Determinants of Convexity in the Flow-Performance Relationship: A Study of Pakistani Mutual Funds

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ABSTRACT

Purpose: This paper aims to study the potential sources of convexity in the flow-performance relationship curve in the Asian region.

Design/Methodology/Approach: The sample for this study includes 75 mutual funds from three broader investment categories: stock funds, balanced funds, and asset allocation funds. The data is collected from the financial reports of the respective funds from 2011 to 2020. The study employs the ordinary least square method on unbalanced panel data.

Findings: The findings show that the fund flows are positively associated with fund performance in the Pakistani mutual fund market. The result also confirmed that the shape of the relationship is convex. The fund size and marketing expenditures are positively associated with convexity. However, fund age does not affect the convexity. The Result also confirmed that fund rating is not an appropriate proxy for fund size.

Practical Implication- In period of low performance mutual fund management can retain their investors by increasing their marketing expenditures and fund size.

Originality/Value: This paper fulfills an identified need to study the sources behind non-linear flow-performance relationship curve in the Asian region. This study also aims to resolve the conflict in literature relating to the fund size on the convexity of the flow performance relationship.

Introduction
Mutual fund flow and its relationship with performance remain the hot debate in the finance literature. The broad agreement is that the flow-performance relationship curve is convex. Chavelier & Elision (1997) and Siri & Tuffano (1998) were the first who observe the non-linear relationship between fund flow and performance. They found that good-performing funds get a substantial inflow in the subsequent period, whereas poor-performing funds suffer from minimal outflow in the subsequent period. But unfortunately, very few researchers paid attention to the sources behind this convex relationship. Only a few studies have identified potential sources behind this convexity in the flow-performance relationship. But some of the results of earlier studies are conflicting in nature. Siri & Tuffano (1998) and Huang et al. (2007) argued that fund size is an essential determinant of convexity in the flow-performance relationship curve. They argued that fund size is positively related to the convexity of the flow-performance relationship.

On the contrary, Jun et al. (2014) examined the flow performance relationship in the Chinese mutual fund market. They found no significant impact of fund size on the convexity of the flow-performance relationship. There is inconsistency in the literature relating to the size of mutual funds, which needs to be investigated further. So this study aims to resolve this inconsistency in literature by reexamining the role of fund size.

Besides this, most of the earlier studies have been done in developed countries. Ferreira et al. (2012) argued that we could not apply the research implications of the US to other regions of the world because of different investor sophistication levels. Siri & Tufano (1998) discussed the role of search cost and argued funds that spend substantially on marketing experience a more non-linear flow performance relationship. Marketing diverts the investors' attention from performance to other fund services and makes investors less sensitive about performance. So, according to them, high marketing positively impacts the flow-performance relationship.

Similarly, Huang et al. (2007) argued that high marketing reduces the participation cost for investors and makes investors less sensitive to performance. These high marketing expenditures make the flow-performance relationship curve convex. Navone et al. (2012) also argued that fund marketing expenditures are positively associated with the non-linearity of the flow-performance relationship curve. So, according to these authors, high marketing positively relates to the flow-performance relationship. Similarly, Chevalier & Elision (1997) and Huang et al. (2007) discussed fund age that is highly associated with the convexity of the flow-performance relationship. But unfortunately, these findings are only limited to developed countries. Thus, it is essential to re-interrogate the effect of fund marketing and fund age on the convexity of the flow-performance relationship in some developing countries. We hope that our findings will provide further empirical support to Chevalier & Elision (1997), Siri & Tuffano (1998), Huang et al. (2007), and Navone et al. (2012).

The paper is arranged as follows. The literature review is presented in the second section. The third section delves into the data and technique. Section four presents the study's findings, while section five concludes the study.

Literature Review
Chevalier and Elision (1997) were the first who tried to explore the reason behind this convexity. They selected a sample of 393 mutual funds obtained directly from Morningstar. They divided the funds into two categories: young and old. The Mutual fund between 2 and 5 years was categorized as a young fund, whereas funds with more than six years of age were classified as old funds. Their setting allowed them to study the associations between fund flow and performance in younger and older funds. They found a significant convex shape association between fund flow and performance. The fund increases its riskiness due to this convex
relationship. They found that fund manager increases risk in the fourth quarter to attain higher returns. They employed the semi-parametric model and found that the non-linearity in the relationship is associated with the fund's age. They found that fund flows in younger funds are more sensitive to performance. Investors in older funds are less sensitive to performance and stay with funds even in a period of low performance. It results in a non-linear flow-performance relationship. Howell (2001) argued that younger funds have more failure risk than older funds. This makes investors less sensitive about performance and wants to stick with older funds even in low performance.

Huang et al. (2007) present a coherent model that sheds light on the sensitivity of fund flows to past performance. They obtained the data from the CRSP database and found an asymmetric flow-performance relationship. While investigating the role of age on the sensitivity of fund flows, they also found a positive relationship. They argued that fund age is highly associated with the shape of the relationship. Navone et al. (2012) argued that older age funds are more visible to investors than younger age funds. They also found that fund age is positively associated with the non-linearity of the flow-performance relationship curve.

Sirri and Tuffano's (1998) contribution to this strand of literature is phenomenal. They put effort to shed light on the reasons behind this asymmetric flow-performance relationship. They explore several aspects behind this convex flow-performance relationship, and fund size is one of them. They selected 690 US equity funds and obtained this data from the investment company data institute (ICDI). They studied 20 years' time period from 1971 to 1990. They applied piecewise linear regression and measured relative fund returns. They thought that investors readily accessed rudimentary performance measures. Most of their analysis used crude consumer returns and risk measures. They argued that larger funds received a more significant flow and flow-performance relationship that is more pronounced in these funds. Larger funds are highly visible and more famous as compared to smaller funds. Larger funds offer higher services to their investors, diverting investors' attention from fund performance to these services.

Huang et al. (2007) examined the actively managed funds in three categories, namely aggressive growth, moderate growth, and fixed income. They classified funds into low, medium, and high performance and measured performance using a four-factor alpha model. They showed that information barriers are the important reason behind this convexity. Funds that have a lower information barrier observed a less convex flow-performance relationship. They argued that funds that are larger in size are usually highly visible and decrease the information barrier. Investor in larger funds bears no information cost, which increases in the case of smaller funds. When investors consider the information cost, they want to stick with larger funds even in low performance. On the contrary, Jun et al. (2014) investigate the flow-performance relationship in the Chinese mutual fund market. They used star funds as the proxy of fund size. Star funds usually have highly experienced management, so they become stars. They argued that star funds are generally more significant in size, so they can be used as a proxy of fund size. They employed the PLR regression estimation technique and found no significant impact of rating on the sensitivity of the flow-performance relationship.

Marketing also plays a key role in the investment decisions of the investors. Spitz (1970) was the first that highlight the role of sales and marketing in investing decisions. He studied the relationship between net flows and net performance in load and no-load funds. They studied 20 mutual funds from the period 1960 to 1967. Load funds were those that charge fees from the investors, and no-load funds do not charge fees. He applied a simple correlation test on current flow and current performance and found no correlation between them. He again took the first difference of both variables and found the same result. However, when he applied the multiple correlation test, he found three "no-load" funds were correlated, and one "load" fund was
correlated. When he applied multiple correlations on current flow and current disposable income to lagged net performance, he found four "no-load" funds were correlated, and two "load" funds were correlated. His findings showed that there are weak associations between fund flows and performance in load funds. This indicates that performance does not matter for investors in load funds, whereas in no-load funds, performance matters to some extent. A rational explanation for this behavior is that load funds sell their shares through sales organizations or underwriters and charge commission for selling them. Due to their marketing campaign and advice, people invest in those funds. Salesmen are prone to pushing certain funds and swaying potential investors' decisions. He concludes that fund sales and marketing influence the investor behavior more toward mutual fund investments rather than sole performance. Cupon et al. (1996) also argued that investors in load funds are usually less informed about their funds as compared to those who made the purchase directly from respective funds.

Sirri and Tuffano (1998) argued that mutual fund investors chase returns and flock to funds with the highest recent return while failing to leave the poor performance. This makes the flow-performance relationship convex. According to them, differential search cost is an essential reason behind this non-linearity. They argued that car sales do not solely depend upon the model and manufacturing. Some other factors also play an important role, such as brand name, advertisement, and distribution ability. Economists acknowledged that consumer purchasing decisions, whether for a car or for a fund, are complicated by the phenomena of costly search. Mutual funds that belong to larger families and get more media considerations usually grow more quickly as compared to others. The flow-performance relationship is more visible in funds with greater marketing efforts. This substantial marketing reduces the search cost borne by the investors. However, the investor faces this search cost in funds with less marketing effort. They measured fund marketing effort by using a proxy of fund expense ratio. They assumed that higher expenses are usually charged for higher fund marketing. They found a positive coefficient on the interaction term (high total fees * low performance). This indicated that marketing effort makes investors less sensitive to performance. Thus, higher fee funds are less performance-sensitive due to their higher marketing efforts.

Similarly, Huang et al. (2007) discussed the role of participation cost in explaining the convexity of the flow-performance relationship. They showed funds that reduce their participation cost make investors less sensitive to performance, and only a medium level of performance is sufficient to attract new inflows. They argued that investors faced participation costs while searching for investment companies and funds that reduced their participation cost, making investors less sensitive about performance. Investors bear two types of participation costs: (1) Information cost and (2) transaction cost. Funds that spend a substantial amount on marketing can reduce the information cost. For example, a high-profile, well-known fund (such as Fidelity Magellan) has no information barrier, and the most investor wants to stay in the fund even with mediocre performance. On the other hand, a small no-name fund has a very high information barrier, especially for unsophisticated investors. Thus, investors in these funds are more performance-sensitive. Funds can reduce participation costs through sales and marketing. They found that funds with more significant marketing and distribution efforts enjoy greater investor recognition, and lower performances are required for attracting new investors.

On the contrary, funds that spend the minimum on marketing require higher performance to attract new investors. Korkeamaki et al. (2007) examined the impact of advertisement on the mutual fund flows in the Finnish mutual market. Their unique data set allowed them to measure advertisement in monetary spending instead of using expense ratio. They found that neither past performance nor advertisement alone produced increased cash flows. However, they both together significantly affect the cash flows. Fund families that spend proportionally more on advertising receive higher cash flows and make investors less sensitive about past performance.
Gallaher (2005) examined the effect of mutual fund family’s strategic decisions on investor flow into the family. He found that mutual fund cash inflows are a function of fund performance. He also observed that this relationship is convex and increasing for top-performing fund complexes. He reported a positive association between fund family flow and its relative levels of advertisement expenditure. Fund flows to mutual fund families are highly associated with load and 12b-1 fees. He showed that strategic fund decisions significantly affect the investor’s flows to the fund family besides portfolio management decisions. Navone et al. (2012) also examined the role of marketing on the sensitivity of the flow-performance relationship. To measure the impact of marketing expenditures, they decomposed fees into two groups: marketing and non-marketing. They obtained data from the CRSP database from period 1992 to 2005. They also found that marketing expenditures are positively associated to the non linearity of the flow-performance relationship.

Data
Data is obtained directly from the financial statements of the respective funds covering the period from 2011 to 2020. The geographical location covered in this study is Pakistan. There are three main reasons for selecting this geographical location. First, many studies have been done in European countries, but our knowledge about this area is very limited in Asian countries, which needs to be investigated. Secondly, Pakistani mutual funds have shown tremendous growth in the last two decades. It was only 0.31 billion of net assets in 2001, which are 662 billion in 2020 (ICI factsheet, 2020). A lot of Pakistani mutual funds are in the top 100 mutual funds. In 2013, out of 42 Asian mutual funds, 15 were from Pakistan in the list of the world’s top 100 best performing funds (Thomson Reuters Lipper, 2013). Thirdly, the Pakistani equity market is interrelated with many emerging markets, particularly Nepal, India, Sri Lanka, and Bangladesh (Kapoor et al. 2013; Narayan et al., 2004). So, this can prove the best representative of emerging countries in Asia. The sample comprises 75 mutual funds divided into three broader fund categories: equity fund, asset allocation fund, and balanced fund. To evade the impact of outliers, we have deleted funds that have aged less than one year. We have also deleted funds whose asset under management is less than 100 million and more than 10000 million in our sample.

Empirical Methodology
Several performance measures have been used by academic researchers. But most of the studies used relative performance measures by using raw returns. Patel et al. (1994) argued that investors focus more on raw returns as compared to risk-adjusted returns and care more about ranking rather than absolute performance. We also used relative performance measures in our study. To measure fund performance ($R_{Ki,t-1}$), we computed percentile using raw return. Percentile return represents fund performance relative to other funds, ranging from 0 to 1. One represents the top-performing fund, and zero represents the poor-performing fund. We also compute the square performance return measure ($SQRK_{Ki,t-1}$) by taking the square of the percentile return ($R_{Ki,t-1}$).

In the literature, fund flows are measured in a similar manner. Sirri & Tuffano (1998) defined fund flow as a net change in total net assets adjusted for fund returns over a year. Many researchers have adopted the method of Sirri & Tuffano (1998) to date. It is estimated as follows:

\[ \text{Flow}_{i,t} = \text{NTA}_{i,t} - \text{NTA}_{i,t-1} \times (1 + R_{i,t}) \]  

Equation one measures a net capital flow and is defined as a rupees change in net total assets net of realized return. The left-hand side of equation one represents net flow to fund $i$ in year $t$. $\text{NTA}_{i,t}$ is the net total assets of fund $i$ in year $t$. $\text{NTA}_{i,t-1}$ is the previous year net total asset of fund $i$. $R_{i,t}$ is an annual return of fund $i$ in year $t$. The second measure is percentage flow, which is the net flow measured in equation one divided by the net total asset at the end of the year $t-1$.

\[ \text{Flow}_{i,t} \% = \frac{\text{Flow}_{i,t}}{\text{NTA}_{i,t-1}} \]
Flowi,t % is the percentage flow for the ith fund in year t, NTA_{i,t-1} is net total asset of fund i in previous year (t - 1). Ri,t is the return of fund i in year t. We study the sources of the flow-performance relationship with two main specifications. In first specification we adopt a linear model:

\[
\text{Flow}_{i,t} = a_i + \beta_1 (\text{High}) + \beta_2 (\text{High}_R K_{i,t-1} \times \text{Dmv}_C_v x_{k,i,t-1}) + \beta_3 (\text{Low}_R K_{i,t-1} \times \text{DMV}_C_v x_{k,i,t-1}) + \beta_4 X_{i,t-1} + \mu_{i,t} \quad (\text{III})
\]

Where high and low are dummy variables, High (Low) takes the value 1 if the ith fund is ranked in the top (bottom) 50 percent based on its performance in the year (t-1) and 0 otherwise. The term Dmv is the dummy variable it includes: Older is dummy variable that takes the value 1 if the fund age exceeded more than 5 years; otherwise, it takes 0, Big is a dummy variable that takes the value 1 if the fund asset under management NTA (as a proxy for fund size) is above than median and 0 otherwise, High* is dummy variable that takes the value 1 if the fund rating (as a proxy for fund size) is above the median and 0 otherwise. Large is a dummy variable that takes the value 1 if the fund marketing is above the median and 0 otherwise. The term Cvx includes fund age, fund size, Fund rating (as a proxy for fund size), and marketing expenditure. Fund marketing expenditures are measured as expense ratio plus 1/7th of the front-end load ratio (Sirri and Tuffano, 1998 and Huang et al., 2007). Our primary interest is in the coefficient of term (Low_RK_{i,t-1} \times \text{DMV}_C_v x_{k,i,t-1}). Suppose the coefficient is found to be positive and significant. In that case, it shows that funds flow is less sensitive to performance, and Cvx factor is an essential determinant of convexity in the flow performance relationship. We adopt the quadratic regression model in the second specification by following Navone et al., 2012. This model introduces the square performance term in the regression model. Then we interact Cvx factor with square performance rank to capture the effect of Cvx on the sensitivity of the flow-performance relationship curve. It is estimated as follows:

\[
\text{Flow}_{i,t} = a_i + \beta_1 (R K_{i,t-1} \times C_v x_{k,i,t-1}) + \beta_2 (S Q R K_{i,t-1} \times C_v x_{k,i,t-1}) + \beta_3 X_{i,t-1} + \mu_{i,t} \quad (\text{IV})
\]

Here we are interested in the coefficient of the term (SQRK_{i,t-1} \times Cvx_{k,i,t-1}), which measures the sensitivity of fund flows with fund age, fund size, fund rating, and fund marketing expenditures. If the coefficient is found positive and significant, then it shows Cvx factor is an essential determinant of convexity in the flow-performance relationship.

**Result & Discussion**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficients (1)</th>
<th>Coefficients (2)</th>
<th>Coefficients (3)</th>
<th>Coefficients (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rk_{i,t-1} \times High_{i,t-1}</td>
<td>3.12 *</td>
<td>(0.94)(3.29)</td>
<td>1415</td>
<td>(567)(2.49)</td>
</tr>
<tr>
<td>Rk_{i,t-1} \times Low_{i,t-1}</td>
<td>0.89**</td>
<td>(0.53)(1.67)</td>
<td>1154*</td>
<td>(694)(1.66)</td>
</tr>
<tr>
<td>\beta 1 - \beta 2 = 0 (Wald test)</td>
<td>2.23</td>
<td>(0.78)(2.85)</td>
<td>261</td>
<td>(815)(0.31)</td>
</tr>
</tbody>
</table>
Table 4.1 exhibits the relationship between fund flow and performance. We interact fund performance measure $R_{k_{i,t-1}}$ with dummy variable high and low. The interacting variable $R_{k_{i,t-1}} \ast \text{High}$ measures sensitivity of flow to fund performance in a good performing fund. Similarly, the interacting variable $R_{k_{i,t-1}} \ast \text{Low}$ measures flow sensitivity to fund performance in poor-performing funds. We can clearly see that the investors in poor-performing funds are less sensitive to performance. One percent increase in return increases net flow to 0.89 percent, which is significant at a five percent probability level. However, investors in good-performing funds care more about performance. One percent increase in return increases net flow to 3.12 percent. But here, our main concern is in the difference between the coefficients ($\beta_1 - \beta_2$) of interacting variables. So, this study applied the Wald test and tested the proposition $\beta_1 - \beta_2 = 0$. The Wald test rejects the proposition $\beta_1 - \beta_2 = 0$. It shows that investors do not respond to fund performance linearly for good and poor-performing funds. The difference between the coefficients $\beta_1$ and $\beta_2$ is positive. This implies that investors in good-performing funds are more performance-sensitive, whereas investors in poor-performing funds are less performance-sensitive. This indicates funds that perform well will get a larger net flow in the subsequent periods, whereas fund that performs poorly will suffer from smaller outflow in the subsequent period. This makes the flow-performance relationship curve convex.

We reexamine the convexity with the square performance return measure and find the same results for robustness. The coefficient of square performance measure ($SQRK_{i,t-1}$) is positive and significant at a 5 percent probability level. These results indicate that the flow-performance relationship curve is also convex in the Pakistani mutual fund market. Our findings are very similar to the developed countries (Smith, 1978; Ippolito, 1992; Chevalier & Elision, 1997; Siri and Tuffano, 1998; Fant and Neal, 2000; Guercio et al., 2002; Berk & Green, 2004; Ferreira et al., 2012; Bellando & Tran Dieu, 2011; Brborovic & Posedel, 2014; Mazur et al., 2017).

Table 4.2: Sources of the convexity in the flow performance relationship

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>Fund Flow in Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>SQRK_{i,t-1}</td>
<td>0.55** 0.24(2.22) 530** (268)(1.97)</td>
</tr>
<tr>
<td>Front end load X_1</td>
<td>-0.04 (0.05)(-0.92) -0.08 (0.05)(-1.39) -9.23 (39.2)(-0.23) -40.24 (41.02)(-0.98)</td>
</tr>
<tr>
<td>Expense Ratio X_2</td>
<td>-0.10*** (0.03)(-3.33) -0.09*** (0.02)(-3.34) -26 (18.4)(-1.42) -5.93 (17.13)(-0.34)</td>
</tr>
<tr>
<td>Management fee X_4</td>
<td>0.19 (0.22)(0.86) 0.40*** (0.15)(2.62) 55.1 (149)(0.36) 400*** (103)(3.86)</td>
</tr>
<tr>
<td>Total Net assets X_6</td>
<td>0.0001*** (3.07)(3.53) 9.01*** (2.96)(3.04) 0.36*** (0.06)(5.90) 0.34*** (0.06)(5.63)</td>
</tr>
</tbody>
</table>

Note: Dependent variable is fund net flow. $R_{k_{i,t-1}}$ is fund fractional rank which is based on fund performance relative to other funds. $SQRK_{i,t-1}$ is the square return performance that turns the relationship from linear to quadric. High and low are dummy variables in our regression model. High takes the value of 1 if the fund is in top 50 percent who perform well otherwise 0. Low takes the value of 1 if the fund is in bottom 50 percent who perform poor otherwise 0. $X_1$ to $X_6$ are control variables. *** represents 1 percent significant level, ** represents 5 percent significant level and * represent 10 percent probability level. The number reported in first parentheses is standard error and number reported in second parentheses is t-statistics.
<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficients (1)</th>
<th>Coefficients (2)</th>
<th>Coefficients (3)</th>
<th>Coefficient (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High_RK_i t_t_1*Older_Age_i t_1</td>
<td>-0.02 (0.01)(-1.29)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low_RK_i t_t_1*Older_Age_i t_1</td>
<td>-0.05 (0.03)(-1.61)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High_RK_i t_t_1*Big_Size_i t_1</td>
<td></td>
<td>0.001** (5.76)(2.02)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low_RK_i t_t_1*Big_Size_i t_1</td>
<td></td>
<td>0.004*** (0.001)(4.23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High_RK_i t_t_1*high_Rating_i t_1</td>
<td></td>
<td></td>
<td>0.096** (0.035)(2.74)</td>
<td></td>
</tr>
<tr>
<td>Low_RK_i t_t_1*high_Rating_i t_1</td>
<td></td>
<td></td>
<td>0.048 (0.028)(3.42)</td>
<td></td>
</tr>
<tr>
<td>High_RK_i t_t_1*Large_MktExp_i t_1</td>
<td></td>
<td></td>
<td></td>
<td>0.02* (0.05)(0.41)</td>
</tr>
<tr>
<td>Low_RK_i t_t_1*Large_MktExp_i t_1</td>
<td></td>
<td></td>
<td></td>
<td>0.17*** (0.09)(1.91)</td>
</tr>
<tr>
<td>Front end load X_1</td>
<td>-0.05 (0.05)(-0.98)</td>
<td>0.04 (0.04)(0.98)</td>
<td>-0.09** (0.16)(0.56)</td>
<td>-0.02* (0.06)(0.17)</td>
</tr>
<tr>
<td>Expense Ratio X_2</td>
<td>-0.11*** (0.03)(-3.34)</td>
<td>-0.11*** (0.03)(-3.59)</td>
<td>-0.15** (0.08)(1.87)</td>
<td>-0.15*** (0.04)(-3.75)</td>
</tr>
<tr>
<td>Management fee X_3</td>
<td>0.31 (0.22)(1.39)</td>
<td>0.22 (0.21)(1.04)</td>
<td>0.27 (0.15)(1.8)</td>
<td>0.29 (0.22)(1.30)</td>
</tr>
<tr>
<td>Total Net assets X_4</td>
<td>8.63*** (2.95)(2.92)</td>
<td>9.01*** (2.96)(3.04)</td>
<td>7.45** (3.62)(2.05)</td>
<td>8.93*** (2.81)(3.18)</td>
</tr>
</tbody>
</table>

Note: Dependent variable is fund net flow in percentage. RK\_i t\_t\_1 is fund fractional rank which is based on fund performance relative to other funds. High and low are dummy variables, High (low) takes the value of 1 if the ith fund is ranked in the top (below) 50 percent based on its performance in the year (t) and 0 otherwise. Older is dummy variable that takes the value of 1 if the fund age exceeded more than 5 years otherwise it takes 0. Large is a dummy variable which takes the value 1 if the fund marketing expenditures are above the median and 0 otherwise. X\_1 to X\_4 are control variables. *** represents 1 percent significant level, ** represents 5 percent significant level and * represents 10 percent probability level.

Table 4.2 presents the effects of some potential sources on the convexity of the flow-performance relationship. The two interacting variables measure the flow sensitivity to fund performance with fund age effect, fund size effect, and fund marketing effect. First, interacting variables measure flow sensitivity to high-performing funds that are older in age, bigger in size, and have larger marketing expenditures. The second interacting variable measures flow
sensitivity to low-performing funds that are older in age, bigger in size, and have larger marketing expenditures. Here our primary interest is in the coefficient of the second interacting variable. The coefficient of the term \((Low\_RK_{i,t-1} \times Older\_Age_{i,t-1})\) is negative and non-significant, indicating that fund age does not make investors less sensitive to performance in the Pakistani mutual fund market. Contrary to the literature, we find a negative relationship between fund age and fund flow. This indicates older funds get smaller flow as compared to younger funds in the Pakistani mutual fund market (Chevalier & Elision (1997), Navone et al. (2012) and Huang et al. (2007). Younger funds usually have a larger growth opportunity that’s why they receive larger flow as compared to older funds that have limited growth opportunities.

The coefficient of the term \((Low\_RK_{i,t-1} \times Big\_Size_{i,t-1})\) is positive and significant. This indicates that funds with low performance but bigger in size still get fund flows in subsequent periods. This shows investors in low-performing funds that are larger in size are less sensitive to performance. But when we measured fund rating as a proxy for fund size, we could not find any significant relationship between fund size and convexity of the flow-performance relationship. The coefficient of term \((Low\_RK_{i,t-1} \times high\_rating_{i,t-1})\) is positive but non-significant. Our findings support the argument put forward by Sirri & Tuffano (1998) and Huang et al. (2007). However, our finding does not provide support to the findings of Jun et al. (2014). This is because Jun et al. (2014) measured fund rating as a proxy for fund size, which is inconsistent in the literature.

The coefficient of the term \((High\_RK_{i,t-1} \times High\_MktExp_{i,t-1})\) is positive, indicating that funds that have high performance and high marketing expenditures get positive flows in the subsequent period. This shows that high-performance funds spend a substantial amount on marketing to get larger flows in the subsequent periods. But here, our main concern is in the second interacting variable \((Low\_RK_{i,t-1} \times High\_MktExp_{i,t-1})\), which is also positive and significant at a 5 percent probability level. This shows funds that have low performance but high marketing expenditures still enjoy larger flows in the subsequent periods. Thus indicating high marketing expenditure makes investors less sensitive about performance. Our findings support the argument put forward by Siri and Tuffano (1998), Huang et al. (2007), and Navone et al. (2012). They argued that higher marketing diverts investors’ attraction from performance to other fund characteristics. This makes investors less sensitive to performance, and this is the sufficient condition behind this convexity.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Coefficients (1)</th>
<th>Coefficients (2)</th>
<th>Coefficients (3)</th>
<th>Coefficient (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(RK_{i,t-1} \times Age_{i,t-1})</td>
<td>-0.006 ((0.05)(-0.01))</td>
<td>(0.006) ((0.05)) ((-0.01))</td>
<td>(0.006) ((0.05)(-0.01))</td>
<td>(0.006) ((0.05)(-0.01))</td>
</tr>
<tr>
<td>(SQRK_{i,t-1} \times Age_{i,t-1})</td>
<td>(0.03) ((0.05)(0.56))</td>
<td>(0.03) ((0.05)(0.56))</td>
<td>(0.03) ((0.05)(0.56))</td>
<td>(0.03) ((0.05)(0.56))</td>
</tr>
<tr>
<td>(RK_{i,t-1} \times Size_{i,t-1})</td>
<td>(0.28**) ((0.21)(1.31))</td>
<td>(0.28**) ((0.21)(1.31))</td>
<td>(0.28**) ((0.21)(1.31))</td>
<td>(0.28**) ((0.21)(1.31))</td>
</tr>
<tr>
<td>(SQRK_{i,t-1} \times Size_{i,t-1})</td>
<td>(0.001***) ((6.90)(2.57))</td>
<td>(0.001***) ((6.90)(2.57))</td>
<td>(0.001***) ((6.90)(2.57))</td>
<td>(0.001***) ((6.90)(2.57))</td>
</tr>
</tbody>
</table>
Table 4.3 exhibit the robust results of some potential sources of non-linearity. For robustness, this study interacts square return with fund age, size, and marketing expenditures to capture the effect on non-linearity. The coefficient of the interacting term \( \text{SQRK}_{i,t-1} \times \text{Age}_{i,t-1} \) is positive but insignificant. This also reconfirms that fund age does not turn the relationship into a quadric in the Pakistani mutual fund market. On the contrary, the coefficient of an interacting term \( \text{SQRK}_{i,t-1} \times \text{Size}_{i,t-1} \) is found positive and significant. This implies that fund size turns the flow-performance relationship into a quadric in the Pakistani mutual fund market. But when we measured fund rating as a proxy for fund size, then this relationship was found linear. This also confirms that fund rating is not a correct proxy for fund size. The coefficient of an interacting term \( \text{SQRK}_{i,t-1} \times \text{MKTExp}_{i,t-1} \) is also positive and significant. This also indicates that fund marketing expenditures turn the relationship into a quadric in the Pakistani mutual fund market. This confirms that marketing expenditures are an important determinant of convexity in the flow-performance relationship in the Asian region.

**Conclusion**

The mutual fund flow-performance relationship remains a hot debate in the academic literature. The broad agreement is that this relationship is not linear in nature. The reason behind this convexity is still unclear. Few researchers have identified some potential sources of this convexity but the results are conflicting and also limited to the developed countries. This paper aims to study the flow-performance relationship in the Asian region. So, Pakistani mutual funds have been selected as a case study to represent this region. Pakistani mutual funds are growing at a rapid pace in the Asian region. It was only 0.31 billion of net assets in 2001, which are 662
billion in 2020. Most of the equity markets are also interrelated with the Pakistani equity market, so they can become the best representative of emerging countries. The sample comprises 75 mutual funds from three categories: equity funds, asset allocation funds, and balanced funds. The results exhibit that fund size is positively associated with convexity in the flow-performance relationship curve (Sirri & Tuffano, 1998; Huang et al., 2007). However, our findings do not provide support to Jun et al., 2014. This is because Jun et al., 2014 measured fund rating as a proxy for fund size, which is inconsistent in the literature. This study also found that fund marketing expenditures are positively associated with the convexity of the flow-performance relationship curve. This indicates fund marketing diverts investor attention from performance to other fund services. This makes investors less sensitive to fund performance. Finally, contrary to the literature on developed countries, this study does not find any effect of fund age on the convexity of the flow-performance relationship in the Pakistani mutual fund market.

**Practical Implication for the Industry**

1. The results indicated that fund size is an important determinant of convexity in the flow performance relationship. The study found that investors in larger funds are less performance sensitive. This means bigger size funds still get positive flows even in case of low performance. So asset management companies can retain their investors or attract new investors in period of poor performance by increasing the fund size. On contrary, smaller size funds only gets fund flows if they perform well because investors in smaller size funds are more performance sensitive.

2. Fund marketing is another important determinant of convexity in the flow performance relationship. The study found that funds that spend substantial amount on marketing make investors less sensitive to performance. Marketing diverts investor attention from performance to other fund services. The study found that funds that perform poorly but spend larger amount on marketing get positive flows in subsequent periods. Fund marketing reduces search cost borne by investors in case of smaller unknown funds. So asset management companies can retain their investors or attract new investors in period of poor performance through excessive marketing.

**References**


