# The Performance of Canadian-Based Versus US-Based Mutual Fund Managers in the US Stock Market

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## ABSTRACT

This paper compares the performance of the Canadian-based mutual funds with the U.S-based mutual funds that only invest in U.S equity markets. The time horizon under study is from 1990 to 2009. Moreover, the time period was broke down in to two sub-periods to capture the effect of bull and bear market on the relative performance of the funds under study. The results in this paper are of practical importance to Canadian investors who seek exposure to U.S equity markets through investing in mutual funds. Financial theories suggest that the performance of the two must be similar since both are exposed to the same market and are large enough to be well diversified. Our results suggest that U.S based mutual funds have out-performed the Canadian-based mutual funds in the total period of 1990 to 2009. Additionally the gap between their performances increased significantly in the period of 2000 to 2009.



**Keywords:** Performance measurement, Sharpe ratio, Unconditional Jensen's Alpha, Conditional Jensen's Alpha, Fama-French three factor model, Carhart four factor model, Canadian mutual funds, U.S mutual funds, Ranking of funds

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# 1. Introduction

The performance of mutual funds and mutual fund managers has captured the attention of the academic, investor and finance professional communities over the last half century. There are different views on what is the most appropriate tool for measuring mutual funds' performance. Perhaps the most influential breakthrough is due to Sharpe (1966), the Sharpe ratio which is a risk-adjusted measure of reward per unit of risk (standard deviation). Following the findings of Sharpe, Jensen (1968) suggested measuring the performance of funds above and beyond the return of the market portfolio, commonly known as Jensen's alpha. Many other scholars have contributed to further improve on Jensen's original model by adding independent variables and conditions, Fama-French (1996), Carhart (1997) and Ferson and Schadt (1996).

In this paper we used the Sharpe ratio, the unconditional Jenson's alpha, Fama and French's three factor alpha (1996), Carhart's four factor alpha (1997) and Ferson and Schadt's conditional alpha (1996) to conclude on funds' performance ranking relative to each other. We studied the monthly returns for nine categories of U.S open-ended mutual fund managers, an equally weighted portfolio of these funds and a portfolio of the Canadian-based mutual funds that are only exposed to the U.S equity market. In order to compare the alphas of Canadian based funds with U.S based funds we took the difference between their returns and tested for abnormal returns of the difference. This method allows us to comment on the significance of the difference of funds performance. We considered the time period of 1990 to 2009 as the total period of our study. In addition, we analyzed the periods of 1990 to 2000 and 2000 to 2009 as two individual ten years sub-periods to investigate the effect of bull (1990 to 2000) and bear (2000 to 2009) markets on the managers' performance.

Our study reveals a number of interesting insights about North American mutual fund performance. First, Canadian-based funds under-perform American-based funds in the twenty year period under study; they have performed the worst in the bear market of 2000 to 2009. Second, U.S manager based Value and Blend funds have the best performance in the total period according to the consensus of four out of five models used for this study. Third, U.S manager based Medium capitalization funds have the best performance when compared to others in the total period. Additionally, U.S manager based Large capitalization funds have the best performance in the bull market of 1990 to 2000 and Small capitalization funds out-perform others in the bear market since 2000.

This paper proceeds ad follows: Part one is a brief introduction; Part two explains the data structure of our study; Part three explains the different models we used for our analysis; Part four contains the empirical results we obtained, and Part five concludes our paper.

## 2. Performance Measures

### 2.1 Sharpe Ratio

The Sharpe ratio is the single most used performance measure. It measures the percentage excess return per unit of risk (Standard Deviation) taken. Logically a higher Sharpe ratio would be preferred for any fund. The ratio is defined as

$$sharpe = \frac{E\left[ R_p - R_f \right]}{\sigma_p} \tag{1}$$

Where $R_p$ is the portfolio return, $R_f$ is the risk free rate of return and $\sigma_p$ is the Standard Deviation of the portfolio return.

### 2.2 Jenson's alpha

The Jenson's alpha (1968), is primarily used to measure the abnormal return of assets. According to the CAPM the excess return of a security must plot on the security market line (SML). Jenson's alpha measures the distance between the security's actual return and the SML. risk in contrast to the Sharpe ratio, which uses the standard deviation of the return as the measure of risk, this model uses beta as the measure of. The alpha is calculated by estimating the following regression

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + u_{pt} \tag{2}$$

Where $R_{pt}$ is the monthly portfolio return of portfolio *p*, $R_{ft}$ is the risk free rate of return and $R_{mt}$ is the market portfolio return at time *t*. The estimated intercept is referred as the Jenson's alpha that measures the abnormal return of the portfolio. The estimated slope, $\beta_p = \text{cov}(R_p , R_m)/\sigma_m^2$, measures the sensitivity of the portfolio's return to market's return. In most academic literature $\beta$ is referred to as the systemic or un-diversifiable risk of the portfolio.

### 2.3 Conditional alpha

Under the unconditional form of CAPM the use of any publicly available information may lead to abnormal performance since the underlying assumption is that the investor holds unconditional expectations. Assuming the semi-strong form of market efficiency hypothesis holds, asset prices must reflect all the publicly available information, possessing such information

should not imply abnormal performance. Ferson and Schadt (1996) suggest that conditioning the original CAPM to a vector of information factors, that in theory and practice are used to form expectations for future performances, would eliminate the bias mentioned above and at the same time, control for the time varying betas and market premium. For the purpose of our study, the conditional beta is defined as

$$\beta_p = b_{0p} + b_{1p} Dy_{t-1} + b_{2p} TB_{t-1} + b_{3p} YS_{t-1} \quad (3)$$

Where $Dy_{t-1}$ is the one month lagged dividend yield, $TB_{t-1}$ is the one month lagged yield on a 90-days U.S treasury bill and $YS_{t-1}$ is the one month lagged yield spread between 10-year and 2-year U.S Treasury bill. By substituting equation (3) in equation (2) we estimate the coefficients by considering the following regression,

$$R_{pt} = \alpha_{cp} + b_{0p} R_{mt} + b_{1p}\ Dy_{t-1} R_{mt}\ + b_{2p}\ TB_{t-1} R_{mt}\ + b_{3p}\ YS_{t-1} R_{mt}\ + u_{pt} \quad (4)$$

Where $\alpha_{cp}$ is the conditional alpha, $b_{0p}$ is the unconditional beta. The coefficients $b_{1p}, b_{2p}$ and $b_{3p}$ capture the variations in beta caused by dividend yield, short-term interest and yield spread, respectively. Please note that both $R_{pt}$ and $R_{mt}$ are the excess returns of portfolio *p* and market portfolio, respectively.

## 2.4 Fama-French three-factor alpha

Fama-French (1992) found that there is no linear relationship between average returns and betas thus rejected the CAPM. In their writings, specifically Fama-French (1996), they present their three-factor model. They found that the excess return of a security is related to three factors:

1. Excess rate of return of the market portfolio.
2. Return on a porfolio of Small size stocks minus the return on a portfolio of Large size stocks(SMB, Small Minus Big).
3. Return on a porfolio of stocks with high book-to-market ratio minus the return on a portfolio of stocks with low book-to-market ratio(HML, High Minus Low). The sensitivity factors of this model are estimated by running the following regression

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + s_p SMB + h_p HML + u_{pt} \quad (5)$$

Where $R_{pt}$, $R_{ft}$, $R_{mt}$ and $\beta_p = \text{cov}(R_p, R_m)/\sigma_m^2$, SMB is the expected premium of Small size stocks, HML is the expected premium of stocks with high book-to-market ratios. $s_p$ and $h_p$ are the sensitivity measures of a security with respect to SMB and HML, respectively.

## 2.5 Carhart alpha

In most finance literature persistence in mutual fund performance is well documented but not explained. Carhart (1997) attempts to explain the short-term persistency in mutual fund returns by adding a fourth factor to the Fama-French model. Carhart (1997) claims that the mutual fund returns can be explained by a performance attribution model consisting of four elementary strategies: high versus low beta stocks, Large versus Small market cap stocks, Value versus Growth stocks and one year return momentum versus contrarian stocks. The model is defined as

$$R_{pt} - R_{ft} = \alpha_p + \beta_p(R_{mt} - R_{ft}) + s_p SMB + h_p HML + m_p MOM + u_{pt} \quad (6)$$

Where $R_{pt}$, $R_{ft}$, $R_{mt}$ ,SMB, HML, $\beta_p = \text{cov}(R_p , R_m)/\sigma_m^2$ , $s_p$, $h_p$ are the same as previously stated and MOM is the monthly momentum factor which is the average return on the two portfolios with prior high returns minus the average return on the two portfolios with prior low returns and $m_p$ is the sensitivity factor of a security with respect to MOM.

# 3. Data

In this study we use monthly returns, net of MER, of Canadian-based and U.S open-ended mutual funds, which solely invest in U.S equities, from October 1990 to May 2009. The data used for our study come from several sources. The monthly funds' returns come from Morningstar. Morningstar categorizes the U.S mutual funds into nine different sub-categories based on the funds' capitalization size and their fundamental characteristic (i.e. Value, Growth and Blend, please refer to exhibit 1). In total we looked at 568 U.S funds. For the purpose of comparison, we created nine equally weighted portfolios for each of the nine categories. Further, we considered one equally weighted portfolio containing the former nine portfolios as a proxy for U.S mutual fund returns for the period under study. The universe of Canadian-based mutual funds is much smaller than their U.S counterparts. There are thirty Canadian-based funds that had available data for the period under study. Again, we constructed an equally weighted portfolio containing the thirty funds as a proxy for Canadian-based mutual funds that only invest in U.S equity.

The monthly returns for market portfolio, SMB, HML and MOM for the Fama-French and Carhart models are from Kenneth R. French Data Library[1]. The one month lagged dividend yield data was obtained from CRSP Value weighted market index provided by Dr.Grauer. The

[1] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

one-month lagged 90 days T-bill yield and yield spread, between 10-years and 2-years yields, were gathered from Federal Reserves Bank of St. Louis's Economic Data (FRED)[2].

# 4. Empirical Results

## 4.1 Mean and Standard Deviation

Considering the total period since 1990, US-based funds have had a higher Mean and Standard Deviation than Canadian-based funds. As documented in Table 1 Panel A, Value and Blend asset allocation strategies have had a higher Mean in Small and Medium cap fund while Growth asset mixtures have had higher Mean in Large cap funds. As one would expect, Growth funds have had a higher Standard Deviation than Value and Blend funds.

**[Table 1 Here]**

Comparing the two sub-periods, US funds have had a higher Mean and Standard Deviation in both periods. In both periods, Growth funds and also Smaller cap funds have had higher Standard Deviation than the rest.

In terms of Mean, the interesting point is that in the first period Growth stocks were better than the Blend funds and the Value funds were the least successful. However, in the second period, Value funds were better than the Blend funds while the Growth funds have been the worst to invest in.

## 4.2 Sharpe Ratio

Considering the results obtained in Table 1, US mutual funds have outperformed their Canadian-based counter parts in the past two decades. Also among the different US mutual funds categories, we can see that Small and Medium cap funds have outperformed the Large cap funds since 1990. Moreover, Blend and Value funds have higher Sharpe ratios relative to the Growth funds.

Table 1 Panels B and C contain Sharpe ratios of all the funds under study in two sub-periods, period one from 1990 to 2000 and period two from 2000 to 2009. Comparing the two periods reveals an interesting insight. US funds demonstrate better performance than Canadian-based in both decades. Also, we can see that the Sharpe ratio dropped for both US and Canadian-based mutual funds going from the first period to second; however, the Canadian-based Sharpe

[2] http://research.stlouisfed.org/fred2/

ratio fell much more than the US ones. Another interesting result is that in the first period the funds with higher market caps were much more successful than the smaller caps and also Growth funds did much better than Blend and Value funds. However, in the second period the Small-cap funds were more successful than the Large-cap funds and also the Value funds have beaten the Blend and Growth funds.

## 4.3 Unconditional Jenson's alpha

As mentioned Jenson's alpha is used to measure the performance of mutual funds above and beyond the market. Table 2 Panel A contains regression results of  on equation (2) for the period of 1990 to 2009. According to Jenson's alpha test the U.S mutual funds have been outperforming the Canadian-based mutual funds by over 20 basis points on a monthly basis. An interesting result is that the alpha measure for the Canadian-based fund is statistically less than zero at 5% significance level. The alphas of all the nine different categories of U.S mutual funds are not statistically different from zero. Therefore, unlike the findings of Fersonand and Schadt (1996), all expect two (Medium and Large Growth) have positive alphas. Just as the theory suggests, all the betas are positive and significantly different from zero. According to our study, U.S funds have a higher beta than Canadian-based funds, although the difference is marginal. The difference between the performance of the two is 21 bps and is statistically significant at 5% level (t-stat = 2.31). In the nine U.S based sub-categories of funds, the Growth asset mixture strategy has the highest beta whereas the Value strategy has the lowest market sensitivity factor. The latter finding is consistent with theory, taking beta as a measure of riskiness of an asset, Growth stocks have a higher risk than the Value stocks hence a portfolio containing them should  have a higher beta than a portfolio of Value stocks. Small capitalization portfolios have the highest beta compared to Large and Medium cap portfolios mainly because of their higher exposure to Small capitalization stocks. According to R-square figures, this model explains 77 to 98 percent of the variation in the excess return of the portfolios under study.

**[Table 2 Here]**

When we break the period into two ten year periods the results get even more interesting. As documented in Table 2 Panel B, all the eleven portfolios under study have underperformed compared to the market portfolio in the first period. The gap between Canadian-based and U.S funds narrows in that period but still results are in favor of U.S funds. The difference between the performance of the two is 3 bps and is insignificant at 5% level (t-stat =0.25). As was the case in the total twenty year period, the portfolio of Canadian-based funds has a statistically significant

negative alpha. The ranking and magnitude of the betas stays the same as previously discussed. The goodness of the fit of the model stays in the range of 70% to 99%.

It is not until the second period that the results take a dramatic change. Canadian-based funds take a hard beating from the U.S funds. During the period of 2000-2009 U.S funds beat the market by an average of 27 basis points while Canadian-based funds underperform the market by an average of 18 basis points on a monthly basis (See Table 2 Panel C). More astonishing is the fact that both alphas are statistically significant at 5% significance level. The difference between the performance of the two is 44 bps and is significant at 5% level (t-stat = 3.33). Four out of the total of nine different categories of U.S funds demonstrate alphas that are statistically greater than zero at 5% significance level. Funds that contain Large, Medium and Small cap Value stocks performed considerably better than the other categories. The ranking, magnitude and significance of the betas remain the same as previously discussed. According to the data obtained from Kenneth R. French Data Library, the monthly average excess market return during the first and second period were 1.22 and -0.25 percent, hence our study suggests that fund managers perform worst in bull markets and better in bear market conditions. The superb performance of Small-cap Value funds in the second period is largely due to the fact that market portfolio experienced a bubble burst in the year 2000, as the tech bubble came to an end. By definition Small-cap Value funds invest in Small capitalization stock with lower Growth rate such as manufacturing, financials, utility and energy stocks, hence their exposure to tech firms were minimal which is clearly reflected in their relative performance. This claim is further evident from Value funds' lower betas relative to other funds.

## 4.4 Conditional Jenson's alpha

Tables 3 contain our findings using conditional beta. In contrast to the findings of Fersoand and Schadt (1996) our results do not suggest substantial and significant changes in alphas. None of the negative alphas obtained from the unconditional model change sign nor did their significance (and ranking) changed after adding lagged dividend yield, T-Bill yield and yield spread as conditional variables. The conditional model suggests, once again, that the U.S funds have outperformed Canadian-based funds in the period from 1990 to 2009. The difference between the performance of the two is 23 bps and is significant at 5%level (t-stat = 2.56). Another interesting result drawn from the conditional model is the significance of the positive coefficients of dividend yields. Black and Scholes (1974) argues that in an efficiently operating capital market in which firms were optimizing shareholders' interest, there would be no

observable relationship between risk-adjusted returns and the dividend yields. Our finding suggests that in fact the relation between lagged dividend yield and risk-adjusted return is statistically greater than zero in the period under study. It is worth mentioning that Value funds have the highest coefficients on dividend yields. One possible explanation for the later observation could be that the investment strategy of Value funds favors high dividend yield stocks hence their returns are more positively related to higher dividend yield stocks. The significance and ranking of the market betas remained the same as suggested by the unconditional model. Coefficients on lagged T-Bill yield and yield spread are statistically insignificant. The adjusted R-squares increased by very little implying that the explanatory power of the model did not changed substantially.

**[Table 3 Here]**

Looking at the results for the two ten year sub-periods we observe the same behaviors as suggested by the unconditional model. Canadian-based funds have underperformed the U.S funds in both periods but more substantially in the second period. The difference between the performance of the two is 5 bps and statistically insignificant at 5% level (t-stat = 0.37) in the first period while the difference increases to 43 bps and become statistically significant at 5% level in the second period (t-stat = 3.15). In the period of 1990-2000 all the eleven alphas remain negative. In the period of 2000 to 2009 the same dramatic changes are apparent. With six of the eleven funds having statistically significant positive alphas, the conditional model re-affirms the superior performance of U.S funds compared to both the market portfolio and the Canadian-based funds. The magnitude, significance and ranking of the sensitivity factors remain unchanged from the results obtained by considering data of the total period. The adjusted R-squares show little or no improvement to the explanatory power of the model when compared to R-squares obtained from the unconditional model.

## 4.5 Fama-French alpha

Table 4 contains the regression results of equation (5). Considering the whole twenty year period, the Fama-French model produces different results compared to the unconditional CAPM model. In contrast to CAPM outputs, alphas for Growth funds are positive, all the other alphas are negative and Value funds have the lowest alphas. Considering Table 4 Panel A, it is apparent that the U.S funds have outperformed the Canadian-based funds. The difference between the performance of the two is 13 bps and statistically significant at 5% level (t-stat = 2.02). The Fama-French gives us the same ranking, significance and almost same magnitude of betas when

compared to the unconditional CAPM. The interesting results are from the coefficients of the SMB and the HML. Only two of the eleven coefficients on the SMB factors are statistically not different from zero, suggesting that the SMB factor is an adequate explanatory variable for variations in excess returns of funds. The portfolios rank in terms of this factor sensitivity from highest to lowest as: Small-cap, Medium-cap and Large-cap which is consistent with the findings of the Fama-French (1996). It is worth noting that the portfolio consisting of the Canadian-based funds not only has a lower SMB coefficient but it is also negative, suggesting that the Canadian-based funds under study are exposed to the Large-cap stocks more than the Small-caps; whereas the portfolio of the U.S funds has a high, positive SMB coefficient which could be a reason for their superior performance compared to the Canadian-based funds. The sensitivity factors of HML are all significant except for the Small-cap Growth and the Canadian-based portfolios, implying that the HML factors do help us explain the variations in funds' excess returns. Growth funds have negative factor loadings, which is reasonable since Growth funds have more exposure to stocks with low book-to-market ratios. The Canadian-based funds seem to be well balanced between high and low book-to-market stocks since they have an insignificant and very Small HML coefficient. Over this period, our study suggests higher positive sensitivity of the U.S funds to the market portfolio, the SMB and the HML factors contributed to their superior performance compared to the Canadian-based funds.

**[Table 4 Here]**

Returning to the two ten year sub-periods, in the first period, from 1990 to 2000, it is evident from the alpha figures that all the funds except for Growth funds have underperformed with respect to the market portfolio. In this period the Value funds did worse than other categories since they have statistically significant negative alphas. The Canadian-based funds show poorer performance compared to the U.S funds and the gap is much bigger than previously suggested by the unconditional CAPM. The difference between the performance of the two is \5 bps and is statistically insignificant at 5%level (t-stat = 0.83). Betas of all funds in this period are statistically significant and they rank from highest to lowest as: Growth, Blend and Value. The coefficients on the SMB factor are all significant with the exception of the Large-cap Value fund and the portfolio of Canadian-based funds. As was the case in the total period, Small cap funds have the highest loading and Large cap funds have the lowest. The coefficients on the HML factors in this period are all statistically significant except for the portfolio of Canadian-based funds (the ranking and magnitude of the coefficients remain the same as previously mentioned). The adjusted R-squares suggest that the Fama-French three-factor model fits the data for this period almost perfectly (range from 93% to 99%, see Table 4 Panel B).

Table 4 Panel C contains the regression outputs for the period of 2000 to 2009. Considering the alphas in this period, all the alphas are statistically not different from zero expect for the portfolio of the Canadian-based funds which has a negative alpha. The difference between the performance of the two is 26 bps and is significant at 5% level (t-stat =2.40) . All the betas in this period are significant and positive and their ranking and magnitude remains the same as the previous period. The coefficients on the SMB factors are all statistically significant except for three funds (Large-cap Blend and Value, and Medium-cap Growth), with the same ranking as before. The coefficients on the HML are statistically significant at 5% significance level with the exception of Medium and Small cap Growth, and the portfolio of Canadian-based funds.

## 4.6 Carhart alpha

Tables 5 contains the statistical regression results of equation (6). During the total period, from 1990 to 2009, the results are not significantly different from the results we got by using the Fama-French (see Table 5 Panel A). In this period, alphas remain insignificant with the exception of the portfolio of Canadian-based funds which has statistically less than zero alpha. The difference between the performance of the Canadian based funds and the U.S based funds is 10 bps and is significant at 5% level (t-stat = 1.98). The betas of all the nine different categories of funds remain very close to the market sensitivity coefficients suggested by the Fama-French model; they remain positive and statistically significant at significant at 5% significance level. The coefficients on the SMB for all the portfolios under study are positive and significant except for two, Large-cap Growth and Canadian-based, while Large-cap Value coefficients are insignificant. The coefficients on the SMB for the Canadian-based portfolio and the US portfolio of funds are exactly the same as suggested by the Fama-French model mentioned previously. The coefficients on the HML factors are all positive except for the Large, Medium and Small capitalization Growth funds. The portfolio of Canadian-based funds has an insignificant HML loading as was the case under the Fama-French model. The coefficients on momentum factor (MOM) are all significant with the exception of Small-cap Blend and Value, and the portfolio of the U.S and the Canadian-based funds. The MOM coefficients suggest that there is a significantly positive relation between momentum and the excess returns of Growth funds, the reverse holds for the Value funds. It is worth mentioning that the U.S and Canadian-based funds are not sensitive to short term momentum. The adjusted R-Squares have improved significantly (lowest figure is 95%) with the addition of the fourth factor.

**[Table 5 Here]**

Considering the regression results for the period between 1990 and 2000 the alphas for all the eleven portfolios under study are negative and not significant except for the portfolio of Canadian-based funds which has a statistically significant negative alpha. The difference between the performance of the Canadian based funds and the U.S based funds is 9 bps and is statistically insignificant at 5% level (t-stat = 1.37). The market sensitivity loadings of every other fund remains positive and statistically significant at 5% significance level; their ranking and magnitude remains the same as the total period, expect during this period the portfolio of Canadian-based funds has a higher beta than the U.S portfolio. The coefficients on the SMB factor are significant and positive with Growth funds having the highest loadings and the exception of Large-cap Value and the portfolio of Canadian-based funds which have negative coefficients. The coefficients on the HML behave in the same manner as the first period; they are all significant except for the Canadian-based portfolio, and are positive except for the Growth funds. The coefficients on the momentum factor remain significant except for the U.S and the Canadian-based portfolios while the Growth funds remain the only funds with a positive MOM loading. The adjusted R-Square measures indicate a very good fitted model to data in this period.

In the period of 2000-2009 the alphas are, once again, statistically not different from zero except for the portfolio of Canadian-based funds. As other models suggest, during this time period the gap between the portfolio of Canadian-based and American funds increase the most. The difference between the performance of the Canadian based funds and the U.S based funds is 26 bps and is significant at 5% level (t-stat = 2.50). The market sensitivity measures, betas, remain positive and significant. As other models suggest, in this period, Small capitalization and Growth funds have the highest betas. The coefficients on the SMB are positive in this period, except for the Large-cap Growth, the Blend and the Canadian-based funds. The coefficients on the HML factor remain significant for all eleven funds under study with the exception of the portfolio of the Canadian-based funds. The HML loadings are significantly less than zero for the Growth funds. The coefficients on the momentum factor are negative except for the Growth funds which have positive sensitivities to momentum. Eight of the eleven funds under study have coefficients on the MOM that are statistically different from zero at 5% significance level.

## 5. Conclusion

In conclusion, our findings can be summarized into three categories. First, we have found that the portfolio of Canadian-based open-ended mutual funds has lower performance measures

compared to the U.S funds in the twenty year period. Although the gap between them is marginal during the first period but it widens significantly over the second period. According to Morningstar's website, on average, the Canadian-based funds have a higher MER relative to the US funds. Hence we suspect that the difference between the performance of the US and the Canadian-based funds is mainly due to different management expense ratios.

Second, in view of our empirical findings, Large funds have the worst performance over the total period. Moreover, Medium funds achieve superior returns according to the Carhart, Sharpe and Fama-French models. However, both Unconditional and Conditional CAPM suggest Small capitalization funds are the better performers. Considering each of the two ten year sub-periods, we observe that the Large capitalization funds have performed the best compared to the others in the first sub-period while Small-cap funds showed the worst performance; however, the Small-cap funds have the best performance in the second sub-period.

Third, regarding the different investment strategies our findings suggest that Blend funds have had the worst performance in the total period since 1990 additionally, the Value funds performed better according to the Unconditional Jensen's alpha, Conditional CAPM, Sharpe and Carhart models. However, the Fama-French three-factor model suggests that Growth funds performed the best during this period. Considering each of the two ten year sub-periods, our findings show that during the first period, Blend funds performed better compared to other categories according to all the models except the Fama-French, which suggests Growth funds are the best performers. In the second period, the Sharpe ratio, the Unconditional Jensen's alpha and the conditional CAPM conclude that the Value funds have the best performance while the Carhart and the Fama-French suggest that the Growth funds are the better performers.

# APPENDICES

## Exhibit 1

**Large Value:** Large-Value funds focus on big companies that are less expensive or growing more slowly than other large-cap stocks.

**Large Blend:** Large-Blend funds have portfolios that are fairly representative of the overall stock market in size, Growth rates, and price. They tend to invest across the spectrum of U.S. industries and owing to their broad exposure; the funds returns are often similar to those of the S&P 500 Index.

**Large Growth:** Large-Growth funds invest in big companies that are projected to grow faster than other large-cap stocks. Most of these funds focus on companies in rapidly expanding industries.

**Mid-Cap Value:** Some mid-cap Value funds focus on medium-size companies while others land here because they own a mix of small-, mid-, and large-cap stocks. All look for stocks that are less expensive or growing more slowly than the market.

**Mid-Cap Blend:** The typical mid-cap Blend fund invests in stocks of various sizes and mixed characteristics, giving it a middle-of-the-road profile. Most shy away from high-priced Growth stocks, but are not so price-conscious that they land in Value territory.

**Mid-Cap Growth:** Some mid-cap Growth funds invest in stocks of all sizes, thus leading to a mid-cap profile, but others focus on midsize companies. Mid-cap Growth funds target firms that are projected to grow faster than other mid-cap stocks, therefore commanding relatively higher prices. Many of these stocks are found in the volatile technology, health-care, and services sectors.

**Small Value:** Small-Value funds invest in small-caps with valuations and Growth rates below other small-cap peers. They tend to invest in manufacturing, financial, and energy sectors.

**Small Blend**: Small-Blend funds favor firms at the smaller end of the market-capitalization range, and are flexible in the types of small caps they buy. Some aim to own an array of Value and Growth stocks while others employ a discipline that leads to holdings with valuations and Growth rates close to the small-cap averages.

**Small Growth**: Small-Growth funds focus on faster-growing companies whose shares are at the lower end of the market-capitalization range. These funds tend to favor companies in up-and-coming industries or young firms in their early Growth stages. As a result, the category tends to move in sync with the market for initial public offerings. Many of these funds invest in the technology, health-care, and services sectors. Because these businesses are fast growing and often richly valued, their stocks tend to be volatile.

**Table 1.**
**Mean, Standard Deviation and Sharpe Ratio**

The mean and the standard deviation of each fund is calculated based on excess return of each fund. The Sharpe ratio indicates the excess return per unit of risk and is defined as

$$Sharpe = \frac{E\left[ R_p - R_f \right]}{\sigma_p},$$

Where $R_p$ is the portfolio return, $R_f$ is the risk free rate of return and $\sigma_p$ is the standard deviation of the portfolio return.

| | U.S Managers | | | | | | | | | U.S | Canadian |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Large Cap | | | Medium Cap | | | Small Cap | | | Managers | Managers |
| | Growth | Blend | Value | Growth | Blend | Value | Growth | Blend | Value | Total | Total |
| **Panel A: 1990-2009** | | | | | | | | | | | |
| **Sharpe Ratio** | 0.10 | 0.11 | 0.11 | 0.10 | 0.13 | 0.14 | 0.10 | 0.14 | 0.13 | 0.12 | 0.08 |
| **Mean** | 0.47 | 0.44 | 0.43 | 0.56 | 0.58 | 0.61 | 0.60 | 0.66 | 0.63 | 0.55 | 0.33 |
| **Standard Deviation** | 4.69 | 4.02 | 3.81 | 5.58 | 4.46 | 4.23 | 6.04 | 4.80 | 4.74 | 4.48 | 4.24 |
| **Panel B: 1990-2000** | | | | | | | | | | | |
| **Sharpe Ratio** | 0.33 | 0.34 | 0.30 | 0.28 | 0.29 | 0.28 | 0.27 | 0.26 | 0.23 | 0.30 | 0.30 |
| **Mean** | 1.36 | 1.15 | 0.94 | 1.34 | 1.05 | 0.93 | 1.37 | 1.03 | 0.94 | 1.13 | 1.10 |
| **Standard Deviation** | 4.11 | 3.44 | 3.12 | 4.77 | 3.69 | 3.36 | 5.16 | 3.98 | 4.07 | 3.79 | 3.66 |
| **Panel C: 2000-2009** | | | | | | | | | | | |
| **Sharpe Ratio** | -0.08 | -0.06 | -0.01 | -0.03 | 0.02 | 0.06 | -0.02 | 0.06 | 0.06 | 0.00 | -0.09 |
| **Mean** | -0.41 | -0.27 | -0.06 | -0.22 | 0.11 | 0.29 | -0.17 | 0.30 | 0.31 | -0.01 | -0.44 |
| **Standard Deviation** | 5.07 | 4.42 | 4.35 | 6.20 | 5.07 | 4.94 | 6.73 | 5.48 | 5.32 | 5.03 | 4.63 |

**Table 2.**
**Unconditional Jensen's Alpha**

Jenson's alpha (1968) is defined as $R_{pt} - R_{ft} = \alpha_p + \beta_p(R_{mt} - R_{ft}) + u_{pt}$ ,where $R_{pt}$ is the monthly portfolio return of portfolio *p*, $R_{ft}$ is the risk free rate of return and $R_{mt}$ is the market portfolio return at time *t*. The estimated intercept is referred as the Jenson's alpha that measures the abnormal return of the portfolio. The estimated slope, $\beta_p = \text{cov}(R_p , R_m)/\sigma_m^2$, measures the sensitivity of the portfolio's return to market's return.

| | U.S Managers | | | | | | | | | U.S Managers Total | Canadian Managers Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Large Cap | | | Medium Cap | | | Small Cap | | | | |
| | Growth | Blend | Value | Growth | Blend | Value | Growth | Blend | Value | | |
| **Panel A: 1990-2009** | | | | | | | | | | | |
| α | -0.04 | 0.00 | 0.05 | -0.01 | 0.11 | 0.19 | 0.00 | 0.20 | 0.17 | 0.07 | -0.14 |
| **(t-Stat)** | (-0.58) | (-0.02) | (0.47) | (-0.07) | (1.12) | (1.47) | (0.00) | (1.28) | (1.09) | (0.93) | (-3.09) |
| β | 1.04 | 0.90 | 0.79 | 1.16 | 0.95 | 0.85 | 1.22 | 0.95 | 0.94 | 0.98 | 0.95 |
| **(t-Stat)** | (70.41) | (90.75) | (33.68) | (35.17) | (41.57) | (28.84) | (29.91) | (27.57) | (26.72) | (54.14) | (95.20) |
| **$R^2$** | 0.96 | 0.97 | 0.84 | 0.85 | 0.89 | 0.79 | 0.80 | 0.77 | 0.76 | 0.93 | 0.98 |
| **Panel B: 1990-2000** | | | | | | | | | | | |
| α | -0.02 | -0.02 | -0.07 | -0.17 | -0.12 | -0.10 | -0.17 | -0.11 | -0.23 | -0.11 | -0.14 |
| **(t-Stat)** | (-0.18) | (-0.54) | (-0.66) | (-0.95) | (-0.86) | (-0.64) | (-0.66) | (-0.49) | (-1.03) | (-0.95) | (-2.74) |
| β | 1.08 | 0.92 | 0.79 | 1.19 | 0.92 | 0.81 | 1.21 | 0.89 | 0.92 | 0.97 | 0.98 |
| **(t-Stat)** | (44.81) | (88.41) | (29.13) | (25.16) | (25.31) | (20.57) | (18.31) | (15.55) | (16.10) | (31.83) | (72.13) |
| **$R^2$** | 0.95 | 0.99 | 0.89 | 0.85 | 0.85 | 0.80 | 0.75 | 0.69 | 0.70 | 0.90 | 0.98 |
| **Panel C: 2000-2009** | | | | | | | | | | | |
| α | -0.12 | -0.02 | 0.16 | 0.11 | 0.38 | 0.54 | 0.18 | 0.59 | 0.58 | 0.27 | -0.18 |
| **(t-Stat)** | (-1.34) | (-0.28) | (0.88) | (0.46) | (2.61) | (2.55) | (0.68) | (2.74) | (2.65) | (2.40) | (-2.51) |
| β | 1.01 | 0.88 | 0.79 | 1.15 | 0.98 | 0.89 | 1.24 | 1.01 | 0.97 | 0.99 | 0.93 |
| **(t-Stat)** | (53.43) | (56.08) | (21.62) | (24.25) | (32.92) | (20.86) | (22.84) | (23.23) | (21.60) | (43.96) | (64.53) |
| **$R^2$** | 0.96 | 0.97 | 0.81 | 0.84 | 0.91 | 0.80 | 0.82 | 0.83 | 0.81 | 0.95 | 0.97 |

## Table 3.
## Conditional Jensen's Alpha

For the purpose of our study, the conditional beta is defined as

$$\beta_p = b_{0p} + b_{1p} Dy_{t-1} + b_{2p} TB_{t-1} + b_{3p} YS_{t-1}$$

Where $Dy_{t-1}$ is the one month lagged dividend yield, $TB_{t-1}$ is the one month lagged yield on a 90-days U.S treasury bill and $YS_{t-1}$ is the one month lagged yield spread between 10-year and 2-year U.S Treasury bill. By substituting the above equation in to the unconditional CAPM we have

$$R_{pt} = \alpha_{cp} + b_{0p} R_{mt} + b_{1p}\ Dy_{t-1} R_{mt}\ + b_{2p}\ TB_{t-1} R_{mt}\ + b_{3p}\ YS_{t-1} R_{mt}\ + u_{pt}$$

Where $\alpha_{cp}$ is the conditional alpha, $b_{0p}$ is the unconditional beta. The coefficients $b_{1p}$, $b_{2p}$ and $b_{3p}$ capture the variations in beta caused by dividend yield, short-term interest and yield spread, respectively. Please note that both $R_{pt}$ and $R_{mt}$ are the excess returns of portfolio *p* and market portfolio, respectively.

| | U.S Managers | | | | | | | | | U.S Managers | Canadian Managers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Large Cap | | | Medium Cap | | | Small Cap | | | | |
| | Growth | Blend | Value | Growth | Blend | Value | Growth | Blend | Value | Total | Total |
| **Panel A: 1990-2009** | | | | | | | | | | | |
| α | -0.08 | 0.01 | 0.10 | -0.06 | 0.16 | 0.28 | -0.04 | 0.26 | 0.22 | 0.09 | -0.14 |
| **(t-Stat)** | (-1.26) | (0.14) | (0.99) | (-0.40) | (1.70) | (2.32) | (-0.21) | (1.76) | (1.48) | (1.20) | (-3.21) |
| $b_{0p}$ | 0.83 | 0.75 | 0.61 | 1.15 | 0.98 | 0.88 | 1.16 | 0.92 | 0.84 | 0.90 | 0.79 |
| **(t-Stat)** | (10.05) | (13.50) | (4.84) | (6.01) | (7.74) | (5.59) | (4.82) | (4.74) | (4.21) | (8.65) | (13.63) |
| $b_{1p}$ | -4.51 | 3.50 | 9.25 | -8.28 | 8.23 | 12.35 | -5.38 | 16.50 | 15.39 | 5.23 | 2.18 |
| **(t-Stat)** | (-1.99) | (2.27) | (2.63) | (-1.56) | (2.34) | (2.84) | (-0.81) | (3.06) | (2.80) | (1.81) | (1.36) |
| $b_{2p}$ | 0.06 | 0.01 | -0.02 | 0.04 | -0.05 | -0.07 | 0.04 | -0.06 | -0.05 | -0.01 | 0.02 |
| **(t-Stat)** | (4.43) | (0.84) | (-1.11) | (1.44) | (-2.43) | (-2.96) | (1.01) | (-2.06) | (-1.52) | (-0.73) | (1.94) |
| $b_{3p}$ | 0.10 | 0.04 | 0.05 | 0.03 | -0.04 | -0.03 | 0.04 | -0.08 | -0.05 | 0.01 | 0.05 |
| **(t-Stat)** | (2.95) | (1.89) | (0.99) | (0.41) | (-0.71) | (-0.47) | (0.39) | (-1.06) | (-0.61) | (0.16) | (2.14) |
| $R^2$ | 0.96 | 0.98 | 0.86 | 0.86 | 0.90 | 0.83 | 0.80 | 0.80 | 0.78 | 0.93 | 0.98 |

**Table 3. Continue**

| | U.S Managers | | | | | | | | | U.S Managers Total | Canadian Managers Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Large Cap | | | Medium Cap | | | Small Cap | | | | |
| | Growth | Blend | Value | Growth | Blend | Value | Growth | Blend | Value | | |
| **Panel B: 1990-2000** | | | | | | | | | | | |
| $\alpha$ | -0.05 | -0.02 | -0.03 | -0.21 | -0.09 | -0.04 | -0.19 | -0.08 | -0.19 | -0.10 | -0.15 |
| **(t-Stat)** | (-0.51) | (-0.39) | (-0.35) | (-1.12) | (-0.62) | (-0.28) | (-0.72) | (-0.36) | (-0.86) | (-0.84) | (-2.78) |
| $b_{0p}$ | 0.67 | 1.00 | 1.13 | 0.68 | 1.25 | 1.38 | 0.82 | 0.92 | 1.27 | 1.01 | 0.93 |
| **(t-Stat)** | (3.08) | (11.14) | (4.91) | (1.58) | (3.81) | (4.06) | (1.35) | (1.79) | (2.46) | (3.69) | (7.60) |
| $b_{1p}$ | -12.96 | 9.89 | 37.88 | -20.68 | 29.13 | 52.55 | 1.13 | 44.43 | 43.32 | 20.52 | 3.20 |
| **(t-Stat)** | (-1.44) | (2.65) | (3.95) | (-1.15) | (2.14) | (3.72) | (0.04) | (2.09) | (2.03) | (1.80) | (0.63) |
| $b_{2p}$ | 0.11 | -0.05 | -0.18 | 0.16 | -0.15 | -0.26 | 0.07 | -0.14 | -0.20 | -0.07 | 0.00 |
| **(t-Stat)** | (1.83) | (-1.91) | (-2.82) | (1.31) | (-1.61) | (-2.78) | (0.40) | (-0.95) | (-1.40) | (-0.93) | (-0.12) |
| $b_{3p}$ | 0.20 | -0.06 | -0.32 | 0.23 | -0.29 | -0.51 | 0.05 | -0.37 | -0.35 | -0.16 | 0.01 |
| **(t-Stat)** | (2.02) | (-1.40) | (-2.97) | (1.13) | (-1.86) | (-3.18) | (0.19) | (-1.56) | (-1.44) | (-1.22) | (0.20) |
| $R^2$ | 0.95 | 0.99 | 0.90 | 0.86 | 0.86 | 0.82 | 0.76 | 0.71 | 0.72 | 0.91 | 0.98 |
| **Panel C: 2000-2009** | | | | | | | | | | | |
| $\alpha$ | -0.14 | -0.05 | 0.09 | 0.11 | 0.36 | 0.45 | 0.20 | 0.58 | 0.57 | 0.24 | -0.19 |
| **(t-Stat)** | (-1.56) | (-0.73) | (0.55) | (0.49) | (2.61) | (2.44) | (0.75) | (2.79) | (2.67) | (2.17) | (-2.75) |
| $b_{0p}$ | 1.18 | 1.14 | 1.32 | 1.23 | 1.17 | 1.74 | 1.09 | 1.16 | 1.09 | 1.24 | 1.03 |
| **(t-Stat)** | (3.89) | (4.65) | (2.43) | (1.56) | (2.55) | (2.81) | (1.19) | (1.66) | (1.50) | (3.31) | (4.33) |
| $b_{1p}$ | -8.69 | -3.45 | -5.18 | -7.32 | 2.97 | -4.99 | -2.96 | 10.32 | 9.79 | -1.06 | -2.25 |
| **(t-Stat)** | (-1.83) | (-0.90) | (-0.61) | (-0.59) | (0.41) | (-0.51) | (-0.21) | (0.94) | (0.86) | (-0.18) | (-0.60) |
| $b_{2p}$ | 0.00 | -0.06 | -0.14 | 0.04 | -0.08 | -0.21 | 0.07 | -0.09 | -0.09 | -0.06 | -0.03 |
| **(t-Stat)** | (0.09) | (-1.62) | (-1.71) | (0.35) | (-1.15) | (-2.24) | (0.50) | (-0.86) | (-0.78) | (-1.09) | (-0.75) |
| $b_{3p}$ | 0.00 | -0.03 | -0.07 | -0.02 | -0.05 | -0.18 | 0.03 | -0.10 | -0.09 | -0.06 | 0.00 |
| **(t-Stat)** | (0.00) | (-0.52) | (-0.45) | (-0.09) | (-0.38) | (-1.06) | (0.13) | (-0.55) | (-0.45) | (-0.56) | (0.02) |
| $R^2$ | 0.97 | 0.97 | 0.86 | 0.86 | 0.93 | 0.86 | 0.83 | 0.85 | 0.83 | 0.95 | 0.98 |

**Table 4.**
**Fama-French**

The sensitivity factors of this model are estimated by running the following regression $R_{pt} - R_{ft} = \alpha_p + \beta_p(R_{mt} - R_{ft}) + s_p SMB + h_p HML + u_{pt}$, where $R_{pt}$, $R_{ft}$, $R_{mt}$ and $\beta_p = \text{cov}(R_p, R_m)/\sigma_m^2$, SMB is the expected premium of small size stocks, HML is the expected premium of stocks with high book-to-market ratios. $s_p$ and $h_p$ are the sensitivity measures of a security with respect to SMB and HML, respectively.

| | U.S Managers | | | | | | | | | U.S Managers | Canadian Managers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Large Cap | | | Medium Cap | | | Small Cap | | | | |
| | Growth | Blend | Value | Growth | Blend | Value | Growth | Blend | Value | Total | Total |
| **Panel A: 1990-2009** | | | | | | | | | | | |
| α | 0.05 | -0.04 | -0.12 | 0.07 | -0.03 | -0.05 | 0.05 | -0.02 | -0.07 | -0.03 | -0.14 |
| **(t-Stat)** | (0.77) | (-1.12) | (-1.45) | (0.47) | (-0.35) | (-0.53) | (0.31) | (-0.19) | (-0.81) | (-0.52) | (-3.12) |
| β | 1.01 | 0.92 | 0.86 | 1.11 | 0.97 | 0.92 | 1.15 | 0.97 | 0.97 | 0.99 | 0.95 |
| **(t-Stat)** | (73.37) | (101.41) | (44.15) | (34.26) | (56.26) | (43.07) | (31.89) | (46.81) | (47.16) | (69.32) | (91.18) |
| ***s*** | -0.03 | -0.04 | 0.02 | 0.17 | 0.27 | 0.25 | 0.40 | 0.52 | 0.52 | 0.24 | -0.05 |
| **(t-Stat)** | (-1.53) | (-3.83) | (1.01) | (4.17) | (12.46) | (9.32) | (8.80) | (19.83) | (19.76) | (13.44) | (-3.92) |
| ***h*** | -0.15 | 0.07 | 0.31 | -0.12 | 0.27 | 0.45 | -0.06 | 0.42 | 0.47 | 0.19 | 0.01 |
| **(t-Stat)** | (-7.92) | (5.79) | (11.38) | (-2.76) | (11.30) | (15.26) | (-1.14) | (14.62) | (16.50) | (9.81) | (1.04) |
| **$R^2$** | 0.97 | 0.98 | 0.90 | 0.87 | 0.94 | 0.90 | 0.86 | 0.93 | 0.93 | 0.96 | 0.98 |
| **Panel B: 1990-2000** | | | | | | | | | | | |
| α | 0.09 | -0.06 | -0.22 | 0.02 | -0.14 | -0.23 | 0.06 | -0.13 | -0.28 | -0.07 | -0.16 |
| **(t-Stat)** | (1.35) | (-1.90) | (-3.14) | (0.15) | (-1.78) | (-2.49) | (0.55) | (-1.67) | (-2.78) | (-1.23) | (-2.78) |
| β | 0.99 | 0.96 | 0.92 | 1.03 | 0.94 | 0.93 | 1.02 | 0.92 | 0.97 | 0.96 | 0.99 |
| **(t-Stat)** | (47.91) | (99.99) | (44.32) | (34.61) | (40.45) | (33.54) | (31.38) | (39.83) | (32.81) | (62.54) | (61.63) |
| ***s*** | 0.09 | -0.05 | 0.01 | 0.42 | 0.42 | 0.35 | 0.71 | 0.74 | 0.70 | 0.37 | -0.01 |
| **(t-Stat)** | (4.09) | (-4.82) | (0.64) | (12.59) | (15.91) | (11.19) | (19.33) | (28.44) | (20.94) | (21.03) | (-0.29) |
| ***h*** | -0.21 | 0.07 | 0.34 | -0.27 | 0.19 | 0.42 | -0.26 | 0.31 | 0.35 | 0.09 | 0.02 |
| **(t-Stat)** | (-7.46) | (5.22) | (11.80) | (-6.50) | (5.89) | (11.00) | (-5.74) | (9.69) | (8.74) | (4.20) | (0.77) |

**Table 4. Continue**

| | U.S Managers | | | | | | | | | U.S Managers Total | Canadian Managers Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Large Cap | | | Medium Cap | | | Small Cap | | | | |
| | Growth | Blend | Value | Growth | Blend | Value | Growth | Blend | Value | | |
| $R^2$ | 0.97 | 0.99 | 0.95 | 0.96 | 0.96 | 0.93 | 0.96 | 0.96 | 0.94 | 0.98 | 0.98 |
| **Panel C: 2000-2009** | | | | | | | | | | | |
| $\alpha$ | 0.00 | -0.10 | -0.12 | 0.19 | 0.11 | 0.11 | 0.17 | 0.15 | 0.09 | 0.07 | -0.20 |
| **(t-Stat)** | (0.00) | (-1.40) | (-0.79) | (0.79) | (0.95) | (0.74) | (0.65) | (1.12) | (0.73) | (0.77) | (-3.04) |
| $\beta$ | 1.00 | 0.90 | 0.82 | 1.13 | 0.98 | 0.92 | 1.19 | 1.00 | 0.96 | 1.00 | 0.92 |
| **(t-Stat)** | (58.86) | (63.84) | (26.90) | (23.41) | (43.51) | (29.33) | (22.66) | (36.54) | (39.41) | (52.18) | (64.35) |
| ***s*** | -0.09 | -0.03 | 0.04 | 0.03 | 0.19 | 0.20 | 0.23 | 0.40 | 0.42 | 0.16 | -0.07 |
| **(t-Stat)** | (-3.94) | (-1.74) | (0.93) | (0.50) | (6.53) | (4.84) | (3.35) | (11.31) | (13.19) | (6.88) | (-3.88) |
| ***h*** | -0.13 | 0.09 | 0.31 | -0.10 | 0.29 | 0.46 | -0.02 | 0.45 | 0.51 | 0.21 | 0.03 |
| **(t-Stat)** | (-5.43) | (4.62) | (7.27) | (-1.41) | (9.16) | (10.46) | (-0.24) | (11.62) | (14.98) | (8.52) | (1.58) |
| $R^2$ | 0.97 | 0.97 | 0.87 | 0.85 | 0.95 | 0.90 | 0.84 | 0.94 | 0.95 | 0.97 | 0.98 |

**Table 5.**
**Carhart**

The model is defined as

$$R_{pt} - R_{ft} = \alpha_p + \beta_p(R_{mt} - R_{ft}) + s_p SMB + h_p HML + m_p MOM + u_{pt}$$

Where $R_{pt}$, $R_{ft}$, $R_{mt}$ ,SMB, HML, $\beta_p = \text{cov}(R_p , R_m)/\sigma_m^2$ , $s_p$, $h_p$ are the same as previously stated and MOM is the monthly momentum factor which is the average return on the two portfolios with prior high returns minus the average return on the two portfolios with prior low returns and $m_p$ is the sensitivity factor of a security with respect to MOM.

| | Open Ended U.S Mutual Funds | | | | | | | | | U.S Managers Total | Canadian Managers Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Large Cap | | | Medium Cap | | | Small Cap | | | | |
| | Growth | Blend | Value | Growth | Blend | Value | Growth | Blend | Value | | |
| **Panel A: 1990-2009** | | | | | | | | | | | |
| α | -0.01 | -0.02 | -0.04 | -0.08 | 0.01 | 0.03 | -0.09 | -0.03 | -0.06 | -0.03 | -0.14 |
| **(t-Stat)** | (-0.19) | (-0.45) | (-0.47) | (-0.61) | (0.08) | (0.40) | (-0.63) | (-0.29) | (-0.63) | (-0.52) | (-3.12) |
| β | 1.03 | 0.91 | 0.82 | 1.17 | 0.96 | 0.88 | 1.21 | 0.98 | 0.96 | 0.99 | 0.95 |
| **(t-Stat)** | (77.33) | (99.29) | (44.12) | (37.83) | (53.75) | (42.38) | (34.29) | (44.91) | (44.83) | (69.32) | (91.18) |
| ***s*** | -0.01 | -0.05 | 0.01 | 0.20 | 0.27 | 0.23 | 0.43 | 0.53 | 0.51 | 0.24 | -0.05 |
| **(t-Stat)** | (-0.92) | (-4.43) | (0.32) | (5.34) | (12.21) | (9.20) | (10.03) | (19.73) | (19.50) | (13.44) | (-3.92) |
| ***h*** | -0.14 | 0.07 | 0.28 | -0.08 | 0.26 | 0.43 | -0.02 | 0.43 | 0.47 | 0.19 | 0.01 |
| **(t-Stat)** | (-7.56) | (5.33) | (11.31) | (-2.01) | (10.94) | (15.31) | (-0.37) | (14.54) | (16.18) | (9.81) | (1.04) |
| ***m*** | 0.06 | -0.03 | -0.09 | 0.16 | -0.04 | -0.09 | 0.16 | 0.01 | -0.02 | 0.01 | -0.01 |
| **(t-Stat)** | (6.01) | (-4.13) | (-6.49) | (6.69) | (-2.55) | (-5.68) | (5.71) | (0.64) | (-0.98) | (1.23) | (-1.83) |
| **$R^2$** | 0.97 | 0.98 | 0.92 | 0.89 | 0.94 | 0.91 | 0.88 | 0.93 | 0.93 | 0.96 | 0.98 |
| **Panel B: 1990-2000** | | | | | | | | | | | |
| α | -0.02 | -0.02 | -0.06 | -0.13 | -0.07 | -0.05 | -0.06 | -0.02 | -0.17 | -0.07 | -0.16 |
| **(t-Stat)** | (-0.30) | (-0.72) | (-1.06) | (-1.35) | (-0.87) | (-0.63) | (-0.54) | (-0.30) | (-1.71) | (-1.23) | (-2.78) |
| β | 0.99 | 0.96 | 0.92 | 1.04 | 0.94 | 0.92 | 1.03 | 0.91 | 0.97 | 0.96 | 0.99 |
| **(t-Stat)** | (54) | (106) | (59) | (38) | (41) | (40) | (33) | (43) | (34) | (63) | (62) |
| ***s*** | 0.12 | -0.06 | -0.02 | 0.45 | 0.40 | 0.31 | 0.73 | 0.72 | 0.68 | 0.37 | -0.01 |
| **(t-Stat)** | (5.59) | (-5.73) | (-0.94) | (14.48) | (15.58) | (11.93) | (20.57) | (29.51) | (20.88) | (21.03) | (-0.29) |

**Table 5. Continue**

| | U.S Managers | | | | | | | | | U.S Managers Total | Canadian Managers Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Large Cap | | | Medium Cap | | | Small Cap | | | | |
| | Growth | Blend | Value | Growth | Blend | Value | Growth | Blend | Value | | |
| ***h*** | -0.17 | 0.05 | 0.28 | -0.21 | 0.16 | 0.35 | -0.21 | 0.27 | 0.31 | 0.09 | 0.02 |
| **(t-Stat)** | (-6.46) | (4.21) | (12.52) | (-5.44) | (5.00) | (10.67) | (-4.77) | (8.78) | (7.78) | (4.20) | (0.77) |
| ***m*** | 0.10 | -0.04 | -0.15 | 0.13 | -0.06 | -0.17 | 0.11 | -0.10 | -0.10 | -0.03 | 0.01 |
| **(t-Stat)** | (5.57) | (-3.77) | (-9.45) | (4.79) | (-2.76) | (-7.07) | (3.44) | (-4.52) | (-3.34) | (-1.85) | (0.35) |
| **$R^2$** | 0.98 | 0.99 | 0.97 | 0.97 | 0.96 | 0.95 | 0.96 | 0.97 | 0.95 | 0.98 | 0.98 |
| | | | | | | | | | | | |
| **Panel C: 2000-2009** | | | | | | | | | | | |
| $\alpha$ | 0.00 | -0.10 | -0.12 | 0.19 | 0.11 | 0.12 | 0.17 | 0.15 | 0.09 | 0.07 | -0.20 |
| **(t-Stat)** | (-0.01) | (-1.50) | (-0.85) | (0.88) | (0.97) | (0.79) | (0.71) | (1.13) | (0.73) | (0.77) | (-3.04) |
| $\beta$ | 1.04 | 0.87 | 0.76 | 1.25 | 0.96 | 0.86 | 1.31 | 1.02 | 0.95 | 1.00 | 0.92 |
| **(t-Stat)** | (58.97) | (60.32) | (24.64) | (26.32) | (39.06) | (26.55) | (24.94) | (34.19) | (35.29) | (52.18) | (64.35) |
| **SMB** | -0.08 | -0.04 | 0.03 | 0.05 | 0.19 | 0.19 | 0.25 | 0.41 | 0.42 | 0.16 | -0.07 |
| **(t-Stat)** | (-4.02) | (-2.08) | (0.79) | (0.83) | (6.52) | (4.95) | (3.97) | (11.50) | (13.11) | (6.88) | (-3.88) |
| **HML** | -0.13 | 0.09 | 0.31 | -0.09 | 0.29 | 0.46 | -0.01 | 0.45 | 0.51 | 0.21 | 0.03 |
| **(t-Stat)** | (-5.78) | (4.92) | (7.92) | (-1.53) | (9.27) | (11.08) | (-0.20) | (11.76) | (14.93) | (8.52) | (1.58) |
| **MOM** | 0.05 | -0.04 | -0.10 | 0.19 | -0.04 | -0.09 | 0.19 | 0.04 | -0.01 | 0.02 | -0.03 |
| **(t-Stat)** | (4.20) | (-4.26) | (-4.79) | (5.59) | (-2.05) | (-3.89) | (5.13) | (1.82) | (-0.63) | (1.50) | (-3.17) |
| **$R^2$** | 0.98 | 0.98 | 0.90 | 0.88 | 0.95 | 0.91 | 0.88 | 0.94 | 0.95 | 0.97 | 0.98 |

## References

Black, F., and Scholes, M., 1974. The Effects Of Dividend Yield And Dividend Policy On Common Stock Prices And Returns. *Journal of Financial Economics 1***,** 1-22.

Fama, E. F., and French, K. R. (1996). Multifactor Explanations of Asset Pricing Anomalies. *Journal of Finance* , 55-84.

Ferson, W. E., and Schadt, R. W. (1996). Measuring Fund Strategy and Performance in Changing Economic Conditions. *Journal of Finance* , 425-459.

Jensen, M. C. (1968). The Performance of Mutual Funds in the Period 1945-1964. *Journal of Finance* , 389-416.

Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. *Journal of Finance* , 57-81.

Sharpe, W. F. (1966). Mutual Fund Performance. *Journal of Business 39* , 119-138