimated by economies of scale for the mutual fund industry. By expanding assets under management, the average mutual fund complex can achieve significant economies of scale. Latzko (1999) also showed evidence to prove that there are economies of scale in administering and managing mutual funds. These studies remind us that the existence

of scale of economies should be one important component when investigating the relationship between fund size and fund performance.

Furthermore, a recent study on pension fund suggests that the largest plans outperform smaller ones when the economies of scale are positive (Dyck & Pomorski, 2011). The authors argue that the impact of scale on performance at the pension plan level is dominated. They test whether economies of scale arise from investment approach within an asset class or firm asset, and explore the limits to scale economies, focusing on governance. As a result, in a certain range of size, larger defined pension plans benefit from economies of scale about 0.43% to 0.50% on average than smaller plans each year. They conclude that bigger is better when it comes to pension plans.

Chen, Hong, Huang, & Kubik (2004) found strong evidence that fund size may erode mutual fund performance. “Controlling for its size, a fund’s return does not deteriorate with the size of the family that it belongs to.” They used multiple models such as the Capital Asset Pricing Model (CAPM), the Fama-French three-factor model and this three-factor model augmented by a momentum factor to test their initial hypothesis. The results suggest that fund size can erode fund performance due to the interaction of liquidity and organizational diseconomies related to hierarchy costs.

2.2 Uniqueness of Closed-end Funds

Since closed-end funds have some unique characteristics, a lot of researches have been done to study the market behavior of closed-end funds. Lee, Andrei, & Thaler (1990) introduced several closed-end funds anomalies in their research.

“1) New funds appear on the market at a premium and move rapidly to a discount. 2) Closed-end funds usually trade at substantial discounts relative to their net asset values. 3) Discounts (and premium) are subject to wide variation, both over time and across funds. 4) When closed-end funds are terminated, either through merger, liquidation, or conversion to an open-end fund, prices converge to reported net asset value.”

Most of related studies, such as Zweig (1973), Lee, Andrei, & Thaler (1991) suggest that those closed-end funds puzzles should be associated with investor sentiment.

On the other side, some papers investigate the performance persistence of closed-end funds. Bers & Madura (2000) address on the topic of why performance persistence varies among closed-end funds. They believed the uniqueness of closed end funds that can be distinguished from open-end funds are its management style and pricing method. Based on their empirical analysis, they concludes that performance persistence exists and varies for fund-specific characteristics, such as fund size, a fund’s goal, expense ratio, turnover ratio, fund experience, fund family and stock exchange.

2.3 Size effects on stocks

Since closed-end funds partly exhibit some characteristic like stock, it is also necessary to look at some literature on the size effect on stocks. The size effect on stocks refers to the observation that smaller firms tend to perform better in stock market compared to larger firms. This observation was first observed by Banz (1980). Since then, the reasons for the size effect phenomenon are controversial. However, most studies, such as Berk (1995), believes that size effects should be related to risks of the firm.

2.4 Summary

Previous studies indicate that fund size does matter, and the relationship between fund size and fund performance cannot be determined conclusively. The relationship may depend on fund specific characterizes. Thus, when investigating the effect of fund scale on the performance of Canadian closed-end funds, it is necessary to understand the uniqueness of closed-end fund first. Since closed-end funds are traded on the stock exchange just like individual stock, the phenomenon of size effects on stocks should also be considered into the study.

Chapter 3: Methodology

3.1 Theoretical Assumptions

In order to test the relationship between closed-end fund size and fund performance and the possible factors that may have effects on the relationship, several theoretical assumptions were made before the research model was built.

The first assumption is that closed-end fund size and fund performance are correlated. The relationship between closed-end fund size and fund performance could be positive, negative or both.

The second assumption is that closed-end fund size may be influenced by management style and economies of scale just like open-ended funds.

The third assumption is that closed-end fund size may be influenced by investor sentiment which will make the price of closed-end fund deviate from its NAV.

The fourth assumption is that closed-end fund size may be influenced by the listing stock exchange and risk level since closed-end funds are listed on the stock exchange like an individual stock.

Based on the theoretical assumptions above, one hypothesis will be tested:

H₀: Closed – end fund size may not be influenced by risk level, investor

confidence, primary exchange, management style, discount or premium offered or fund expense ratio.

H₁: Closed – end fund size may be influenced by risk level, investor

confidence, primary exchange, management style, discount or premium offered or fund expense ratio.

3.2 Data sources and data overview

To explore the relationship between closed-end fund size and fund performance, we take advantage of data from Bloomberg, which includes 161 closed-end fund investments registered in Canada that are currently actively managed and traded on the exchange for last three years from 2010-2013.

According to Bloomberg, it suggests that there are more than 290 closed-end fund investments registered in Canada. Due to lack of information for some of the closed-end funds, only 161 closed-end funds are used in this research paper. The dataset retrieved from Bloomberg includes variables such as ticker name, year to date return, expense ratio, total asset, standard deviation (one- year weekly average), last premium percent, Net asset value (as of Aug 8th , 2013) and current share outstanding. The dataset is unbalanced since some of the CEFs are registered within three years or some information are not available to public.

As indicated in Figure 1, most of Canadian closed-end funds in the dataset have total asset value lower than \$100 million. Total asset value of sample CEFs ranges from \$0.11 million to \$4409.95 million. Thus, this paper will sort the full sample into seven groups in order to compare and study the behavior of fund performance with different fund size.

The fund size classification will be as follows:

Class 1 = Total asset value less than \$20 million Canadian dollars

Class 2 = Total asset value between \$20 million Canadian dollars and \$40 million Canadian dollars

Class 3 = Total asset value between \$40 million Canadian dollars and \$60 million Canadian dollars

Class 4 = Total asset value between \$60 million Canadian dollars and \$80 million Canadian dollars

Class 5 = Total asset value between \$80 million Canadian dollars and \$100 million Canadian dollars

Class 6 = Total asset value between \$100 million Canadian dollars and \$300 million Canadian dollars

Class 7 = Total asset value over \$300 million Canadian dollars

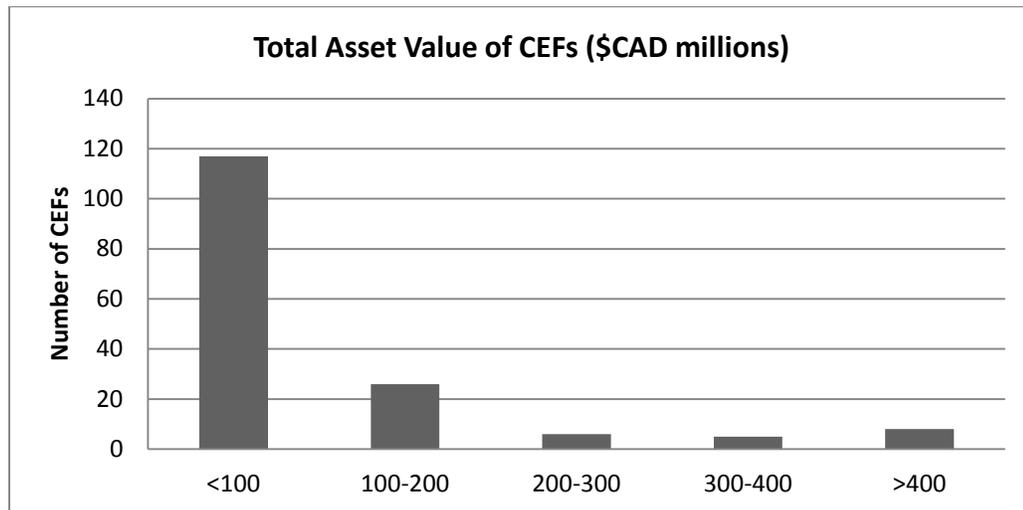


Figure 1 Number of CEFs in different size group

3.3 Research Model

3.3.1 Methodologies to calculate total return of CEFs

First of all, total return of closed-end funds is calculated in order to see if there is a relationship between fund size and fund performance.

There are two ways to calculate total return of CEFs. One way is to include returns calculated from market data. This methodology can reflect the market fluctuation. Another way to calculate total return of CEFs is based on net asset value, and this methodology is more consistent with how returns of open-ended funds are calculated, which may also reflect what investors can receive. By comparing these two methodologies, the second methodology is applied in this research paper since the purpose is to see the relationship between fund size and fund performance by excluding any market factors.

$$\text{Formula: } TR_i = \frac{D_{pt} + (NAV_{end} - NAV_{start})}{NAV_{start}} \times 100$$

Where D_{pt} = closed – end fund i 's dividends received per unit at time t

$$\text{Model 1: } FZ_i = \alpha_i + \beta_i TR_i + \varepsilon_i$$

Where

FZ_i = total asset value of fund i

TR_i = total reuturn of fund i

3.3.2 Hypothesis Testing Model

In order to test the hypothesis that is made before, the second model will be used to determine the possible reasons for the result received in the first model, the dependent variables are the fund return as of August 8th, 2013, the independent variables include (1) fund's risk level (2) investors' confidence level (3) primary exchange of CEFs (4) management style (5) discount or premium rate offered (6) and fund's expense ratio.

In the hypothesis testing model, standard deviation is used to represent fund's risk level. Tobin's Q ratio is used to represent investors' confidence level of the fund, which will be calculated by:

$$\text{Tobin's } Q = \frac{\text{Total Market Value of the fund}}{\text{Total Asset Value of the fund}}$$

If $Q > 1$, the fund is overvalued, which implies investors' confidence level is high.

If $Q < 1$, the fund is undervalued, which implies investors' confidence level is low.

The hypothesis testing model is indicated below:

$$FZ_i = \alpha_i + \beta_i \sigma_i + \gamma_i Q_i + \theta_i \sum DMS_i + \tau_i FPR_i + \phi_i FER_i + \varepsilon_i$$

Where

FZ_i = total asset value of fund i

σ_i = standard deviation of fund i (represents the risk level of the fund)

Q_{it} = Tobin's Q ratio of fund i (represents the investor confidence of the fund)

DMS_{it} = dummy variable, 1 = Fund i is managed by others (blend, value, income, etc.), 0 = fund i is managed by sectors

FPR_i = the premium rate or discount rate that fund i offered

FER_i = the expense ratio of fund i

All data will be adjusted to logarithmic scale rather than standard linear scale, because the variables used in hypothesis testing model cover a large range of values. The use of the logarithms of the values rather than the actual values reduces a wide range to a more manageable size.

Chapter 4: Results

In this section, results of the research models will be discussed after running several tests through Excel and Stata.

4.1 The relationship between fund size and fund performance

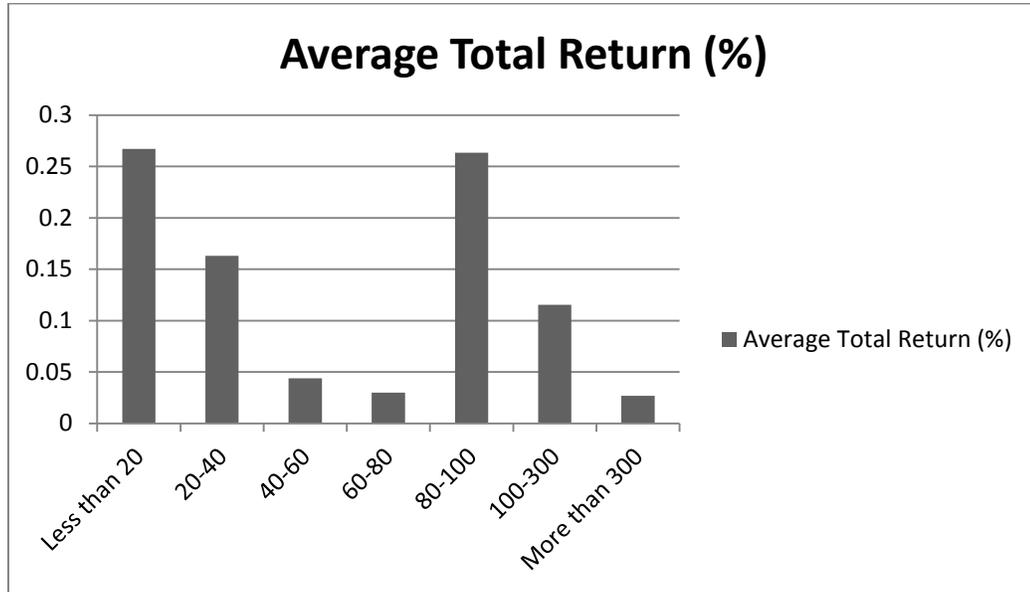


Figure 2 Average total returns for different size groups

Figure 2 shows the average total returns for the seven fund size groups in last year. It is difficult to identify whether the relationship between fund size and fund performance is positive or negative by only looking at the chart. However, the chart shows that the average total return for CEFs' total asset value less than \$20 million and between \$80-\$100 million Canadian dollars are higher than other five size groups, while CEFs with total asset value between \$60 million and \$80 million has lowest average total return.

In order to better access the relationship between fund size and fund performance, a regression between fund asset values on logarithmic scale and total returns has been run

by excluding those CEFs with negative total returns. (Since variables in the sample dataset cover a large range of values, logarithmic scale is used.)

<i>ln(Total Asset Value)</i>	<i>Coef.</i>	<i>P-value</i>	<i>R-square</i>
<i>ln(total return)</i>	-0.143	0.095	0.0252
<i>CONS</i>	3.544	0.00	

Figure 3 Regression results for fund asset value vs. Total return

Figure 3 suggests that total may be negatively correlated with total asset value at 90% significance level based on the sample used in this paper. It also means that fund performance may decrease when fund size increases. This result also supports Chen, Hong, Huang, & Kubik's finding, that is, fund size may have negative effects on mutual fund performance.

However, the low R-square value indicates that the independent variable in the regression model might not be sufficiently explaining the dependent variable. Thus, in next section, more independent variables are added in the model to test

4.2 Factors may have effects on fund size

By running the hypothesis regression model that is determined in section 3, the output is given as follows:

<i>ln (FZ)</i>	<i>Coef.</i>	<i>p-value</i>	<i>R-squared</i>
<i>ln(risk level)</i>	-0.7358	0.000	0.2414
<i>ln(premium)</i>	0.1393	0.134	
<i>ln(Q)</i>	-1.3224	0.163	
<i>Management style</i>	0.2560	0.0257	
<i>ln(expense ratio)</i>	-0.4386	0.000	

Figure 4 Regression Results for period Aug 2012-Aug 2013

<i>ln (FZ)</i>	<i>Coef.</i>	<i>p-value</i>	<i>R-squared</i>
<i>ln(risk level)</i>	-0.4258	0.097	0.2574
<i>ln(premium)</i>	0.0774	0.516	
<i>ln(Q)</i>	-1.6509	0.193	
<i>Management style</i>	0.7093	0.04	
<i>ln(expense ratio)</i>	-0.6377	0.000	

Figure 5 Regression Results for period Aug 2010-Aug 2013

4.2.1 Risk Level

The regression results suggest that risk level may be negatively correlated to fund size in last year at 95% significance level. It also indicates that smaller sized closed-end fund size expose to higher risks than larger sized CEFs. However, the risk level may be not significantly related to fund size in a longer time horizon.

4.2.2 Management Style

At 95% significance level, both regression results shown above suggest that management style should be related to fund size, which also proves Indro, Jiang, Hu, & Lee's comments (1999), "size alone does not hamper money managers; the issue is style".

4.2.3 Fund Management Expense

Among all these factors, management expense, which is represented as expense ratio should be considered as the most important factor that may have direct relationship with CEFs' size. Based on the regression results, the lower CEF size tends to have higher expense ratio. The interpretation for the adverse relationship between CEF size and expense ratio might be associate with economies of scale. Large funds may have positive economies of scale. Thus, the relative fund management expense may be lower for large sized CEFs than small sized CEFs.

4.2.4 Pricing and Investors' confidence

The large p-values for CEFs' premium and Tobin's Q suggest that there are no direct relationship between fund size and investors' confidence and CEFs' pricing, which means how CEF priced and what investors' confidence level does not vary with different fund size.

Chapter 5: Conclusion

Limitations exist while conducting this research paper. First, the initial dataset is unbalanced. Some information is not available to public. Thus, even though there are 290 closed-end funds in Canada, only 161 funds are used in the analysis process. Second, since closed-end funds are registered in different years, it is difficult to track historical performance in a long time horizon. Otherwise, the size of sample data could be not large enough to produce useful and conclusive results. Third, survivorship bias may exist, because the sample data only includes survived closed-end funds. Some losing closed-end funds could be closed or merged in order to hide poor performance.

Given the results in Chapter 4, it shows a negative relationship between fund size and fund performance. However, this result is weak due to high p-value and low R square. Thus, the relationship between fund size and fund performance cannot be determined. One way to explain is the existence of economies of scale. Large sized closed-end funds may expose to positive economies of scale; however, if a closed-end fund's size too large, it may cause extra costs and economies of scale becomes negative. In addition, a small sized closed-end fund may have fewer costs compared to large sized closed-end fund, while a closed-end fund may also result in negative economies of scale if the size is too small.

By looking at the factors may have effects on fund size, it shows that both management style and management expenses have effects on closed-end fund size. The negative relationship between fund size and management expenses suggests small funds may have higher management expenses as they spread expenses among a smaller number of

investors. Management style is also related to fund size since large fund size allows fund managers to change their management style or select different securities in the portfolio.

Overall, the research findings in this paper do support some researchers' studies and the initial hypothesis. However, limitations do exist and further analysis could be helpful to get a clear idea about relationship between closed-end fund size and closed-end fund performance.

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