The Relative Importance of Investment Policy and Active Management in Explaining Canadian Mutual Fund Return Variations and Performance

Yang Li

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By: Yang Li

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Signed by the final examining committee:

Peter Jaskiewicz Chair

Abraham I. Brodt Examiner

Ian Rakita Examiner

Lawrence Kryzanowski Supervisor

Approved by ______________________________
Chair of Department or Graduate Program Director

____
Dean of Faculty

Date ______________________________

Abstract

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Three main factors affect mutual fund returns; namely, market movements, investment policy, and active management. In this thesis, we use fifteen years of data to examine each factor's role in explaining return variations for Canadian balanced and equity funds, and their performances relative to their respective policy benchmarks. We find that active management plays a more important role in explaining both intra- and inter-fund return variations than investment policy after controlling for market effects, and that there is an incremental effect on the importance of active management if we add the constraint of no short selling to policy return portfolios. We also find that active management does not outperform the policy benchmark after controlling for fund size and risk.

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1. INTRODUCTION

Several different factors affect mutual fund returns, including the general conditions of the market where the mutual fund invests, macro level decisions made by fund sponsors, and micro level decisions made by its managers. Macro level decisions generally deal with the broad allocation of assets to stocks, bonds and other types of securities (called asset allocation policies). Micro level decisions involve allocations across various investment styles by the managers and the security selection and market-timing decisions of each manager (called active management) (Bailey et al., 2007). The relative importance of asset allocation policy and active management in explaining the return variations for mutual funds has been under debate for decades, with no agreed-upon conclusions until more recently. In this study, we re-examine this issue by examining Canadian mutual funds.

We use fifteen years of monthly data for Canadian balanced and Canadian equity funds to examine the relative importance of their asset allocation and active management decisions in explaining the variation in returns both across funds and across time while controlling for market movements. We calculate the monthly policy return using the return-based style analysis method of Sharpe (1992), using each fund's previous 36-month actual returns and benchmark indices returns representing different asset classes. We use two groups of policy returns where each is calculated using a different regression method for comparison purposes. We conduct time-series regressions to test the explanatory power of each type of investment decision on the variation in fund returns over the 15-year time period, and also cross-sectional regressions to examine the power of asset allocation policies and active management to explain return differences among funds. We conclude by examining the portion of total returns explained by the policy benchmark returns, and calculating risk-adjusted abnormal returns to determine if funds add value beyond their policy decisions.

Time-series and cross-sectional analyses provide consistent results. After removing market effects, asset allocation policy explains, on average, around one-third of the total return variations for Canadian balanced funds, and about one-fourth for Canadian equity funds. Active management exhibits higher explanatory power than the broad allocation decision among asset classes for both measures of policy returns. We find evidence for the incremental importance of active management when adding constraints to normal portfolios for both balanced and equity funds. By examining the portion of total return explained by the policy benchmark return, we discover that active management appears to add value above the policy benchmark. However, this added value disappears after controlling for fund size and risk.

The remainder of this thesis is structured as follows: We begin with a review of the debate about the relative importance of asset allocation policy and active management since Brinson et al. (1986). This identifies the issues under debate that are examined in this thesis. We then present the return decomposition model used herein, which is followed by a description of the sample and data. We introduce the policy return calculation process in the return-based style analysis section. This is followed by a presentation of the hypothesis and methodology. The findings are presented and discussed in separate sections based on time-series regressions, cross-sectional regressions, and return level analyses. We end with a brief conclusion, followed by references, tables and figures.

2. LITERATURE REVIEW

Before investing funds and paying management fees to fund managers, investors need to know what factors determine the returns they expect to obtain. Thus, performance attribution is one of the most important topics for mutual funds. The total returns of mutual funds are generally attributed to three main components, the market, investment policy, and active management. Performance attribution is the process of comparing a portfolio's return to a benchmark's return, where the benchmark should at least be a well-diversified portfolio or a portfolio with average asset mix, rather than pure cash with no risk. Thus, market movement is the first factor that should be considered. The asset allocation (investment) policy (see Bailey, Richards, and Tierney, 2007) determines the broad allocation of assets to stocks, bonds and other types of securities, or divisions thereof. Active management selects and assigns weights to securities in each portfolio based on security analysis or market timing.

Which one of the three factors plays the most important role in explaining the variability of total returns has been debated for more than two decades. Fama (1972) and Jensen (1968) examine the components of mutual funds' returns, and divide the returns into the returns from security selection and from bearing systematic risk. Brinson, Hood, and Beebower (1986) propose a framework for calculating the returns attributable to asset allocation policy, and conclude that investment policy is the primary determinant of total return variation for large U.S. pension funds, and that the contributions from security selection and market timing play minor roles. This study initiated the debate about the explanatory power of asset allocation policy and active management in explaining the variability of mutual fund returns.

In a subsequent study, Brinson et al. (1991) confirm their previous result that investment policy explains 93.6% of the variation in actual returns. Although subsequent studies by Hensel et al. (1991) and Ibbotson and Kaplan (2000) also find that investment policy explains more than 90% of the variance of total returns across time, they disagree with the conclusion about the dominance of investment policy choices. Hensel et al. (1991) find that investment policy becomes relatively unimportant if a diversified mix, rather than T-bills is chosen as the benchmark. Ibbotson and Kaplan (2000) argue that the high R-square values are not all attributable to a specific asset allocation policy, but simply due to participation in the general market. When they use a more realistic baseline such as the average policy benchmark across all funds, policy mix only explains around 40% of the time-series variation in fund returns. Other studies, such as Vardharaj and Fabozzi (2007), obtain similar results. Thus, investment policy choices appear to not play the dominant role in explaining the variation of fund returns once market movements are accounted for. Xiong et al. (2010) examine the explanatory power of investment policy by regressing total returns against the policy returns in excess of overall market returns, rather than the unadjusted policy returns. This thesis also chooses this method to exclude the impact of market movements across time on total fund returns.

In terms of active management, Brinson et al. (1991) examine the contribution of security selection and market timing separately, and find that the overall effect of active management by investment managers is negligible. Kritzman and Page (2002) argue that security selection is substantially more important than asset mix for equity funds. Xiong et al. (2010) find an almost equal explanatory power of asset allocation mix and active management for U.S. balanced, equity, and international equity funds. Aglietta et al. (2012) also report evidence of a significant contribution from active management for pension funds. Some other studies, such as Ibboston and Kaplan (2000) and Vardharaj and Fabozzi (2007), only focus on the explanatory power of investment policy. Therefore, the current literature exhibits mixed conclusions on the role played by active management relative to investment policy in explaining the variations in fund returns.

Another related topic under debate is that the Brinson et al. (1986) study only examines a static asset allocation policy (fixed asset class weights) during the 10-year period they studied (e.g., Jahnke, 1997). This is criticized as being rarely related to an investor's specific circumstances or changing capital market opportunities. To illustrate, Jahnke (2004) argues that the practice of setting and sticking with a fixed asset allocation only makes sense under the condition that asset class return expectations do not vary with time. While Tokat et al. (2006) note that the theory behind dynamic asset allocation is sound, they express concern about how to implement the process in empirical tests. Thus, we calculate the policy returns in each month using the exposures to asset classes during the previous 36 months, rather than using a static allocation over the whole period examined herein. This method involves the application of the return-based style analysis first proposed by Sharpe (1992) and used by, e.g., Ibbotson and Kaplan (2000), Xiong et al. (2010) and Tokat et al. (2006).

Another criticism of Brinson et al. (1986) is that their conclusion that policy returns explain more than 90% of fund returns only applies, on average, to fund returns over time, and not to return variations among funds. Thus, Ibboston and Kaplan (2000), Vardharaj and Fabozzi (2007), and Xiong et al. (2010) examine the explanatory power of the return components in explaining return variations both across time and across funds.

Jahnke (1997) also criticizes the focus of Brinson et al. (1986) of only explaining portfolio volatility rather than portfolio returns. He argues that the latter is of greater concern to investors over their investment horizons. Ibbotson and Kaplan (2000) calculate the percentage of fund returns explained by policy returns net of replication costs for each fund, and find that policy returns account for more than all of total returns, which implies that no value is added above the benchmarks. Vardharaj and Fabozzi (2007) calculate the differences between compound annual policy returns and total returns, and find that policy returns exceed total returns by an average of 3.73%. Thus, both studies report that no value is added by active management above benchmark policy returns. In this thesis, we use both their ratio and difference methods to examine the total return level explained by the returns on the benchmark policy of each fund.

To summarize, the debate about the relative importance of investment policy and active management is ongoing. Since this literature deals mostly with U.S. funds, this thesis contributes to the current literature by examining the returns of Canadian balanced and equity funds over a 15-year period to examine the relative importance of investment policy and active management in explaining return variations and performance across time for the same and among funds for a specific period of time.

3. RETURN-DECOMPOSITION MODELS

In order to compare the explanatory power of investment choices on the variations of mutual fund returns, we define the corresponding return components as policy return and active return, respectively. To calculate the policy return, we use the return-based style analysis of Sharpe (1992), which is explained later. When we examine the explanatory power of policy returns on a fund's total returns, we subtract the market returns from the policy returns to prevent market effects from contaminating the results attributable to investment policy. The remaining part of total returns after removing the policy returns is then the active return component, which embodies the security selection and market timing abilities of the fund managers.

To confirm whether market returns have a large impact relative to the other two components over time, we decompose a fund's returns as follows:

$$R_{i,t} = R_{M,t} + (R_{P,t} - R_{M,t}) + (R_{i,t} - R_{P,t}); \quad (1)$$

Where $R_{i,t}$, $R_{M,t}$ and $R_{P,t}$ are for month t, respectively, the total returns for fund i, the market (e.g., the equally weighted return of all funds or fund category in month t), and investment policy returns for fund i. The terms, $(R_{P,t} - R_{M,t})$ and $(R_{i,t} - R_{P,t})$, are proxies for the components of the total returns that are due to policy and active decisions by the fund, respectively.

After removing the market's influence on a fund's returns, we examine the role played by the other two components. To examine the relative impact of fund decisions after controlling for market movements, the market return is deducted from the dependent variable in equation (1).

This yields:

$$R_{i,t} - R_{M,t} = (R_{P,t} - R_{M,t}) + (R_{i,t} - R_{P,t}); \quad (2)$$

Since the market return is the same for each fund at a point in time, the market return is not subtracted from the total or policy returns when examining the effect of a fund’s investment policy and active management decisions relative to other firms for the same time period. Thus, the proportion of the return differences among funds due to different choices of investment policy and active management are obtained based on the following relations:

$$R_{i,t} = R_{P,t}; \quad (3)$$

$$R_{i,t} = (R_{i,t} - R_{P,t}). \quad (4)$$

4. SAMPLE AND DATA

The final sample consists of 1247 Canadian equity funds and 582 Canadian balanced funds. They are drawn from the Morningstar Direct database for the period from January 1996 to December 2013. Each fund’s share-level monthly returns net of fees are obtained from this database and then combined at the fund level using the monthly total net asset value (NAV) of each share class relative to the NAV of all share classes for that fund. To perform the style analyses based on the previous three years of return data, we require that all funds have at least four years of continuous total return data during the 1996-2013 time period. This ensures that each fund has at least one year (12 months) of policy returns for the style analysis. The first policy return begins at January 1999, so our final sample period is the fifteen years period from January 1999 to December 2013. Funds that no longer exist are included as long as they satisfy this minimum number-of-years criterion. Thus, our sample is to a large extent free of survivorship bias.

To obtain the investment policy returns, we use the style analysis method proposed by Sharpe (1992) where each fund's total returns are regressed against returns for different asset classes to determine their exposures. Table 1 lists the different benchmark indices used to represent different asset classes for balanced and equity funds (based on Xiong et al., 2010; and Ayadi and

Kryzanowski, 2011). Since we do not divide equity funds into domestic and international equity funds groups, the benchmark indices for the equity fund sample include both Canadian and international equity indices. The historical Canadian 30-day Treasury bill rates are obtained from Statistics Canada, and the values for all the other indices are from the Morningstar Direct database. All returns are denominated in Canadian dollars. The returns for the four developed and emerging market indices for equity funds are converted from USD to CAD using the historical monthly foreign exchange rates of USD/CAD.

5. RETURN-BASED STYLE ANALYSES

5.1 Methodology

The regular multi-factor linear regression model used for the style analyses is given by (Sharpe, 1992):

$$R_i = \alpha + \beta_{i1}X_1 + \beta_{i2}X_2 + \cdots + \beta_{in}X_n; \tag{5}$$

where R_i, X_j, $\beta_{i,j}$ $(i, j = 1, 2 \ldots, n)$ represent the dependent variable (fund's total returns, R_i), independent variables (returns of the different asset classes), and the vector of exposure coefficients to each of the independent variables, respectively.

Sharpe (1992) uses two methods in addition to a regular regression for estimating equation (5). These are a one-constraint regression ($\sum_{j=1}^{n} \beta_j = 1$) and a two-constraint regression using quadratic programming ($\sum_{j=1}^{n} \beta_j = 1$ and $0 \leq \beta_j \leq 1$). By requiring all the coefficients to sum to 1, we are able to interpret the coefficients as representing the fund's allocation weights to the corresponding asset classes. Restricting each coefficient to a value between 0 and 1 can deal with the possibility that the sum-to-one constraint may lead to negative and extreme coefficients. As a result, the estimated coefficients can be more reasonably treated as a mutual fund's real asset allocation weights. Although, this two-constraint regression is the only choice of other researchers when calculating policy returns (see Ibbotson and Kaplan, 2000; Vardharaj and Fabozzi, 2007; and Xiong et al., 2010), we examine the results from the one-constraint regression as well in this thesis. The rationale is that, if the coefficients from the one-constraint regressions are considered as weights of a normal portfolio, and those of the two-constraint regressions are weights of a long-only portfolio, we can observe the incremental part of active management involved from no short-selling constraints by comparing the results with those from normal portfolio management.

Table 2 provides an example for one balanced and one equity fund of how the policy returns for one month for one fund are calculated. For the balanced fund in panel A, we regress its 36-month total returns on the benchmark indices returns from December 2010 to November 2013 to obtain the parameter estimates for each asset class under both types of regressions. We obtain the policy returns in December 2013 for this fund by combining the products of each of these estimates and their corresponding index returns on December 2013. Each fund's policy returns for every month (except the first 36 months) are calculated using this procedure. Based on table 2, we surmise that the parameter estimates from the two-constraint regression are more reasonable as allocation weights than those from the one-constraint regression. However, the fit (R-square value) is lower for the two-constraint regression than for the one-constraint regression, which is consistent with the observation by Sharpe (1992) when comparing the estimates from the different regression methods.

5.2 Findings

To compare the explanatory powers for the balanced and equity fund indices under the two style-analysis regression methods and to ensure that the regression results are reliable, we average the R-square values over all the available months for each fund. The distributions of the R-square values are reported in table 3. Group 1 and 2 represent the results from the one-, and two-constraint regressions, respectively. The frequency reported is rescaled for the 582 balanced funds and the 1247 equity funds so that the cumulative distributions add up to 100%. The style indices explain more than 80% of the total return variations of the balanced funds based on both the mean and median R-square values from the one-constraint regressions. The regression fits are not as good for the equity funds, although most funds have average R-square values higher than 70% for the one-constraint regressions. The average R-square values from the two-constraint regressions are lower than those for their one-constraint counterparts. This is expected since the former trade-off better parameter estimation with poorer regression fit. As a whole, the investment policy returns calculated from these two regression methods are deemed to be sufficiently reliable that they can be used in later sections of this thesis.

6. TIME-SERIES REGRESSION ANALYSES

6.1 Hypotheses

In this thesis, our first hypothesis tests whether the extremely high importance of investment policy first identified by Brinson et al. (1986) is supported for Canadian mutual funds. The predominance of asset allocation has been challenged by many later researchers (e.g., Hensel et al., 1991; Ibbotson and Kaplan, 2000), who report that investment policy can only explain around 40% of return variations. Thus, we expect that the explanatory power of investment policy is not predominant. Our first null and alternative hypotheses are:

$H_{1,0}$: Investment policy is the predominant factor in explaining the return variances of Canadian mutual funds.

$H_{1,a}$: Investment policy is not the predominant factor in explaining the return variances of Canadian mutual funds.

If the null hypothesis is rejected (i.e., investment policy is not the determinant factor), we surmise that investment policy is at least as important as active management, given the findings of Hensel et al. (1991) and Xiong et al. (2010). Thus, our second null and alternative hypotheses are:

$H_{2,0}$: Investment policy is at least as important as active management in explaining the variations in the returns of Canadian mutual funds over time.

$H_{2,a}$: Investment policy is not as important as active management in explaining the variations in the returns of Canadian mutual funds over time.

Since policy returns are calculated from both one- and two-constraint regressions in order to examine the incremental role of active management for long-only versus normal portfolios, we expect that long-only portfolios will be more actively managed than the normal portfolios. Thus, our third null and alternative hypotheses are:

$H_{3,0}$: Active management in normal portfolios is at least as important as in long-only portfolios in explaining the variations in returns of Canadian mutual funds over time.

$H_{3,a}$: Active management in normal portfolios is not as important as in long-only portfolios in explaining the variations in returns of Canadian mutual funds over time.

6.2 Methodology

In this section, time-series regressions based on equations (1) and (2) are run to examine the power of investment policy and active management to explain the variations of fund returns over time. Specifically:

$$R_{i,t} = \alpha + \beta_1 R_{M,t} + \beta_2 (R_{P,t} - R_{M,t}) + \beta_3 (R_{i,t} - R_{P,t}) + \varepsilon_{i,t}; \quad (6)$$

$$R_{i,t} - R_{M,t} = \alpha + \beta_1 (R_{P,t} - R_{M,t}) + \beta_2 (R_{i,t} - R_{P,t})) + \varepsilon_{i,t}; \quad (7)$$

Since the return-decomposition models are equalities, we cannot estimate them together in a time-series analysis. As a result, the dependent variable is regressed on each of the independent variables separately using a panel regression. The R-square for each panel regression is a proxy for the power of investment policy and active management to explain total fund return variations over the sample period. As a test of robustness, we also use the methodology of Xiong et al. (2010), which conducts the regressions for each fund separately. We then compare the average R-square values from the fund-by-fund regressions with the single R-square value from the panel regressions.

6.3 Findings

The results for the time-series regressions are reported in tables 4 and 5 for total returns and excess returns (equations 6 and 7), respectively. In each table, panel A contains the panel regression R-square values, and panels B and C, respectively, contain the mean and median R-square values from the time-series regressions for the individual funds. The interaction effect is the balancing term to make the R-square values of the other independent variables sum to 100%, or simply the residual effects. In table 4, we observe high explanatory power of market movements under both the panel and individual regressions for both the balanced and equity funds. A possible concern with these results is that some funds may pretend to be actively managed in order to charge active management fees while actually they are index funds or only a little bit more active than being totally passive. To exclude the effects from such funds, we remove the 229 balanced funds and 63 equity funds with R-square values higher than 90% as a test of robustness. The results for this screened sample are reported in tables 6 and 7. Group 1 and group 2 are results of using policy returns calculated under one- and two-constraint regressions, respectively, representing normal portfolios and long-only portfolios.

From panel A of table 4 that reports the panel regression results for equation (6), market movements explain 72% and 57% of the total return variations of balanced and equity funds, respectively, with policy returns in excess of market returns explaining only 30% and 27% under both normal and long-only portfolios. The fund-by-fund regressions attribute higher power to market movements for explaining total returns (see panels B and C of table 3). Based on table 6, the R-square attributable to market movements drops about 10% for the screened sample, while that attributable to investment policy remains at around 30% and 27% for balanced and equity funds, respectively, under both policy return groups. These results are consistent with the conclusions of Hensel et al. (1991) and Ibbotson and Kaplan (2000) that the high explanatory power of investment policy proposed by Brinson et al. (1986) is due to embedded market effects. Since investment policy does not contribute the most in explaining the variations in the total returns of funds, we can reject the first hypothesis and conclude that investment policy is not the predominant factor in explaining the variations in mutual fund returns over time.

To compare the explanatory power of investment policy and active management in explaining the variations in total returns, we first compare the R-square values from regressions based on equation (6) that are reported in tables 4 and 6 for the full and screened sample, respectively. Based on table 4, the panel regressions for the normal portfolios provide an almost equal R-square value for investment policy (32%) and active management (35%) for balanced funds, and a lower R-square value for investment policy (27%) than active management (41%) for equity funds. Since only 5% of the sample was removed, the results are essentially unchanged for the screened sample of equity funds. Since almost 50% of the sample was removed to obtain the screened sample of balanced funds, the R-square value is relatively unchanged for investment policy (31%) and higher for active management (38%) under normal portfolios according to table 6. For both full and screened samples, panel regression results show that the constraint of no short selling on portfolio return variations enlarges the difference between the R-square values for investment policy and active management for both balanced and equity funds. The fund-by-fund regressions provide different results for balanced funds, with the R-square values associated with investment policy exceeding those associated with active management.

Since the regressions based on equation (6) do not remove the effect of market movements on total returns, we then conduct time-series regressions based on equation (7) to compare the relative importance of investment policy and active management after accounting for market movements. The R-square values of the two return components under full and screened samples are reported in tables 5 and 7, respectively. The fund-by-fund regression results appear to be less reliable since the relative importance of investment policy and active management are inconsistent for the full and screened samples based on both the mean and median R-square values. The panel regression results for the normal portfolios provide consistent results for the full and screened samples. The R-square values attributable to investment policy and active management are 32% and 37%, respectively, for the balanced funds. The results are similar with the total return regressions for the equity funds, with 27% and 41% of the R-square values attributable to investment policy and active management, respectively. Based on results for the normal portfolios, we observe that investment policy has around 5% (15%) lower explanatory power than active management for balanced (equity) funds. Long-only portfolios present even greater R-square value differences between investment policy and active management, explaining about 28% (27%) and 64% (73%) of return variations over time, respectively, for balanced (equity) funds for both the full and screened samples. Thus, we can reject the second hypothesis and conclude that investment policy plays a less important role than active management in explaining the variations in the returns of Canadian balanced and equity funds over time.

We now compare the explanatory power of active management for normal versus long-only portfolios to examine whether the incremental effects of active management exist when managing a portfolio with the constraint of no short selling rather than normal portfolios. In terms of the panel regression results for excess returns reported in table 5, the R-square value attributable to investment policy for the full sample of balanced funds decreases slightly from 33% to 28% with the addition of the no-short-selling constraint, while the corresponding R-square values attributable to active management increase from 36% to 62%. The R-square value attributable to investment policy for the full sample of equity funds remains at 27% with the addition of the no-short-selling constraint, while the corresponding R-square values attributable to active management increase from 62% to 73%. These observations are similar for the screened sample results reported in table 7 and the fund-by-fund regressions based on excess returns. Therefore, we can reject the third hypothesis and conclude that the explanatory power attributable to investment policy either decreases or remains unchanged with the addition of a no-short-selling constraint to a normal portfolio, while the role played by active management is more important for long-only versus normal portfolios.

7. CROSS-SECTIONAL REGRESSION ANALYSES

7.1 Hypotheses

One critique of the study of Brinson et al. (1986) by Ibbotson and Kaplan (2000) and Xiong et al. (2010) is that Brinson et al. did not address return variations among funds. In an extreme scenario where all funds passively manage their portfolios but differ markedly in their investment policies, then all the return variations between funds will be explained by investment policies. Thus, our fourth null and alternative hypotheses are:

$H_{4,0}$: Investment policy differences explain all the cross-sectional variations in returns between Canadian balanced and equity funds.

$H_{4,a}$: Investment policy differences only explain a portion of the cross-sectional variations in returns between Canadian balanced and equity funds.

Evidence from the earlier literature finds that investment policy differences cannot explain all the cross-sectional return variations between funds (e.g., Vardharaj and Fabozzi, 2007). If we find that the null hypothesis is rejected for our sample in that investment policy only plays a partial role, we then want to test if its role is greater or less than that played by active management. As was the case for the time-series findings, we expect that active management will explain more of the cross-sectional variation in returns than investment policies. Thus, our fifth null and alternative hypotheses are:

$H_{5,0}$: Investment policy explains at least as much of the cross-sectional variation in returns as active management for Canadian balanced and equity funds.

$H_{5,a}$: Investment policy explains less of the cross-sectional variation in returns as active management for Canadian balanced and equity funds.

Our earlier time-series regression results found that the power of active management to explain the variations in fund returns differed for normal versus long-only portfolios. Thus, we also examine whether such is also the case in the cross-section. Our sixth null and alternative hypotheses are:

$H_{6,0}$: Active management explains the same portion of cross-sectional return variations for normal and long-only portfolios based on Canadian balanced and equity funds.

$H_{6,a}$: Active management explains different portions of the cross-sectional return variations for normal and long-only portfolios based on Canadian balanced and equity funds.

7.2 Methodology

Since market returns are the same for each fund for each month, they are removed naturally from the cross-sectional estimations. This enables us to examine to what extent the differences in investment policies and active managements can explain the return variations across all available funds. To test the fifth and sixth hypotheses, we run the following cross-sectional regressions based on the return-decomposition equations (3) and (4):

$$R_{it} = \alpha + \beta_1 R_{Pt} + \varepsilon_{i,t}; \quad (8)$$

$$R_{it} = \alpha + \beta_1 (R_{it} - R_{Pt}) + \varepsilon_{i,t}. \quad (9)$$

Starting with January 1999, we estimate these two regressions with all the available returns data in each month. As was the case previously, the R-square values measure the power of fund-specific differences in investment policy and active management to explain the differences in returns across the funds.

7.3 Findings

In order to examine the relative importance of investment choices on the return variations between funds, we first examine how much of fund-specific returns differ for each month over our sample period. The cross-sectional fund dispersion and residual errors $\varepsilon_{i,t}$ for the balanced and equity funds are depicted in figures 1 and 2, respectively. Fund dispersion is defined as the standard deviation of the cross-sectional total returns of each fund, R_{it}, and the residual errors are from regression (8) when policy returns are calculated using estimates from the two-constraint regressions. For both the balanced and equity funds, the monthly fund dispersion is largest during the early 2000s and 2007-2009. This coincides with the internet bubble and the financial crisis, respectively. Even in the other months with relatively stable market conditions, we can still observe large return variations among funds.

Consistent with the R-square values, the residual errors from equation (8) for the balanced funds plotted in figure 1 exhibit greater fluctuations relative to total returns than those plotted in figure 2 for the equity funds. To further illustrate the time-varying nature of the R-square values from the cross-sectional regressions, we plot the rolling R-square values from both equations (8) and (9) with policy returns calculated using estimated parameters from both the one- and two-constraint regressions in figures 3 to 6 and their related statistics in table 8. Panel C includes the results for the time-series panel regression based on equation (7) for comparison purposes.

The R-square values from equation (8) reported in panel A of table 8 represent the power of different investment policy choices to explain return differences. For the balanced funds, the average of the 180 cross-sectional R-square values is 30% and 25% for the normal and long-only portfolios, respectively. For equity funds, the mean R-square is 25% for both portfolios and reaches a maximum of 72%. Thus, we can reject the fourth hypothesis and conclude that the differences in investment polices among funds cannot fully explain the return variations among Canadian balanced and equity mutual funds.

We now compare the relative importance of investment policy and active management in explaining the inter-fund return variations. Panel B of table 8 reports summary statistics for the 180 R-square values obtained from the cross-sectional regression (9). The average R-square value for balanced funds is 44% and 64% for normal and long-only portfolios, respectively. For equity funds, the average R-square values are at the same level as for the balanced funds. The variations of the R-square values from policy returns and active returns measured by their standard deviations are at comparable levels for both the balanced and equity funds, and are consistent with the time-series panel regression results. Therefore, the evidence leads to the rejection of the fifth hypothesis. Accounting for the inter-fund differences in investment policies provides less power than accounting for inter-fund active management in explaining inter-fund return variations for Canadian balanced and equity mutual funds.

Since the investment policy and active returns calculated from the one- and two-constraint regressions represent returns from normal and long-only portfolios, the power of inter-fund investment policy and active returns to explain inter-fund return variations can be examined. This provides an assessment of the incremental contribution of active management depending on whether or not we assume that short sales are constrained. Both figures 3 to 6 and table 8 provide us with the evidence on this comparison from the cross-sectional aspect. Based on table 8, the average power of inter-fund investment policy (active management) differences to explain inter-fund return differences decreases from 29% to 24% (increases significantly from 44% to 66%) for the balanced funds with the assumption of a no-short-sale constraint. The average power of inter-fund investment policy (active management) differences to explain inter-fund return differences remains the same (increases significantly from 47% to 75%) for the equity funds with the assumption of a no-short-sale constraint. We also provide paired-sample t-test and Wilcoxon matched-pairs signed-rank test results to examine whether the means and medians of the two groups differ significantly from each other. For each comparison group, at least one measure is highly significant. Thus, we are able to reject the sixth hypothesis as the power of active management to explain fund returns depends upon whether one assumes the existence of a no-short-sale constraint.

8. ANALYSES OF RETURN LEVELS

8.1 Hypotheses

To this point in the thesis, we have assessed the power of investment policy and active management to explain variations in mutual fund returns. In this section of the thesis, we examine what portion of the level of total returns is explained by investment policy return and calculate the risk-adjusted abnormal returns, since these may be of more importance for practitioners and investors.

Ibbotson and Kaplan (2000) calculate the ratio of the compound annual investment policy return net of a constant replication cost, divided by the compound annual total return. If a fund follows exactly the investment policy mix passively, its ratio will be 1. The ratio will be less than 1 if the fund outperforms its investment policy benchmark. In contrast, Vardharaj and Fabozzi (2007) use a different approach without estimating a replication cost. They assess whether the difference between the policy and total returns covers reasonable replication costs. Ibbotson and Kaplan (2000) find that investment policy accounts for more than 100% of total returns on average, meaning that active management does not add value to the policy benchmark. Similarly, Vardharaj and Fabozzi (2007) report that the policy returns exceed total returns by around 3% for their ten-year sample. Thus both studies report that active management does not add value to total returns since total returns are lower than the returns on the policy mix benchmarks.

Our seventh null and alternative hypotheses are as follows:

$H_{7,0}$: Policy returns are equal to total returns, on average, for Canadian mutual funds.

$H_{7,a}$: Policy returns are not equal to total returns, on average, for Canadian mutual funds.

In addition, simply considering return levels without adjusting for risks is less meaningful in the real world. Since no previous studies find significantly positive risk-adjusted abnormal returns in the Canadian mutual fund market, we expect similar results. Thus, the eighth null and alternative hypotheses are:

$H_{8,0}$: No significantly positive risk-adjusted returns exist for Canadian mutual funds.

$H_{8,a}$: Significantly positive risk-adjusted returns exist for Canadian mutual funds.

8.2 Methodology

In this thesis, we first use the methods of the Ibbotson and Kaplan (2000) and Vardharaj and Fabozzi (2007) to examine what percentage of total returns are explained, on average, by policy returns. We assume that the cost of replicating the investment policy would be approximately 2 basis points per month (25 basis points annually). The specific measures used are:

$$\textit{Return Level Ratio} = {(R_{P,t} - 0.0002)}\big/{R_{i,t}} \quad (10)$$

$$\textit{Return Level Difference} = R_{P,t} - R_{i,t} \quad (11)$$

We first calculate both measures for each month for a fund, and then take the average of each series. Although the mean values are quite reliable for the return level difference measure, the median is used for the ratio since the ratio would be either positively or negatively extremely large if total returns are close to zero. We also calculate the return level ratio with no replication costs and the return level difference with policy returns net of replication costs with quite similar results. Thus we only present the results for measures (10) and (11) in panels A and B of table 9. Outperformance of the investment policy benchmark is indicated for values less than 100% for the return level ratios, and for values less than zero for the return level difference measure.

In addition, geometric mean returns are generally considered to be better measures of average returns over time, thus the third return level measure is for each fund *i*:

$$\textit{Geometric mean return} = \sqrt[n]{\prod_{t=1}^{n}\left[\left(1 + R_{i,t}\right)/\left(1 + R_{p,t}\right)\right]} - 1 \quad (12)$$

The results for measure (12) are presented in panel C of table 9, with outperformance indicated by values greater than 0.

In this section, we use the one-sample t-test and Wilcoxon singed-rank test to examine whether the mean and median value for each measure for each fund group are significantly different from zero. Since the measures (10) and (11) put equal weight on a fund regardless of its number of months of returns data, we test whether this procedure introduces a bias in the results.

To do so, we conduct the tests of significance on the mean and median values of all monthly values of the return level ratios and differences for all funds. The results of this test on the pooled values of each of the first two measures are shown in panel D and E in table 9, respectively.

We then run two time-series regressions based on equation (5) to estimate the risk-adjusted performances of the balanced and equity funds, with the returns on both equally-weighted and total-asset-value-weighted portfolios as dependent variables. For each month, the equally-weighted (EW) portfolio returns are calculated as the mean of returns from all available funds, and the total-asset-value-weighted (VW) portfolio returns are weighted by each fund's total asset value (fund size) relative to the sum of the total asset value of all available funds in that month. The independent variables are the benchmark indices for balanced and equity funds used to calculate the policy returns (see table 1). The regression intercept α, as a proxy for the risk-adjusted abnormal returns, are reported in panel A of table 10.

Since we have time-series EW and VW portfolios based on total returns, we also calculate the EW and VW portfolios for policy returns under both one- and two-constraint regression methods. We compare their respective arithmetic mean and geometric means among total return and policy return portfolios as a test of robustness. These results are reported in panel B of table 10.

8.3 Findings

Based on panel A of table 9, we observe that more than 90% of the funds have return level ratios less than 100% for both the balanced and equity funds. The return level ratios range from 53% to 100% for the balanced funds, and from 33% to more than 100% for the equity funds. The results do not change materially if policy returns are calculated using the estimated coefficients from the one- or two-constraint regressions. The extent of outperformance of policy returns becomes much lower using the difference in returns measure reported in panel B of table 9 for both the balanced and equity funds, since only 2/3 of the funds now show return level differences lower than zero. The balanced and equity funds exhibit similar performance levels compared with their policy benchmarks for normal portfolios. However, 74% of the equity funds and only 59% of the balanced funds outperform the policy benchmarks for long-only portfolios, and the outperformance level of equity funds is also higher than that of balanced funds. For example, the return level difference is 0.003 and 0.0017, respectively, for funds in their respective 95th percentiles. Based on panel C, the outperformance level of both balanced and equity funds measured by geometric means are similar in terms of inference to those measured by the return level differences. Tests conducted on the mean and median values of these measures for all the groups are significant at the 0.01 level.

Based on panel D of table 9, the median of 0.81 for the pool of all monthly ratios on normal portfolios of balanced funds is significantly different from zero, although their mean is not. The mean of the pool of monthly differences on the normal portfolios of equity funds also is significantly different from zero, while its median is not. Thus, we infer that under normal portfolios, either outperformance does exist, or the policy returns we calculated are not accurate for some funds or the differences may be due to risk or size differences between the funds examined and their policy benchmarks. Under long-only portfolios, the mean and median value for the pool of both return level ratio and different monthly values differ significantly from zero for equity funds. Both the mean and median for the difference measure are not significant for the balanced funds and only the mean ratio measure is significant (0.05 level). Thus, the earlier significantly higher outperformance under long-only portfolios for balanced funds is not statistically robust. To this point, we can tentatively reject the seventh null hypothesis based on both return-level measures and conclude that balanced and equity funds, on average, have added value to their choices of policy benchmarks through active management.

Next, we examine if these results stand up if we account for risk by regressing the returns on the total return portfolios against the returns on the policy benchmark indices. Based on panel A of table 10, positive and negative alpha are observed for balanced and equity funds, respectively, although none are significant for both the equally- and TNA-weighted portfolios. As expected, we cannot reject our eighth null hypothesis that no significantly positive abnormal returns exist if returns are risk adjusted.

By comparing the means of the portfolios of total returns and the policy returns reported in panel B of table 10, we observe that the total return portfolios do not underperform the benchmark portfolios, on average, in two cases. The first case is that the arithmetic (geometric) mean total return is higher (lower) than its corresponding policy returns based on the estimated parameters from the one-constraint regression for both the equally- and TNA-weighted portfolios of the balanced funds. The second case is that the total returns (do not) exceed the two-constraint policy returns for equally- (size-) weighted portfolio returns. Therefore, the significance of the value created by active management is not robust after controlling for either risk or size.

9. CONCLUSION

This thesis examined the relative importance of investment policy and active management in explaining the intra- and inter-firm differences in total returns and their performances relative to the policy benchmarks for Canadian balanced and equity mutual funds. The thesis makes three contributions to the current literature.

First, we provided evidence to support the importance of active management in explaining the intra- and inter-fund differences in total returns. We found that investment policy only explains one-third and one-fourth of total return variations for balanced and equity funds, respectively. Active management explained 5% and 15% more in intra-fund return variations for balanced and equity funds, respectively, than investment policy.

Second, we showed that active management has greater explanatory power for the variations in fund returns if the portfolios are assumed to be subject to a no short-sale constraint. These results were based on the estimated parameters from the one- and two-constraint regressions, which can be interpreted as normal and long-only portfolios, respectively. We observed that the power of active management to explain intra- and inter-fund returns increased by 30% for both balanced and equity funds with the assumption of a no-short-sale constraint.

Third, we identified that no value is added by active management after adjusting for fund size and risk. Through assessing the portion of total return explained by the investment policy benchmark return, three return level measures provide evidence for the outperformance of both the balanced and equity funds compared to their policy benchmarks. However, the outperformance is fragile since it disappears after considering fund sizes and using risk-adjusted returns.

To conclude, active management is able to explain a large portion of intra- and inter-fund return variations, but did not outperform the investment policy benchmark over the past fifteen years in the Canadian balanced and equity mutual fund market.

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11.TABLES AND FIGURES

Table 1. Asset Classes and Benchmark Indices

This table lists the different asset classes that are used to identify the investment styles for Canadian balanced funds and equity funds in panel A and B, respectively. The indices are used to represent the benchmark returns on asset classes. By running regressions of the total returns of mutual funds on the returns of benchmark indices, parameter estimates are obtained as each fund's exposures to asset classes during a specific time period.

Panel A. Asset Classes and Benchmark Indices for Balanced Mutual Funds	
Canadian Growth Stocks	S&P Canada BMI Growth TR CAD
Canadian Value Stocks	S&P Canada BMI Value TR CAD
Canadian Real Estate Stocks	FTSE EPRA/NAREIT Canada TR CAD
International Stocks	MSCI EAFE GR CAD
Emerging Market Stocks	MSCI EM GR CAD
Long-term Bonds	Dex Capital Government Long
Intermediate Bonds	Dex Capital Government Mid
Short-term Bonds	Dex Capital Government Short
Cash	Canadian 30-day Treasury Bill
Panel B. Asset Classes and Benchmark Indices for Equity Mutual Funds	
Asset Class	Benchmark
Large/Mid-cap Canadian Value Stocks	S&P Canada LargeMid Value TR CAD
Large/Mid-cap Canadian Growth Stocks	S&P Canada LargeMid Growth TR CAD
Small-cap Canadian Value Stocks	S&P Canada Small Growth TR CAD
Small-cap Canadian Growth Stocks	S&P Canada Small Value TR CAD
Non-Canadian Developed Market Growth Stocks	S&P Developed Ex CAN BMI Growth TR USD
Non-Canadian Developed Market Value Stocks	S&P Developed Ex CAN BMI Value TR USD
Emerging Market Small Stocks	S&P Emerging Small TR USD
Emerging Market Large/Mid Stocks	S&P Emerging LargeMid TR USD
Cash	Canadian 30-day Treasury Bill

Table 2. Policy Return Calculation Process under Two Regression Methods for Two Sample Funds.

This table shows the process of calculating policy returns under both one- and two-constraint regression methods for one balanced fund and one equity fund shown in panel A and B, respectively. Parameter estimates are obtained by regressing the 36-month total returns on the benchmark indices returns from December 2010 to November 2013, and the fund's policy return in December 2013 is calculated by multiplying parameter estimates by benchmark indices returns in December 2013. The R-square values for the regressions are also reported.

Panel A. Sun Life MFS Balanced Growth Fund (DEC. 2010 to NOV. 2013)		
Parameter Estimates	**One-Constraint**	**Two-Constraint**
Intercept	2.434	0.21
Growth Stocks	-2.539	0
Value Stocks	-0.21	0.407
REIT Stocks	0.63	0
International Stocks	-0.045	0
EM Stocks	0.051	0.058
LT Bonds	0.063	0.069
MID Bonds	-34.412	0
ST Bonds	74.607	0
Cash	-37.146	0.466
Total	1	1
R-Square	92.78%	90.88%
Policy Return in December 2013	0.1889	0.8733
Total Return in December 2013	1.5	

Continued

Table 2. -- *Continued*

Panel B. National Bank Canadian Equity (DEC. 2010 to NOV. 2013)

Parameter Estimates	One Constraint	Two Constraints
Intercept	-0.2	0.008
LargeMid Growth Stocks	-0.007	0.008
LargeMid Value Stocks	0.431	0.374
Small Growth Stocks	0.538	0.539
Small Value Stocks	-0.073	0
Developed ex CAN Growth Stocks	0.033	0
Developed ex CAN Value Stocks	-0.093	0
EM Small Stocks	0.159	0.079
EM LargeMid Stocks	-0.047	0
Cash	0.059	0
Total	1	1
R-Square	97.60%	97.37%
Policy Return in December 2013	1.4965	1.5812
Total Return in December 2013	2.53	

Table 3. Distribution of R-square Values from One- and Two-constraint Style Analysis Regressions

There is one R-square value associated with each calculated policy return, which represents how well the indices explain the fund's total return for the 36-month estimation period. For a fund with 216 months of available total returns data, it will have 180 R-square values obtained from the policy return calculations (first 36 months of data are only used to calculate the first policy return for the 37th month) under each regression method. We rank all the average R-square values based on both mean and median measures, and report the distributions in this table. The frequency is rescaled for the 582 balanced funds and the 1247 equity funds so that the cumulative distributions add up to 100%. Group 1 and 2 represent results from the estimated parameters from the one- and two-constraint regressions, respectively.

R-square (%)	**Balanced Funds**				**Equity Funds**			
	Group 1		Group 2		Group 1		Group 2	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
<50	0.34%	0.69%	13.92%	6.53%	3.13%	3.53%	15.80%	15.80%
50-60	1.03%	0.86%	7.73%	6.01%	6.09%	5.45%	14.43%	12.03%
60-70	4.30%	3.61%	8.25%	7.22%	19.49%	15.08%	19.09%	16.60%
70-80	12.54%	9.97%	16.15%	15.29%	26.38%	25.02%	15.32%	16.76%
80-90	41.41%	36.60%	34.71%	36.77%	23.58%	25.74%	19.65%	20.29%
90-100	40.38%	48.28%	19.24%	28.18%	21.33%	25.18%	15.72%	18.52%
Total	100.00%		100.00%		100.00%		100.00%	

Table 4. Decomposition of the Time-Series of Total Return Variations

This table reports the time-series regression results for equation (6) for the full sample of funds (582 balanced funds and 1247 equity funds). Results on "market movements", "asset allocation policy" and "active management" are the R-square values obtained by running the total returns of each fund on market returns, policy returns in excess of market returns, and active returns, respectively. From panel regression, we obtain single R-square values for each independent variable, which are reported in panel A. From fund-by-fund regressions, we obtain one R-square value for each fund, and then average the R-square values of all funds into one mean and median R-square for each independent variable, as reported in panel B and C, respectively. The interaction effect is the balancing term to make the R-square values of the other independent variables to sum to 100%. It captures the effect that is not explained by the independent variables. Group 1 and 2 represent results from the estimated parameters from the one- and two-constraint regressions, respectively.

PANEL A. Panel Regression Results

R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Market movement	71.65%		57.38%	
Asset allocation policy	31.92%	27.36%	27.02%	26.86%
Active management	34.78%	61.58%	41.25%	72.83%
Interaction effect	-38.35%	-60.59%	-25.65%	-57.07%
TOTAL	100.00%		100.00%	

PANEL B. Fund-by-fund Regression Results (Mean)

Average R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Market movement	80.69%		66.65%	
Asset allocation policy	21.79%	22.76%	12.94%	19.21%
Active management	15.06%	14.71%	16.40%	27.16%
Interaction effect	-17.54%	-18.16%	4.01%	-13.02%
TOTAL	100.00%		100.00%	

Continued

Table 4. ---*Continued*

PANEL C. Fund-by-fund Regression Results (Median)

Average R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Market movement	86.62%		69.75%	
Asset allocation policy	16.25%	15.42%	8.66%	15.98%
Active management	10.88%	9.48%	13.91%	24.59%
Interaction effect	-13.76%	-11.52%	7.69%	-10.31%
TOTAL	100.00%		100.00%	

Table 5. Decomposition of the Time-series of Excess Return Variations

This table reports the time-series regression results for equation (7) for the full sample of funds (582 balanced funds and 1247 equity funds). Results for "asset allocation policy" and "active management" are the R-square values obtained by running the total returns of the funds on the policy returns in excess of market returns and active returns, respectively. We obtain a single R-square value reported in panel A for each independent variable based on panel regressions. We obtain one R-square value for each fund based on fund-by-fund regressions, and then average the R-square values of all funds into one mean and one median R-square for each independent variable, as reported in panel B and C, respectively. The interaction effect is the balancing term to make the R-squares of the other independent variables to sum to 100%. It captures the effect that is not explained by the independent variables. Group 1 and 2 represent results from the estimated parameters from the one- and two-constraint regressions, respectively.

PANEL A. Panel Regression Results

R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Asset allocation policy	32.84%	27.52%	26.98%	26.82%
Active management	36.19%	61.53%	41.23%	72.84%
Interaction effect	30.97%	10.95%	31.79%	0.34%
TOTAL	100.00%		100.00%	

PANEL B. Fund-by-fund Regression Results (Mean)

Average R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Asset allocation policy	27.43%	19.82%	22.73%	22.62%
Active management	27.10%	43.35%	36.72%	55.55%
Interaction effect	45.48%	36.83%	40.55%	21.83%
TOTAL	100.00%		100.00%	

PANEL C. Fund-by-fund Regression Results (Median)

Average R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Asset allocation policy	16.16%	11.88%	15.48%	13.97%
Active management	26.59%	42.62%	36.94%	60.30%
Interaction effect	57.26%	45.50%	47.58%	25.73%
TOTAL	100.00%		100.00%	

Table 6. Decomposition of the Time-Series of Total Return Variations for the Screened Sample

This table reports the time-series regression results for equation (6) for the screened sample of funds (354 balanced funds and 1184 equity funds). 229 balanced funds and 63 equity funds are removed because they have higher than 90% R-square values based on regressions involving market movements and total returns. Results on "market movements", "asset allocation policy" and "active management" are the R-square values obtained by running the total returns for the funds on market returns, policy returns in excess of market returns, and active returns, respectively. We obtain a single R-square value for each independent variable based on panel regressions, as reported in panel A. We obtain one R-square value from a fund-by-fund regression for each fund, and then average these R-square values to obtain one mean and median R-square value for each independent variable, as reported in panel B and C, respectively. The interaction effect is the balancing term to make the R-square values of the other independent variables to sum to 100%. It is the effect that is not explained by the independent variables. Group 1 and 2 are the policy returns calculated using the parameter estimates from the one- and two-constraint regressions, respectively.

PANEL A. Panel Regression Results

R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Market movement	62.25%		56.75%	
Asset allocation policy	30.71%	25.44%	27.05%	26.90%
Active management	37.96%	64.37%	41.25%	72.91%
Interaction effect	-30.92%	-52.06%	-24.87%	-56.38%
TOTAL	100.00%		100.00%	

PANEL B. Fund-by-fund Regression Results (Mean)

Average R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Market movement	72.28%		65.20%	
Asset allocation policy	21.20%	22.40%	13.08%	19.39%
Active management	18.07%	17.77%	17.10%	28.24%
Interaction effect	-11.55%	-12.46%	4.62%	-12.83%
TOTAL	100.00%		100.00%	

Continued

Table 6. -- *Continued*

PANEL C. Fund-by-fund Regression Results (Median)

Average R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Market movement	78.47%		68.92%	
Asset allocation policy	16.04%	14.13%	8.92%	16.11%
Active management	14.50%	13.27%	14.63%	25.75%
Interaction effect	-9.01%	-5.88%	7.53%	-10.78%
TOTAL	100.00%		100.00%	

Table 7. Decomposition of the Time-series of Excess Return Variations for the Screened Sample

This table reports the time-series regression results for equation (7) for the screened sample of funds (354 balanced funds and 1184 equity funds). 229 balanced funds and 63 equity funds are removed because they have higher than 90% R-square values of market movements on total returns. Results on "asset allocation policy" and "active management" are the R-square values obtained by running the total returns the funds on their policy returns in excess of market returns and active returns, respectively. We obtain single R-square value for each independent variable from panel regressions, as reported in panel A. We obtain one R-square value for each fund from fund-by-fund regressions, and then average the R-square values of all funds to obtain one mean and median R-square for each independent variable, as reported in panel B and C, respectively. The interaction effect is the balancing term to make the R-squares values of the other independent variables to sum to 100%. It is the effect that is not explained by the independent variables. Group 1 and 2 are from the estimated policy returns calculated using the parameter estimates from the one- and two-constraint regressions, respectively.

PANEL A. Panel Regression Results

R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Asset allocation policy	30.69%	25.48%	27.00%	26.86%
Active management	37.87%	64.34%	41.23%	72.92%
Interaction effect	31.44%	10.18%	31.77%	0.22%
TOTAL	100.00%		100.00%	

PANEL B. Fund-by-fund Regression Results (Mean)

Average R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Asset allocation policy	34.73%	24.10%	23.36%	23.19%
Active management	27.40%	48.51%	37.10%	56.51%
Interaction effect	37.87%	27.39%	39.54%	20.29%
TOTAL	100.00%		100.00%	

Continued

Table 7. -- *Continued*

PANEL C. Fund-by-fund Regression Results (Median)

Average R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Asset allocation policy	25.69%	17.57%	16.48%	14.69%
Active management	27.16%	48.00%	37.45%	61.36%
Interaction effect	47.16%	34.43%	46.07%	23.95%
TOTAL	100.00%		100.00%	

Table 8. Summary statistics for the R-square Values from the Cross-sectional Regressions

This table reports the statistics for the R-square values from 180 cross-sectional regressions for equation (8) and (9) in panel A and B, respectively. Group 1 and 2 are for the policy returns calculated using the estimated parameters from the one- and two-constraint regressions, respectively. Mean and median R-square values are reported with corresponding statistical tests. Paired-sample t-test is used to examine whether the mean R-square values for group 1 and group 2 differ from each other. Wilcoxon signed-ranks test is the nonparametric test used to examine whether the median R-square values from group 1 and group 2 differ from each other. Panel C reports the R-square values from time-series panel regressions for equation (7) for comparison purposes. *** indicates statistical significance at the 0.01 level.

Panel A. R-square Values of Policy Returns on Total Returns

R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Mean	30.02%	25.08%	25.81%	25.02%
Paired-sample t-test	*6.833****		*-17.964****	
Median	28.94%	22.41%	24.44%	21.58%
Wilcoxon Signed-Rank Test (Z)	*6.277****		*0.426*	
Maximum	76.64%	69.31%	72.38%	68.79%
Minimum	0.00%	0.06%	0.01%	0.03%
Standard Deviation	19.79%	17.25%	18.87%	18.18%

Continued

Table 8. -- *Continued*

Panel B. R-square Values of Active Returns on Total Returns

R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Mean	43.64%	64.18%	47.24%	74.92%
Paired-sample T-test (Mean)	*0.919*		*-22.58****	
Median	43.63%	67.99%	48.85%	77.61%
Wilcoxon Signed Ranks Test (Z)	*11.329****		*11.626****	
Maximum	91.95%	94.48%	89.41%	95.04%
Minimum	0.59%	4.77%	0.03%	11.74%
Standard Deviation	22.11%	18.33%	22.02%	14.41%

Panel C. Time-Series Panel Regression Results

R-square	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Asset allocation policy	32.84%	27.52%	26.98%	26.82%
Active management	36.19%	61.53%	41.23%	72.84%

Table 9. Return Level Tests

This table reports the ranges and distributions of three return level measures, *return level ratio*, *return level difference* and *geometric mean*, in panel A, B and C, respectively. The monthly *return level ratio* and *difference* are calculated for each fund, and median *return level ratio* and mean *return level difference* are taken as the average measure for each fund. Each fund's *geometric mean return* is calculated based on equation (12). We rank the *ratio*, *difference* and *geometric mean return* measures across all funds, and record the 5th, 25th, 50th, 75th, and 95th value under each measure for balanced and equity funds. *Return level ratio* less than 100%, *ratio level difference* less than zero, and *geometric mean return* greater than zero, indicate performance in excess of the policy benchmark returns. We conduct one-sample t-tests and Wilcoxon signed ranks tests to examine whether the mean and median of each measure differ from zero. The same tests are conducted on the pool of all monthly *ratio* and *difference* values, with the results reported in panel D and E, respectively. Group 1 and 2 are based on policy returns calculated using the estimated parameters from the one- and two-constraint regressions, respectively. ** and *** indicate significance at the 0.05 and 0.01 levels, respectively, and √ indicates the outperformance group.

Panel A. Return Level Ratio Ranges and Distributions

Percentile	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
5th	54.21%	52.60%	35.96%	33.08%
25th	71.81%	72.81%	59.59%	53.56%
50th	80.78%	82.08%	75.25%	69.76%
75th	87.20%	88.89%	89.81%	85.53%
95th	94.21%	98.10%	100.48%	97.14%
√ (Total) < 100%	98.80%	95.36%	94.71%	97.75%
(Total) > 100%	1.20%	4.64%	5.29%	2.25%
Mean	78.54%	80.24%	73.37%	68.28%
t-test	*150.02****	*124.76****	*124.62****	*115.20****
Median	80.83%	82.13%	75.25%	69.76%
Wilcoxon Test	*20.90****	*20.90****	*30.59****	*30.59****

Continued

Table 9. – *Continued*

Panel B. Return Level Difference Ranges and Distributions

Percentile	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
5th	-0.0030	-0.0031	-0.0054	-0.0064
25th	-0.0010	-0.0011	-0.0020	-0.0029
50th	-0.0002	-0.0002	-0.0005	-0.0012
75th	0.0002	0.0004	0.0007	0.0000
95th	0.0014	0.0017	0.0039	0.0030
√ (Total) < 0	62.71%	58.59%	60.79%	74.18%
(Total) > 0	37.29%	41.41%	39.21%	25.82%
Mean	-0.0005	-0.0004	-0.0006	-0.0015
t-test	*-7.74****	*-6.40****	*-7.21****	*-15.37****
Median	-0.0002	-0.0002	-0.0005	-0.0012
Wilcoxon Test	*-8.22****	*-6.06****	*-8.69****	*-18.15****

Panel C. Geometric Mean Return Ranges and Distributions

Percentile	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
5th	-0.0014	-0.0018	-0.0042	-0.0038
25th	-0.0002	-0.0004	-0.0008	-0.0003
50th	0.0002	0.0002	0.0005	0.0010
75th	0.0010	0.0010	0.0020	0.0027
95th	0.0029	0.0030	0.0054	0.0063
√ (Total) > 0	61.86%	58.59%	59.50%	69.45%
(Total) < 0	38.14%	41.41%	40.50%	30.55%
Mean	0.0004	0.0004	0.0005	0.0012
t-test	*7.24****	*5.79****	*6.02****	*11.61****
Median	0.0002	0.0002	0.0005	0.0010
Wilcoxon Test	*7.70****	*5.60****	*7.70****	*14.97****

Table 9. --- *Continued*

Panel D. Significance Tests for the Pool of Return Level Ratio Values

Significance Tests	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Mean	2587.73	5038.57	10544.17	7197.01
t-test	*1.06*	*2.27***	*3.07****	*2.52****
Median	0.8123	0.8204	0.7795	0.7189
Wilcoxon Test	*140.36****	*140.78****	*187.28****	*192.62****

Panel E. Significance Tests for the Pool of Return Level Ratio Differences

Significance Tests	Balanced Funds		Equity Funds	
	Group 1	Group 2	Group 1	Group 2
Mean	-0.0002	-0.0001	-0.0003	-0.0010
t-test	*-4.11****	*-1.06*	*-3.53****	*-12.73****
Median	-0.0001	0.0000	0.0001	-0.0006
Wilcoxon Test	*-4.26****	*-0.92*	*-0.56*	*-12.07****

Table 10. Results for Risk-adjusted Abnormal Returns and Further Return Level Comparisons

This table presents the risk-adjusted abnormal return results in panel A. Alpha is the proxy for abnormal returns, and is obtained by regressing the returns for the total return portfolios (dependent variable) against the returns for the benchmark indices used in the policy return calculations. EW and VW represent equally- and net-assets-value-weighted total return portfolios. The EW and VW policy returns are calculated from the estimated parameters from the one- and two-constraint regressions, and are represented by PR (one) and PR (two), respectively. Panel B reports the comparisons of the means of the total return and policy returns under each portfolio. Both arithmetic means and geometric means are examined.

Panel A. Risk-adjusted Abnormal Returns

	Balanced Funds		Equity Funds	
	EW	VW	EW	VW
Alpha	0.112	0.107	-0.163	-0.095
t	*1.29*	*1.547*	*-0.983*	*-0.697*
R-square	95.7%	96.7%	94.7%	95.6%

Panel B. Return Level Comparisons

Balanced Funds	EW Portfolios			VW Portfolios		
	TR	PR (one)	PR (two)	TR	PR (one)	PR (two)
Arithmetic Mean	0.00392	0.00379	0.00428	0.00397	0.00370	0.00420
Geometric Mean	0.00541	0.00598	0.00623	0.00568	0.00563	0.00639
Equity Funds	**EW Portfolios**			**VW Portfolios**		
	TR	PR (one)	PR (two)	TR	PR (one)	PR (two)
Arithmetic Mean	0.00461	0.00470	0.00418	0.00451	0.00518	0.00498
Geometric Mean	0.00399	0.00405	0.00358	0.00401	0.00465	0.00449

Figure 1. Comparison of the Cross-sectional Fund Dispersions and Residual Errors from the Cross-sectional Regressions for Group 3 for Balanced Funds.

This figure depicts the fund dispersions and residual errors from January 1999 to December 2013 for balanced funds. Fund dispersion is defined as the standard deviation of the cross-sectional total returns of the funds, and the residual errors are from regressions based on equation (8) using policy returns calculated using the estimated parameters from the two-constrain regressions.

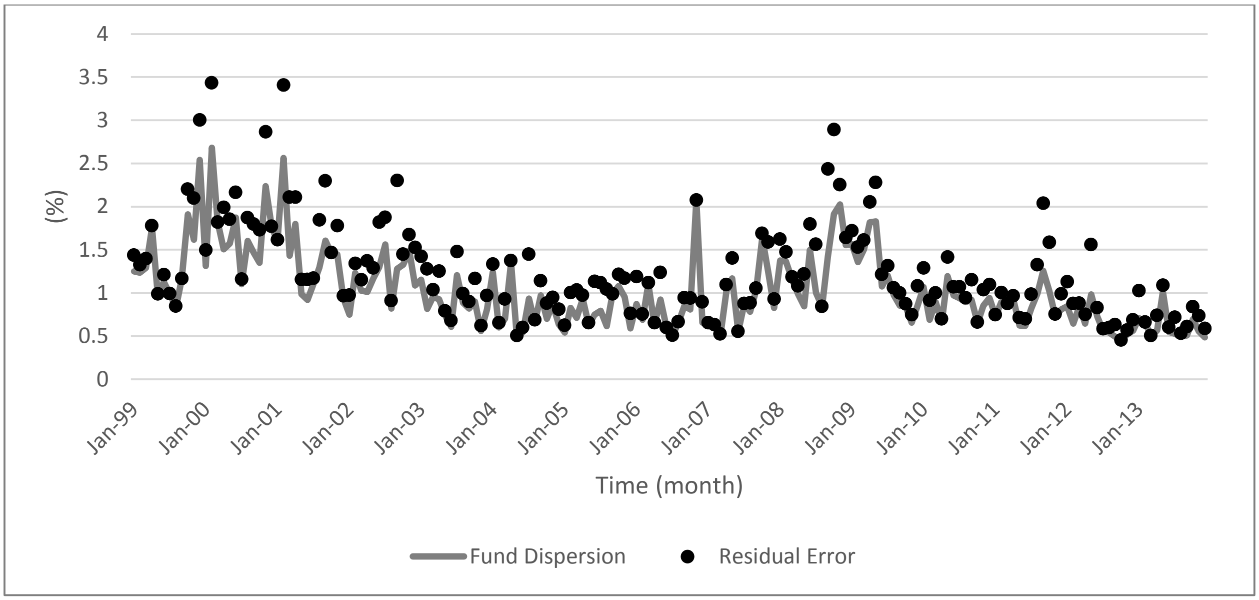

Figure 2. Comparison of the Cross-sectional Fund Dispersions and Residual Errors from the Cross-sectional Regressions for Group 3 for Equity Funds.

This figure depicts the fund dispersions and residual errors from January 1999 to December 2013 for equity funds. Fund dispersion is defined as the standard deviation of the cross-sectional distribution of the total returns of the funds, and the residual errors are obtained from the regressions based on equation (8) when policy returns are calculated using the estimated parameters from the two-constrain regressions.

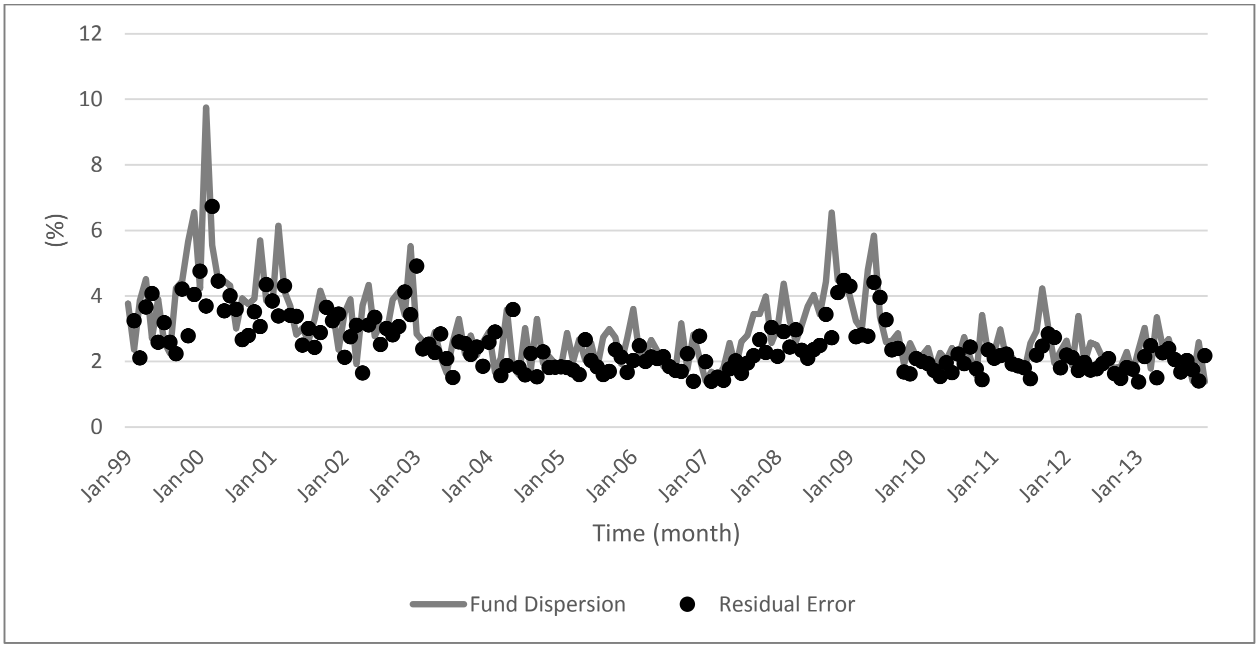

Figure 3. Rolling R-square Values from the Cross-sectional Regressions on Policy Returns for Balanced Funds.

This figure depicts the R-square values from the cross-sectional regressions based on equation (8) for balanced funds from January 1999 to December 2013. Group 1 and 2 represent the results from using policy returns calculated using the estimated parameters from the one- and two-constrain regressions, respectively.

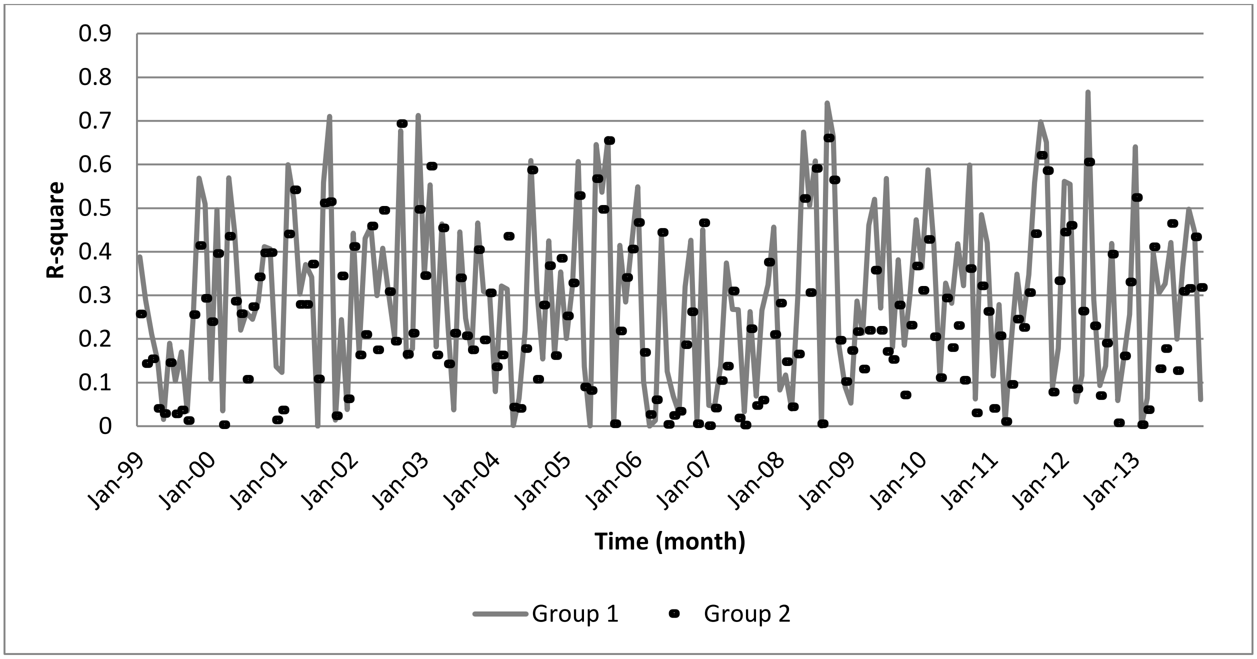

Figure 4. Rolling R-square Values for the Cross-sectional Regressions on Policy Returns for Equity Funds.

This figure depicts the R-square values from the cross-sectional regressions based on equation (8) for equity funds from January 1999 to December 2013. Group 1 and 2 represent the results from using policy returns calculated using the estimated parameters from the one- and two-constrain regressions, respectively.

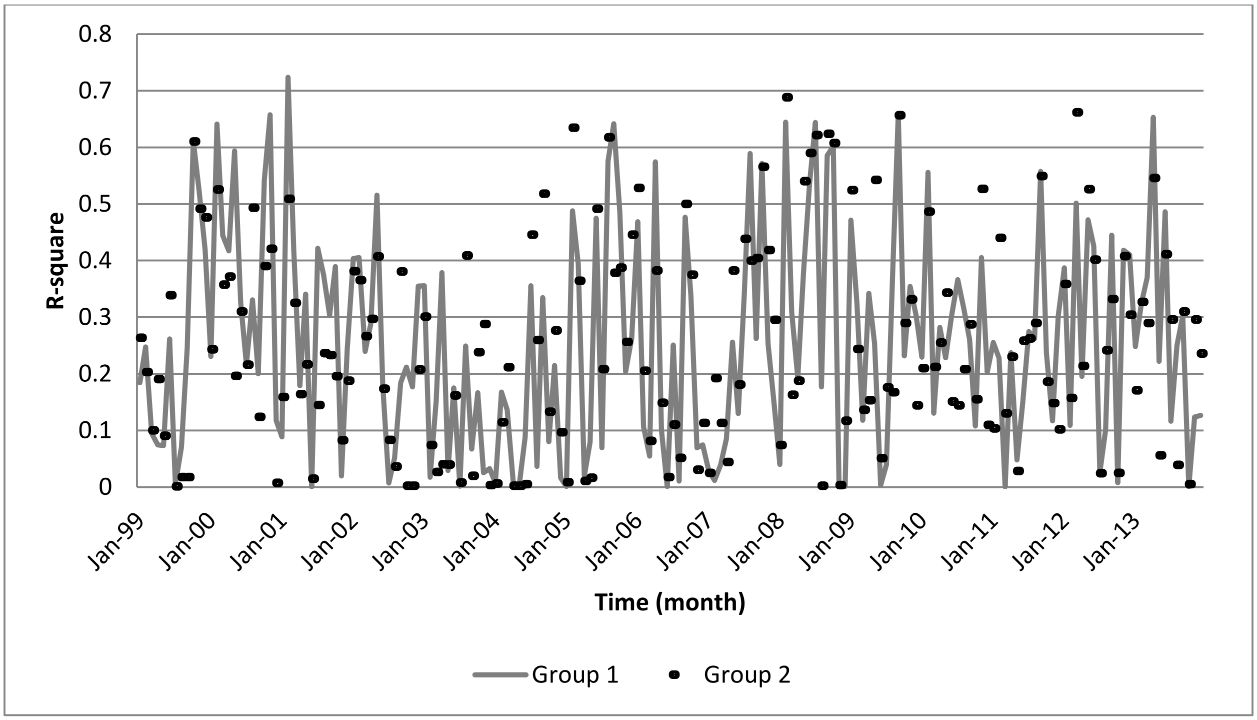

Figure 5. Rolling R-square Values of the Cross-sectional Regressions on Active Returns for the Balanced Funds

This figure depicts the R-square values from the cross-sectional regressions based on equation (9) for the balanced funds from January 1999 to December 2013. Group 1 and 2 represent results from using policy returns calculated using the estimated parameters from the one- and two-constrain regressions, respectively.

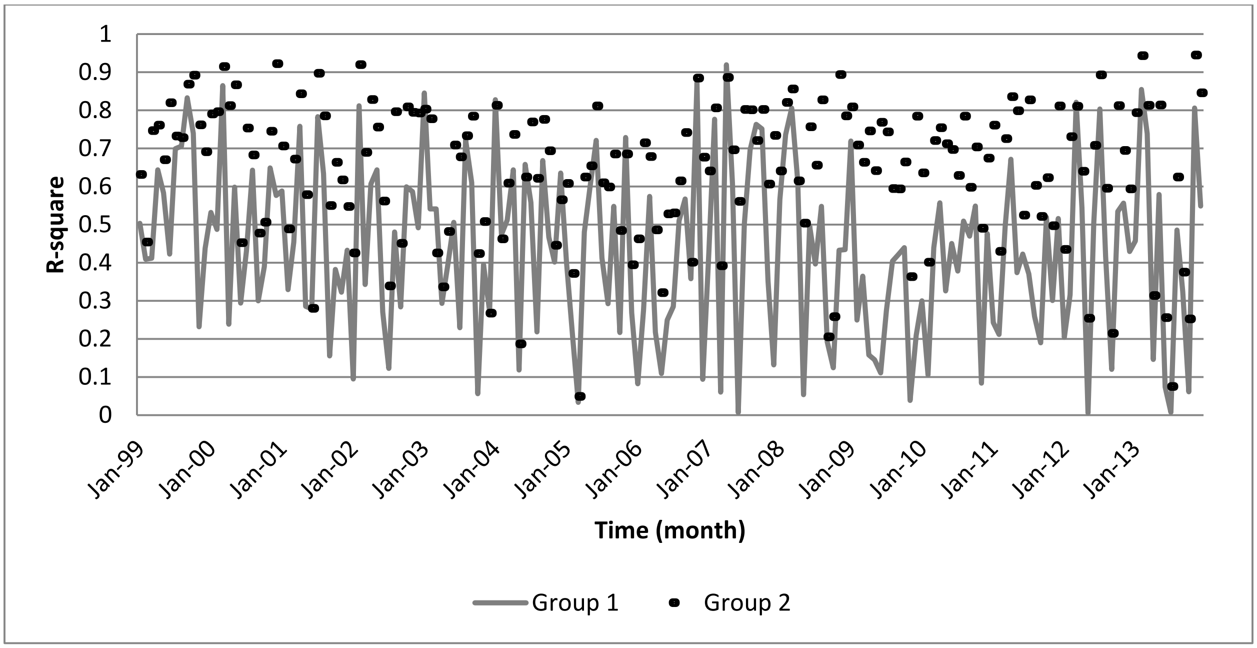

Figure 6. Rolling R-square Values for the Cross-sectional Regressions on Active Returns for Equity Funds

This figure depicts the R-square values from the cross-sectional regressions based on equation (9) for equity funds from January 1999 to December 2013. Group 1 and 2 represent the results from using policy returns calculated using the estimated parameters from the one- and two-constrain regressions, respectively.