Mutual Funds Performance in Saudi Arabia

2017

Project Management Team:

Dr. Tameem Albassam, Associate Dean for Development, Faculty of Economics and Administration (FEA), King Abdulaziz University (KAU).

Dr. Mohammad Alsaigh, Expertise House Manager, FEA, KAU.

Project Research Team:

Dr. Naseem Al Rahahleh, Principal investigator and team leader, Finance Department, FEA, KAU.

Dr. Ishaq Bhatti, Faculty participant, Finance Department, FEA, KAU.

How to cite this report:

Al Rahahleh, Naseem, and Bhatti, Ishaq. "Mutual Fund Performance in Saudi Arabia: Do locally focused equity mutual funds outperform the Saudi Market?", Faculty of Economics and Administration, King Abdulaziz University, Jeddah; August 2017.

Mutual Funds Performance in Saudi Arabia

Executive Summary

Objective

This study offers a consideration of the performance of locally focused equity mutual funds in Saudi Arabia, specifically in comparison to the performance of their benchmarks in the Saudi Arabian context. The purpose is to present an in-depth analysis of the performance of Saudi equity mutual funds. The central research question is: *Do locally focused equity mutual funds outperform the Saudi market?*

Sample Study

The equity mutual fund data used herein consist of the monthly net asset value (NAV) per share and some quantitative and qualitative information about each fund. In line with the literature, only mutual funds meeting the following criteria were included in this study: All the mutual funds were managed in Saudi Arabia and all were open-ended, actively managed, and invested only in local equity. No duplicate funds, specialized sector-focused funds, or IPO equity funds were included in the sample. Finally, all the mutual funds were required to have at least 36 months of continuous returns data for the focal period of April 2007 to October 2016. From the total of 169 equity funds identified for the focal period, 39 met all the criteria with a total of 4,321 monthly observations.

Based on the final sample, the study covers 39 locally focused equity funds, 25 Sharia-Compliant (SC) funds, and 14 Non-Sharia-Compliant (NSC) funds or conventional funds.

In order to capture the performance of the locally focused equity mutual funds across different levels of market volatility risk, we divided the focal period into three sub-sample periods based on our identification of structural breaks (Zivot & Andrews, 2002) in Tadawul All Share Index (TASI) volatility. These periods are (1) the high-volatility period of April 2007 to May 2009; (2) the low-volatility period of June 2009 to June 2014; and (3) the medium-volatility period of July 2014 to October 2016.

Performance Measures

We used various performance measures to evaluate the mutual funds' performance: risk-adjusted return performance measurements (the Sharpe ratio, the Treynor index, and the Modigliani-Modigliani measure), the Capital Asset Pricing Model (CAPM), and the Carhart four-factor model.[1]

Empirical Results

The present study shows that locally focused equity mutual funds in Saudi Arabia significantly outperform their benchmark, i.e., TASI, during the full sample period and the low-volatility period. However, there is no evidence to show that locally focused equity funds outperform their benchmark during either the high- or the medium-volatility period.

---

[1] The Carhart four-factor model is an extension of the Fama–French three-factor model by including a momentum factor.

In addition, the performance of SC and NSC local equity funds relative to their respective benchmarks is considered herein, and the following principal results are reported:

- NSC funds appear to outperform their benchmark, i.e., TASI, for the full sample period and the low-volatility period.

- The SC funds neither outperform nor underperform their benchmark, i.e., the S&P Saudi Arabia Domestic Shariah index, as the Jensen's alpha for these funds is not significant for the full sample or for any volatility sub-period.

Subscribers and Fund's Alpha

The total number of subscribers to Saudi equity mutual funds declined at a rate of 6.6% annually during the period of 2009–2015. We speculate that one of the reasons for this downward trend could be the performance of these equity mutual funds and whether they outperform or underperform their benchmark. In order to establish whether or not this hypothesis is warranted, we studied how the subscriber numbers changed over time, especially in regard to the SC and NSC funds with the highest-estimated alphas and the SC and NSC funds with the lowest-estimated alphas.

In regard to the NSC funds, we found that during the focal period, the number of subscribers declined for funds with the highest-estimated alphas and for funds with the lowest-estimated alphas. However, the decline was most pronounced for the NSC fund with the lowest-ranked alpha.

In terms of the SC funds, we found that the number of subscribers declined both for funds with the highest-estimated alphas and for funds with the lowest-estimated alphas. However, the decline was equally pronounced for funds with the lowest-ranked alphas. This means other factors may be important in accounting for the reported pattern of subscribers.

Policy Recommendations

Based on this study, the following recommendations are presented: create and maintain a comprehensive database for the Saudi mutual funds industry, encourage independent bodies to produce consumer reports on the industry, examine customer satisfaction pertaining to equity mutual funds subscribers, strengthen the collaboration between the mutual funds industry and academia, and formulate a shared strategy for the CMA and the mutual funds industry in Saudi Arabia.

Table of Contents

List of Tables

List of Figures

Section 1

Introduction

The rapid growth in investment in mutual funds around the world and its significance to the economic development of a country makes studying the performance of such funds a matter of importance. Mutual fund assets under management (AUM) grew at a compound average growth rate (CAGR) of 5.8% globally over the period of 2010–2015, with equity and mixed/balanced funds driving most of this increase. In 2015, global mutual fund assets increased slightly by 0.5% to US$32.2 trillion (Ernst & Young, 2015).

Generally, mutual fund instruments allocate money to bonds, short- or long-term equity, and other related medium- to high-return-earning cash instruments, all of which are subject to absorbable risk. Mutual funds can also be invested in ethically based investment vehicles. For example, as of year-end 2015, $8.72 trillion[2] or more are invested in funds of this nature in the US. These funds pool money from investors who wish to invest in what they consider to be ethical business ventures, including Shariah-Compliant (SC) mutual funds. In summary, a mutual fund is designed to invest more optimally than a single investor can in diversified asset classes and diversified securities in an asset class.

In the Arab World region, Saudi Arabia was the earliest market to invest in the mutual fund industry. The country began by using the National Commercial Bank (Al Ahli) mutual fund instrument, also known as the "open-ended" *Al Ahli* Short Term Dollar Fund, which

---

[2] http://www.ussif.org/sribasics

launched in December 1979. Since then, Saudi Arabia's banks and other financial institutions have continued to issue and structure various types of mutual funds in the Kingdom. As of mid-2015, Gulf Cooperation Council (GCC) mutual funds accounted for around US$35.65 billion in assets held, with Saudi Arabia accounting for 77% of the total, i.e., US$27.45 billion in asset values (**Figure 1**) (Ernst & Young, 2015). However, in 2015, public mutual fund assets accounted only for 4.25% of GDP in Saudi Arabia, i.e., US$646 billion (**Figure 2**).
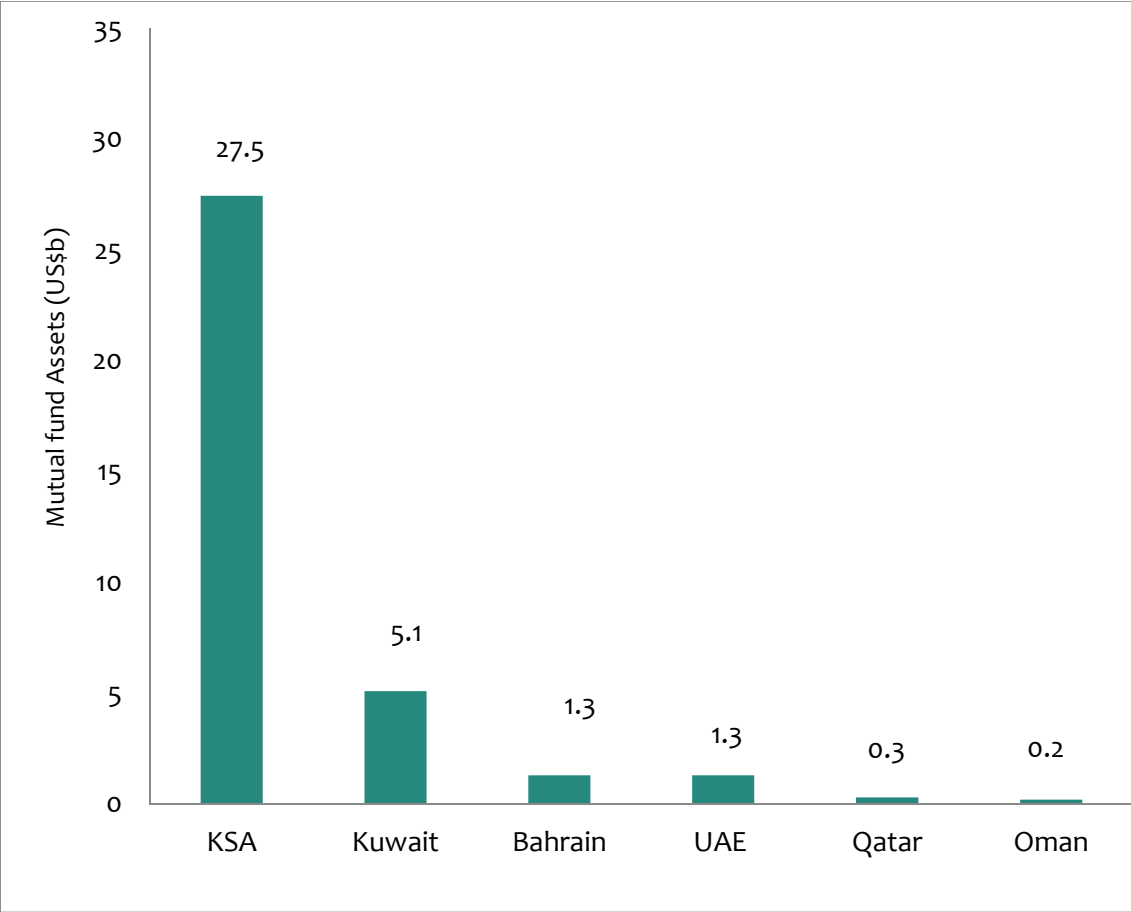
Figure 1: Mutual fund assets in the GCC

Mutual fund assets to GDP (%)

Units: %
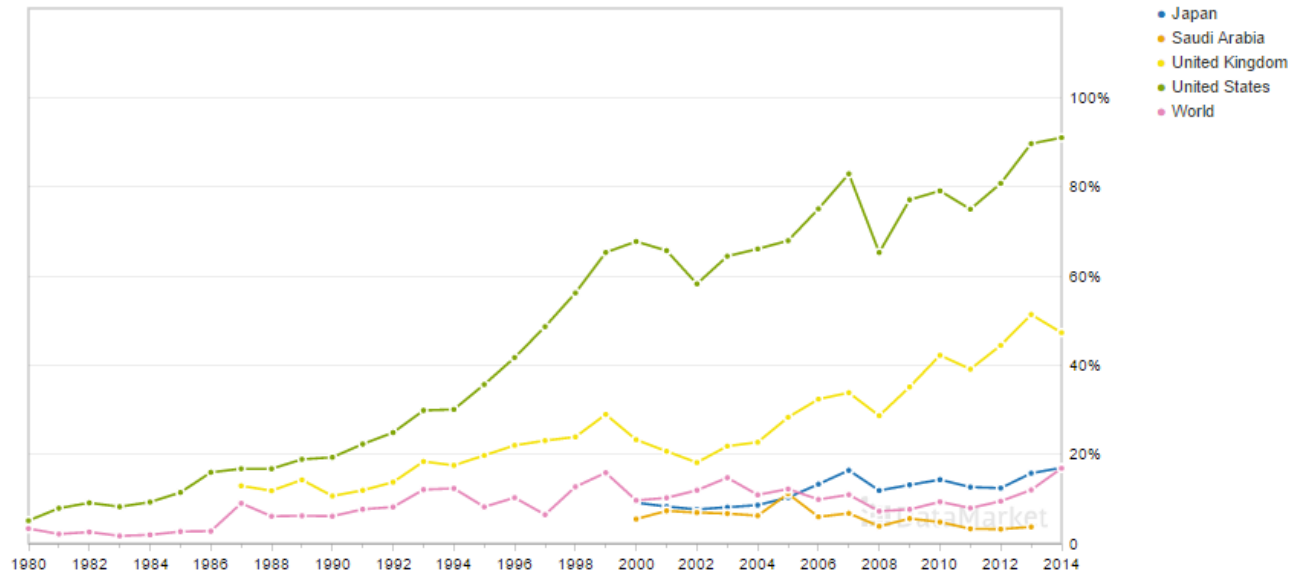
Source: World Bank (citing: World Bank - Non banking financial database)

Figure 2: Mutual fund assets to GDP (%)

The current literature shows that practitioners and individual investors working in the mutual fund industry in the Middle East and North Africa (MENA) region and specifically in the Kingdom of Saudi Arabia lack expertise in the area of financial planning, especially in regard to mutual funds, innovation, structure, and evaluation. That is, they approach investment strategy in a partial way, ignoring the system-oriented methodological approach as well as the major sectors playing interactive and catalytic roles in diversifying the mutual fund industry.

Further, the introduction of a range of mutual funds, including ethical funds, faith-based Shariah-Compliant (SC) funds, real estate investment trusts (REITs), Islamic REITs, and funds of funds (FOFs), mean that research into the performance of mutual funds in emerging markets such as Saudi Arabia has the potential to be of great value to policy-makers and

investors in terms of their understanding of this specific market and, therefore, to their decisions relating to it.

The main objective of the present study is to examine equity mutual funds in the Saudi market and to thereby provide a comprehensive account of their performance in comparison with their benchmarks. The study draws on data relating to the monthly returns of Saudi mutual funds as obtained from the Saudi Capital Market Authority (CMA) and various other sources for the period of April 2007 to October 2016.

Previous studies that examine the performance of mutual funds in Saudi Arabia focused on comparing SC mutual funds with conventional mutual funds rather than on offering a consideration of the bigger industry picture. Further, these studies were not in line with the previous literature as they did not follow most of the screening criteria for mutual funds to clean their sample from mutual funds that add noise to their analysis. For this reason, general conclusions cannot be drawn pertaining to the performance of the Saudi mutual funds market.

In the present study, we address these gaps and offer a comprehensive examination of mutual fund performance relative to the market by using appropriate econometrics models. Our results provide a good general picture of the Saudi equity mutual fund industry with implications for business decision makers and for policy-makers and industry regulators likewise.

The results presented herein provide a sound basis for understanding the performance of mutual funds in the Kingdom, thereby equipping investors to evaluate the performance of current mutual funds relative to other kinds of funds in internally competitive markets.

The rest of study is organized as follows. Section 2 offers a brief review of the related literature. Section 3 describes the research methodology. Section 4 discusses the current status of the Saudi mutual fund industry. Section 5 presents Saudi mutual fund data and some summary statistics. Section 6 presents the empirical results. Concluding remarks and policy recommendations are offered in Section 7.

Section 2

Literature Review

Several studies on mutual fund performance have been published in recent years. The performance of mutual fund returns against any key market returns is a controversial issue: in some studies, mutual funds are shown to yield better market returns than the funds against which they are typically benchmarked, whereas in other studies, mutual funds are shown to yield significantly worse returns. For example, Babalos et al. (2015), Abdelsalam et al. (2014), and Matallín-Sáez et al. (2014) used the stochastic frontier model on US data and showed that the returns of mutual funds compared with the returns of their benchmarks is not easy to determine in relation to various time periods, investment strategies, size effects, growth, or the momentum effect.

In a study of the performance of European mutual funds, Vidal-García (2013) found negative alpha values for Germany, Italy, Spain, France, the Netherlands, and the UK. Recently, Hunter et al. (2014) expanded the standard multifactor performance evaluation models for US equity and fixed income funds with an Active Peer Benchmark[3] factor model. They observed that the addition of the Active Peer Benchmark significantly improves the selection of funds that outperformed their benchmarks. Agnesens (2013), Namvar and Phillips (2013), and Chen et al. (2013) used the multifactor model with the alpha estimate to assess the performance of mutual funds as well as diversified benchmark portfolios.

[3] Active Peer Benchmark represents an equal investment in all same-category funds.

In a small number of studies, researchers have investigated the performance of mutual funds in Saudi Arabia. Merdad, Hassan, and Alhenawi (2010), for example, used a sample of SC and conventional equity mutual funds managed by only one fund manager (HSBC) to show that SC funds underperformed the conventional funds during the period of 2003 to 2010 overall but outperformed the latter funds during the crisis period of September 2008 to January 2010. The Merdad et al. (2010) study is very limited, however, as the researchers considered only one fund manager although there is a large pool of fund managers in the market. Recently, Merdad, Hassan, and Khawaja (2016) used a more comprehensive sample of 143 equity mutual funds in Saudi Arabia (about 61% of all available funds) during the 2004–2010 period and showed that on a risk-return scale locally focused SC mutual funds outperformed locally focused conventional funds and that internationally focused SC mutual funds underperformed internationally focused conventional funds. Using a similar approach, Ashraf (2013) compared the market timing and stock selection ability of 159 mutual funds managed in Saudi Arabia's stock market during the global financial crisis (GFC) period of 2007 to 2011. They found evidence that SC mutual funds performed better than conventional funds did during this period.

The results of the above studies are not generalizable such that they fail to provide a good picture of mutual fund performance in Saudi Arabia for several reasons: Two major negative market events took place during the focal period: (1) the Saudi stock market crash in 2006 and (2) the GFC. Equity market behavior is marked by anomalies during these periods, leading to overly negatively conclusions about mutual fund performance. That is, other than poor performance during the crisis periods, mutual funds may have performed

well relative to market benchmarks. This study addressed these gaps and offers a comprehensive look at funds' performance relative to their benchmark by using frequency data and appropriate mathematical models. The results presented have implications not only for investors, but for regulatory bodies and policy-makers likewise.

Section 3

Methodology

3.1. Non-Risk-Adjusted Returns Methodology

The standard non-risk-adjusted performance measures are the mean and the standard deviation, as the measures of returns and risk, respectively.

3.2. Risk-Adjusted Returns Methodology

We used the Sharpe ratio (SR), the Treynor index (TR), and the Modigliani-Modigliani (M^2) measure as our standard risk-adjusted performance measures. We provide the rationale governing the decision to use each of these measures in the following sub-sections.

3.2.1. Sharpe ratio (SR)

One of the standard performance measurements in mutual funds research, the Sharpe ratio (SR) is used to measure the risk and returns of a fund portfolio. This ratio has been used in a number of studies to evaluate individual funds and/or portfolio performance (Amin & Kat, 2003; Bertin & Prather, 2009). In comparison with other risk-adjusted measures, SR is considered to be a more precise return–risk measurement due to its ability to recognize the existence of a risk-free return in asset portfolios (Eling & Faust, 2010).

SR often refers to the returns of an asset with zero risk, which, in turn, implies a zero standard deviation. Investors or fund managers can choose this risk-free asset in their portfolios as a combination in preference to a risky portfolio. Indirectly, investors or fund

managers can also choose the level of absolute risk (as risk is measured by the standard deviation of a risky portfolio) or the expected return.

In the present study, we adopt the ex post SR introduced by Sharpe (1966) in order to examine the risk–return trade-off of a fund's portfolio. The ratio is the reward per unit of variability or the standard deviation. Therefore, the larger the ratio, the better the performance (Sharpe 1966). The historical data reflect the actual performance of a fund's portfolio. The formula is referred to as ex post SR based on the historical data. The SR estimates the risk–return trade-off by dividing the average excess return of a fund portfolio over the focal period with the standard deviation of returns in the same period. The SR is calculated as shown in **Equation 1**:

$$SR = \frac{\overline{R}_p - \overline{R}_f}{\sigma_p} \tag{1}$$

where $\overline{R}_p$ represents the mean returns to the portfolio, $\overline{R}_f$ represents the mean returns to a risk-free asset, and σ_p represents the standard deviation of the portfolio returns. The three-month Saudi Interbank Offered Rate (SIBOR) is used as a proxy for the risk-free rate asset (for details, see Bodie et al., 2011). Referred to as the mean excess return on a portfolio, the numerator term $(\overline{R}_p - \overline{R}_f)$ in SR measures reward in terms of mean excess return per unit of risk, which is measured by the standard deviation of the $\overline{R}_p$.

3.2.2. Treynor Index (TR)

As there is no guarantee that past performance constitutes the best forecast of future performance as can be predicted through the SR measure, the SR alone is not a sufficient

measure. The SR is, therefore, used in conjunction with other measures, such as the Treynor index (TR). The TR gives the excess return per unit of risk based on systematic risk (the beta of a portfolio) instead of total risk (the standard deviation of a portfolio). The portfolio beta represents the systematic risk of a portfolio against the relevant benchmark. The formula can be expressed as shown in **Equation 2** (Bodie et al., 2011):

$$TR = \frac{\overline{R}_p - \overline{R}_f}{\beta_p} \tag{2}$$

where TR represents the Treynor index; $\overline{R}_p$ represents the average return on the portfolio; $\overline{R}_f$ represents the risk-free rate; and β_p belongs to beta for the portfolio p.

3.2.3. Modigliani-Modigliani Measure (M²)

Next, we apply the Modigliani-Modigliani measure (M²) proposed by Modigliani and Modigliani (1997) as an alternative way to measure risk-adjusted performance. This method has the benefit of measuring fund performance in relation to the market in percentage terms. The higher the M² associated with a fund portfolio, the higher the return of the fund at any level of risk using the formula as expressed in **Equation 3**:

$$M^2 = \frac{\overline{R}_p - \overline{R}_f}{\sigma_p} \sigma_M + R_f \tag{3}$$

where $\overline{R}_p$ represents the average return on the portfolio; $\overline{R}_f$ represents the three-month SIBOR rate; σ_p represents the standard deviation of the returns of a fund portfolio; and σ_M represents the standard deviation of market excess returns.

3.3.A Single-Factor Model – CAPM Analysis

The CAPM regression is performed on the risk-adjusted return (mean excess equity return) of a mutual fund portfolio as a dependent variable. We begin our analysis using the single-factor model, which estimates the Jensen's alpha as well as the systematic risk (beta).

$$R_{pt} - R_{ft} = \alpha_p + \beta_p (R_{mt} - R_{ft}) + \varepsilon_{pt} \qquad (4)$$

where R_{pt} represents the return of portfolio p in month t; R_{ft} represents the risk-free return; R_{mt} represents the return on the market portfolio; and ε_{pt} represents a time-varying error term. The notation α_p represents the regression intercept, commonly referred to as Jensen's alpha (1969), which is used as the performance measure relative to the market portfolio (i.e., the mutual fund application described by Patro (2001)). It measures the average return on a portfolio over and above that predicted by the CAPM, given the portfolio's beta and the average market return (Bodie et al. 2011, p. 851). Jensen's alpha is the portfolio's alpha value (α_p). The formula is expressed as **Equation 5**:

$$\alpha_p = R_{pt} - \left[R_{ft} + \beta_p (R_{mt} - R_{ft}) \right] \qquad (5)$$

The regression slope β_p is referred to as the beta factor. In other words, Jensen's alpha is an intercept of the single-factor CAPM representing the outperformance of a return portfolio in relation to the market and suggesting that the higher the increment the greater the excess return.

Treynor and Mazuy (1966) examined the performance on return (alpha) and risk (beta) allowing for time-varying systematic risk. They used a quadratic regression model following a regression procedure similar to the one applied in the single-factor CAPM but with the

addition of a squared-market return variable as an independent variable, as expressed in **Equation 6**:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{pt}\,(R_{mt} - R_{ft}) + \gamma_{pt}\,(R_{mt} - R_{ft})^2 + \varepsilon_{pt} \qquad (6)$$

where α_p and γ_{pt} represent the selectivity and market-timing skills for the portfolio p, respectively. If γ_{pt} (i.e., the coefficient on the quadratic term of the portfolio returns) is significantly positive, then the fund managers exhibit market-timing ability or superior selection ability relative to other fund managers by adjusting their fund exposure to the market before it swings to capture the upside and avoid the downside. The rest of the model's components are defined in **Equation 4**.

Note that the model represented by **Equation 4** includes only one risk factor. This model, however, can be extended to a multifactor model in order to account for the proportion of variance explained by the regression. We discuss these models in the next section.

3.4.   Multifactor CAPM and the Construction of Four-Factor Portfolios

The CAPM (**Equation 4**) can be extended to a multifactor model in order to account for the proportion of variance explained by the regression. To model the Saudi equity mutual funds for all local, NSC, and SC funds, we construct the Carhart's (1997) multifactor models, as expressed in **Equation 7**:

$$R_{pt} - R_{ft} = \alpha_p + \beta_{pM}\,(R_{Mt} - R_{ft}) + \beta_{pSMB}\,SMB_t + \beta_{pHML}\,HML_t$$
$$+ \beta_{pMMC}\,MMC_t + \varepsilon_{pt} \qquad (7)$$

where R_M is the market factor and is equal to the monthly return of the size-weighted portfolio of all the stocks in the six size-BE/ME[4] portfolios; $(R_M – R_F)$ is the excess market return; and R_f is the risk-free rate measured.

To construct the three passive portfolios, SMB, HML, and MMC, we first classify each stock as large or small (based on market capitalization) and high or low (based on book-to-market ratio) in a given month. Then, we generate a series of market capitalization of the median listed company in a given month and the median of the book-to-market equity (i.e., the 30th and 70th percentile values of the book-to-market ratio for each month). Firms with a market cap below the median in a given month are classified as small for that month, and firms with a market cap above the median are classified as large. Firms with a book-to-market ratio at or below the 30th percentile in a given month are classified as growth or low-BE/ME stocks, whereas firms with a book-to-market ratio at or above the 70th percentile are classified as value or high-BE/ME stocks. Firms in the middle 40% are classified as medium-BE/ME stocks.

These categories result in six portfolios: two size categories times three BE/ME categories. That is, we have six value-weighted return portfolios based on the intersection of two size groups and three book-to-market equity groups: SL (a monthly return portfolio comprising stocks that are both small (market capitalization) and have a low BE/ME ratio); SM (a monthly return portfolio comprising stocks that are both small and have a medium BE/ME ratio); SH (a monthly return portfolio comprising stocks that are both small and have

---

[4] We calculated the firm's market equity value (ME) as the stock price times the shares outstanding. A firm's book value of equity (BE) is computed using the balance sheet value of the common equity in the company (the book value of the share times the shares outstanding). All these data are provided by Saudi CMA.

a high BE/ME ratio); BL (a monthly return portfolio comprising stocks that are both big and have a low BE/ME ratio); BM (a monthly return portfolio comprising stocks that are both big and have a medium BE/ME ratio); and BH (a monthly return portfolio comprising stocks that are both big and have a high BE/ME ratio). Based on the monthly returns of these six portfolios, we compute the returns on the SMB (small minus big) for each month, as the difference between the average return on the three small-cap portfolios and that of the three big-cap portfolios as expressed in **Equation 8**:

$$SMB = \frac{1}{3}[(SL + SM + SH) - (BL + BM + BH)] \tag{8}$$

We also compute the returns on HML (high minus low) portfolios, as the difference between the average return on the two high book-to-market portfolios and that of the two low book-to-market portfolios as expressed in **Equation 9**:

$$HML = \frac{1}{2}[(SH + BH) - (SL + BL)] \tag{9}$$

The Momentum factor (Momentum minus Contrarian, or MMC), the fourth factor in the Carhart model (1997), considers the effect of momentum on stock returns. For example, stocks are either momentum or contrarian based on the returns they have yielded in the previous 12 months. Momentum stocks are those that have performed well during the previous 12 months and continued to do well over the following month (Winners). Contrarian stocks are those that have performed poorly during the previous 12 months and that have continued to perform poorly over the following month (Losers). To determine whether a stock should be considered momentum or contrarian, we generate a series of

one-month lagged 11-month returns for each stock. Put differently, for each stock we generate a monthly series as expressed in **Equation 10**:

$$R_t = \frac{(P_{t-1} - P_{t-12})}{P_{t-12}} \tag{10}$$

where P_t is the stock price at the end of month t. We, then, generate the monthly series of the 30th and 70th percentiles of the 11-month returns of each stock for each month. Firms with an 11-month return below the 30th percentile are classified as contrarian stocks, and firms with an 11-month return above the 70th percentile in a given month are classified as momentum stocks as expressed in **Equation 11**:

$$MMC = \frac{1}{2}[(SMom + BMom) - (SC + BC)] \tag{11}$$

where *SMom* represents small momentum stocks; *BMom* represents big momentum stocks; *SC* represents small contrarian stocks; and *BC* represents big contrarian stocks each month.

Section 4

Saudi Mutual Fund Industry: Current Status

The Saudi mutual fund industry is growing rapidly. In terms of the number of funds listed, the industry has shown tremendous growth in recent years: In 2006, 182 funds were listed whereas in 2015, this figure had grown to 267. Further, the value of the assets of the Saudi mutual fund industry reached SR 102.9 billion in 2015. This growth has given rise to a variety of funds that specialize in terms of investment style in order to cater to various investor needs. As the investment goals of investors vary in terms of return requirements, attitude toward risk, and liquidity needs, investment styles differ accordingly. **Figure 3** shows some key ways in which investors differ from each other in respect to the type of funds they target and the risk involved with each fund type.
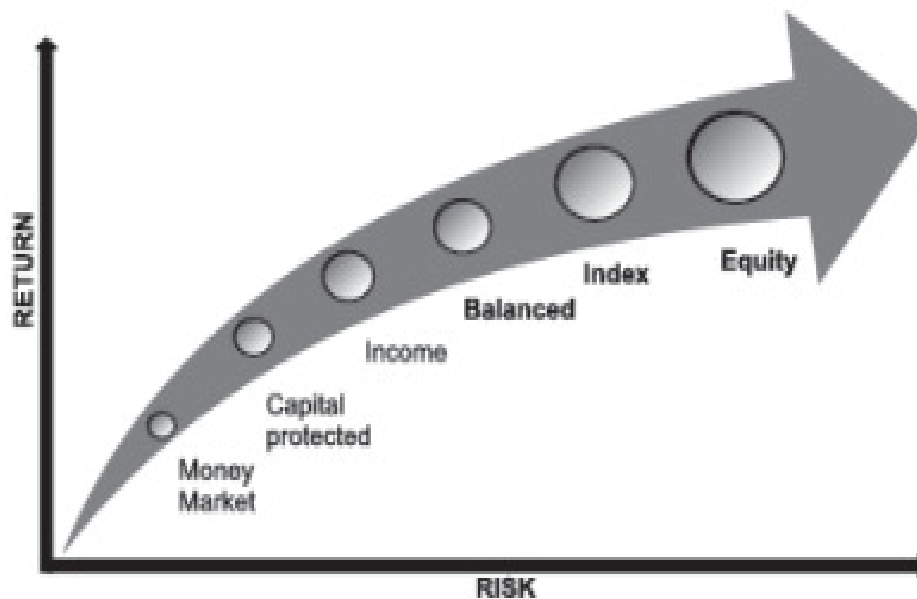
Figure 3: Risk-return exposure

In Saudi Arabia, equity mutual funds represent 57% of the mutual fund industry on average, with 169 equity mutual funds at the end of 2015. The rest of the industry is represented by money market investments at 19% of the industry; FOFs at 14%; real estate at 3%; debt instruments at 3%; balanced funds at 2%; and capital protected at 2% (**Figure 4**). In the present study, we focus on equity mutual funds, as these represent the highest percentage of the industry relative to the other investment vehicles. Further, the breakdown of equity mutual funds based on geographical location indicates that 46% of equity mutual funds are invested locally, 20% are invested in the Arab region including in GCC countries, and 34% are invested internationally in countries other than the GCC and others in the Arab region. To be more specific and upon the request of the CMA, we consider the performance of locally focused equity mutual funds.
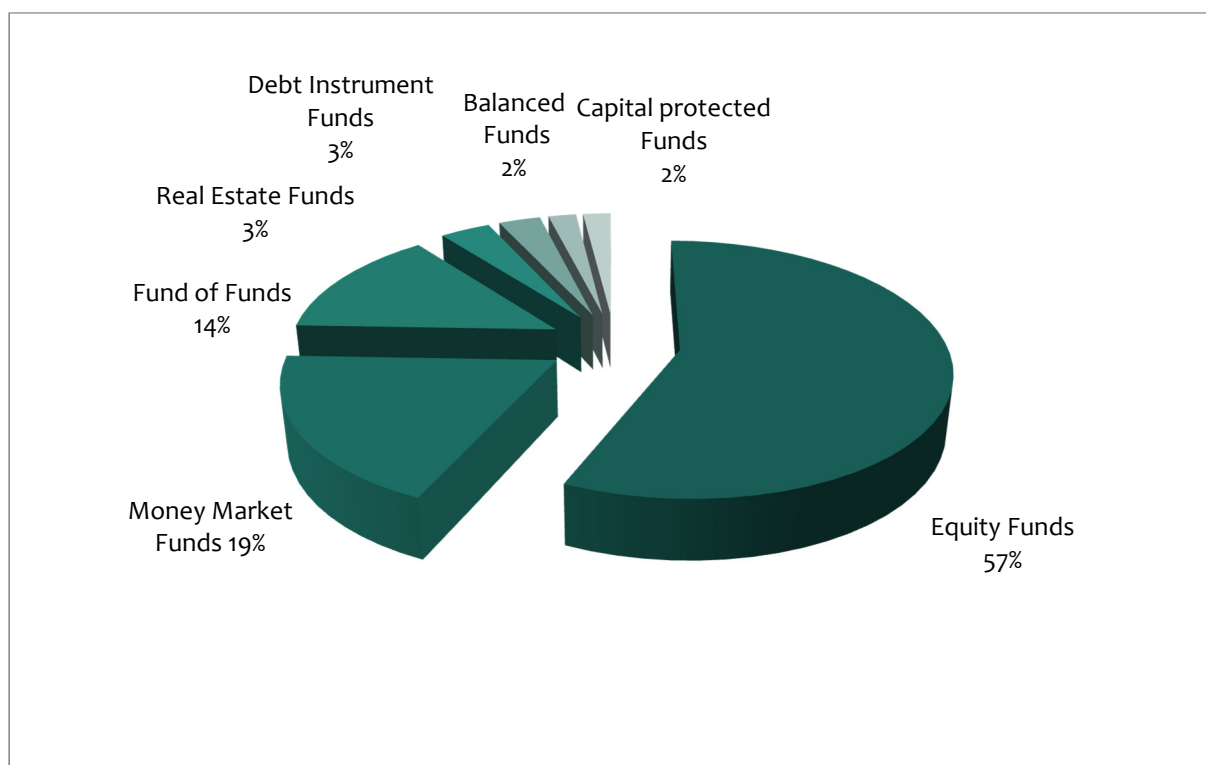
Figure 4: Structure of public investment funds by type of Investment

Although the industry has grown phenomenally over the last ten years, there has also been a noticeable decline in the total number of subscribers. The total number of subscribers to Saudi mutual funds decreased at a rate of 6.5% annually during the period of 2009 to 2015. For example, according to the Saudi Capital Market Authority's (CMA) annual report for 2015, the number of subscribers to public investment funds decreased from 356,331 in 2009 to 236,728 in 2015.

By looking at the number of subscribers by type of investment, we noticed that most of the decrease in the number of subscribers to equity funds is reflected by reduced participation in equity investment funds. For example, the number of subscribers to equity funds decreased from 187,426 at the end of 2014 to 181,997 at the end of 2015. In more detail, the number of subscribers to equity mutual funds decreased at an average annual rate of 15,306 subscribers followed by a decrease in the money market of an average of 3,883 subscribers per year.

Figure 5, with the exception of debt instruments and real estate funds, all types of mutual funds showed a decline in the number of subscribers between the years 2014 and 2015.
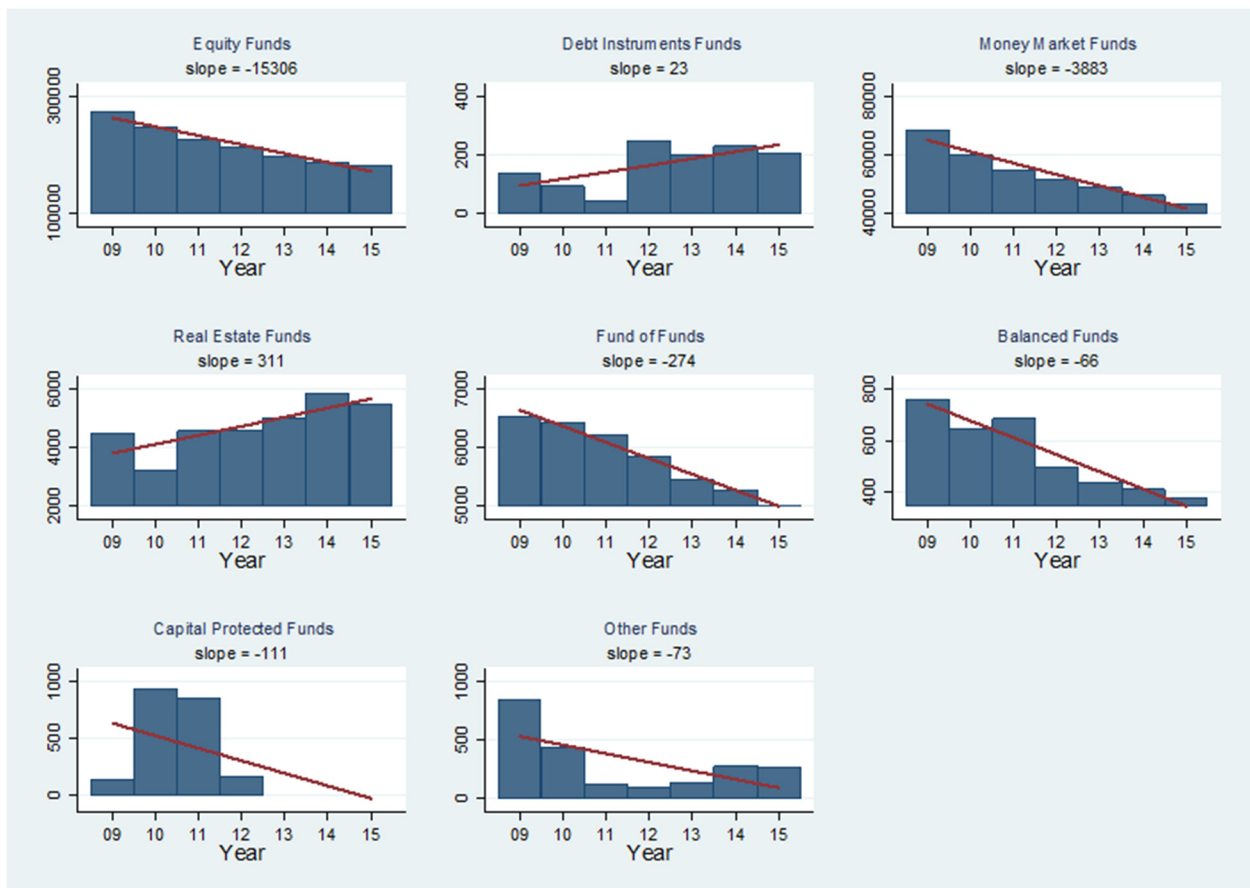
Figure 5: Total number of subscribers: historical trend

By looking further at the number of subscribers to equity mutual funds and the relationship of this number to fund growth (**Figure 6**), we observed that over the last decade the mutual equity fund industry showed growth in both the number of funds and in the value of assets under management (AUM).[5] However, the number of subscribers to equity mutual funds decreased at an average annual rate of 15,306 as mentioned earlier. This observation is discussed in more detail in Section 6.4, and more specifically on the locally focused equity mutual funds.

---

[5] The number of mutual funds investing in equities decreased from 154 in 2010 to 138 in 2012. The total volume of the assets of equity funds decreased as the number of funds invested in equities declined. Yet, equity funds continued to hold the largest number of total investment funds throughout the years.
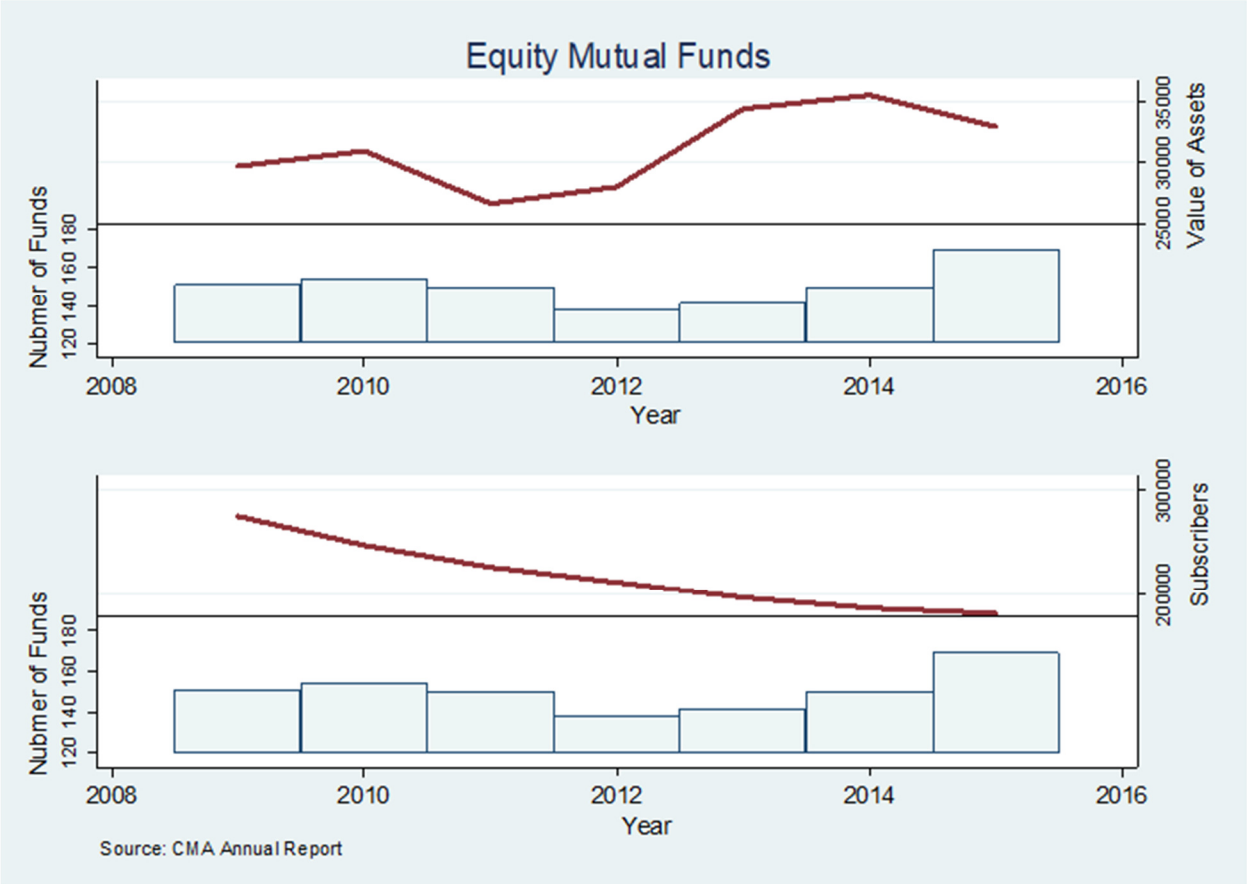
Figure 6: Growth in equity mutual fund market and number of subscribers

Section 5

Saudi Mutual Fund Data

The mutual fund data consist of monthly net asset values (NAVs) expressed on a per-share basis[6] (i.e., unit price) and some quantitative and qualitative information about each fund. The TASI and the S&P Saudi Arabia Domestic Shariah index are used as proxies for the market return for the focal period of April 2007 to October 2016[7]. We obtained the data for this study from the Saudi Capital Market Authority (CMA), the official website of the Saudi Stock Exchange (Tadawul), and the S&P Global.

In accord with the literature, we included only mutual funds that meet the following criteria in our sample: all the mutual funds were managed in Saudi Arabia and all were open-ended, actively managed, and invested only in local equity.[8] Further, we did not include any duplicate funds, specialized sector-focused funds, or IPO equity funds in the sample.[9] Finally, all the mutual funds were required to have at least 36 months of continuous returns data for the focal period of April 2007 to October 2016. From the total of 169 equity funds identified for the focal period, 39 met all the criteria with a total of 4,321 monthly observations. As a

---

[6] Previous studies that have investigated the performance of mutual funds in Saudi Arabia (e.g., Merdad et al., 2010) used NAV and not NAV per share.

[7] This study starts from April 2007 due to data availability on S&P Saudi Arabia Domestic Shariah index as the index was launched on April 24, 2007.

[8] To determine whether a given fund was actively managed, we regressed the fund's returns on the TASI, SMB, HML and MMC portfolios, and the S&P Saudi Arabia Domestic Shariah index. Funds that returned an R^2 larger than 0.98 for any of these regressions were categorized as not actively managed (i.e., passively managed) such that they were excluded from the sample.

[9] A comparison of specialized sector-focused and IPO funds with the TASI (i.e., broad benchmarks) or the S&P Saudi Arabia Domestic Shariah index would be misleading.

result of applying the screening criteria, funds were removed from the sample as follows: 72 equity funds were removed, as we excluded Arabian and international equity funds from the final sample; 26 IPO equity funds and 14 specialized sector-focused funds were removed, as we excluded both of these categories; and 18 mutual funds were removed, as we required this category to have at least 36 months of continuous returns data for the focal period. However, applying the other criteria did not result in the removal of any additional funds from the final sample. Survivorship bias is not accounted for because of information insufficiency. For that reason, no dead funds were included in the sample.

The growth in Saudi equity local mutual funds throughout the focal period is shown in **Figure 7.** The number of mutual funds in the final sample increased from 18 in 2007 to 39 in 2016 with a compounded annual growth rate of 8.97%.
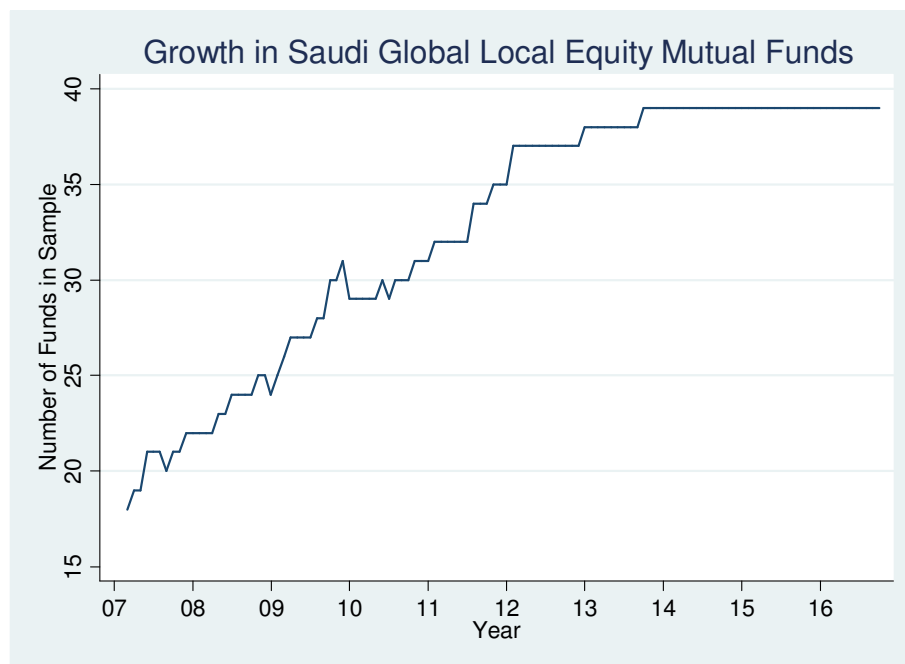
Figure 7: Growth in Saudi equity: locally focused mutual funds

Section 6

Empirical Results and Discussion

As indicated, the present study covers 39 local equity funds. **Table 1** shows the final sample of 26 fund managers with a total of 39 funds. The fund managers can be classified into three categories in terms of key players in the Saudi mutual fund industry: (1) Major key players: fund managers managing a total of 13 funds; 33.3% with an average of 3.25 funds per fund manager. (2) Medium key players: fund managers managing a total of eight funds; 20.5% with an average of 2 funds. (3) Minor key players: fund managers managing a total of 18 funds; 46.2% with an average of one fund. These figures indicate that the industry is not highly concentrated with fund managers in any single category. In addition, **Table 1** shows the distribution of the funds in terms of SC and NSC funds per fund manager. It can be seen that about 64% (25 funds) are SC funds managed by 21 fund managers, whereas 36% (14 funds) are NSC funds managed by 12 fund managers.

6.1. Results For Non-Risk-Adjusted Return Performance and Risk Measures

6.1.1. Non Risk-Adjusted Returns Analysis

Overall, the descriptive summary statistics of the performance of equity mutual funds for the entire sample and the TASI are presented in **Table 2**. The monthly mean and standard deviation for all the funds returns and the TASI returns are also shown in **Table 2**. We observed that on average the fund return is positive and ranges from -4.514 to 4.624%.

Table 1: Number of Locally Focused Equity Mutual Funds Managed by Each Manager

Fund Managers	Equity–Local focused	Shariah Compliant	Non-Shariah Compliant
Samba Capital & Investment Management	4	2	2
Arab National Investment Company	3	2	1
HSBC Saudi Arabia Limited	3	2	1
Riyad Capital Company	3	1	2
ALBILAD Investment Company	2	2	-
Alistithmar for Financial Securities	2	1	1
Saudi Fransi Capital	2	1	1
Global Investment House Saudi	2	1	1
Al Rajhi Capital	1	1	-
Alawwal Capital Company	1	1	-
Alawwal Invest	1	1	-
Alinma Investment Company	1	1	-
Aljazira Capital	1	1	-
Al-Khair Capital Saudi Arabia	1	1	-
Al-Nefaie Investment Group	1	1	-
Aloula Geojit Capital	1	-	1
Blominvest Saudi Arabia	1	-	1
EFG-Hermes KSA	1	-	1
FALCOM Financial Services	1	1	-
Jadwa Investment	1	1	-
KSB Capital Group	1	1	-
Morgan Stanley Saudi Arabia	1	-	1
NCB Capital Company	1	1	-
Osool and Bakheet Investment Company	1	1	-
Rana Investment Company	1	-	1
The Investor for Securities	1	1	-
Total	**39**	**25**	**14**

Note. The list of all the equity mutual funds included in the study is distributed by each fund manager and by fund category during the sample period of April 2007 to October 2016.

The lowest average return corresponds to the year of the GFC (i.e., 2008). Further, the returns standard deviation shows that the GFC period is the most volatile with the highest

SD (9.387%). In terms of the return performance of the TASI over the focal period, we observed that the TASI return index ranges from -6.157 to 4.331% and the standard deviation ranges from 2.01 to 10.456%. The t-test for the mean difference for the non-risk-adjusted returns with the TASI is also presented in **Table 2**. The objective is to determine whether we can support the following hypothesis:

H_1: The average return for equity funds invested locally differs significantly from the average return for the Saudi market index (TASI).

Table 2: Average Monthly Return for All Equity Mutual Funds – Locally Focused and the TASI

Periods	All funds		TASI		Difference
	M (%)	SD	M (%)	SD	in mean
2007	4.624	7.416	4.331	8.306	0.350
2008	-4.514	9.387	-6.157	10.454	1.643*
2009	2.057	5.307	2.305	7.784	-0.248
2010	1.160	4.659	0.751	4.484	0.409
2011	0.043	4.712	-0.150	4.921	0.193
2012	0.866	4.901	0.616	5.372	0.250
2013	2.284	2.250	1.929	2.010	0.355
2014	0.904	6.277	-0.002	6.461	0.906***
2015	-0.977	6.365	-1.285	7.417	0.309
2016	-1.310	6.408	-1.175	6.753	-0.135
Full sample	0.438	6.186	0.029	6.960	0.410**
High-volatility period	0.195	9.215	-0.461	10.788	0.656
Low-volatility period	1.274	3.980	0.977	4.263	0.297*
Medium-volatility period	-1.015	6.647	-1.368	7.200	0.353

Note. The high-volatility period refers to April 2007 to May 2009. The low-volatility period refers to June 2009 to June 2014. The medium-volatility period refers to July 2014 to October 2016. ***, **, and * represent significance at the 1%, 5% and 10% levels, respectively.

As **Table 2** shows, in most years, the difference between the funds' performance and the TASI performance is not significant, which suggests that H_1 should be rejected. The statistical evidence supports the position that the equity-local non-adjusted risk returns do not differ significantly from those of the TASI. However, during 2008 and 2014, the equity-local funds earned a significantly higher monthly mean return percentage than the TASI return did, such that we cannot reject H_1 for those two years.

Further, we divided our focal period into three sub-sample periods based on identifying structural breaks (**Figure 8**) using the Zivot and Andrews (2002) test in the TASI volatility shown in **Figure 9**. These periods are (1) the high-volatility period: April 2007 to May 2009; (2) the low-volatility period: June 2009 to June 2014; and (3) the medium-volatility period: July 2014 to October 2016.
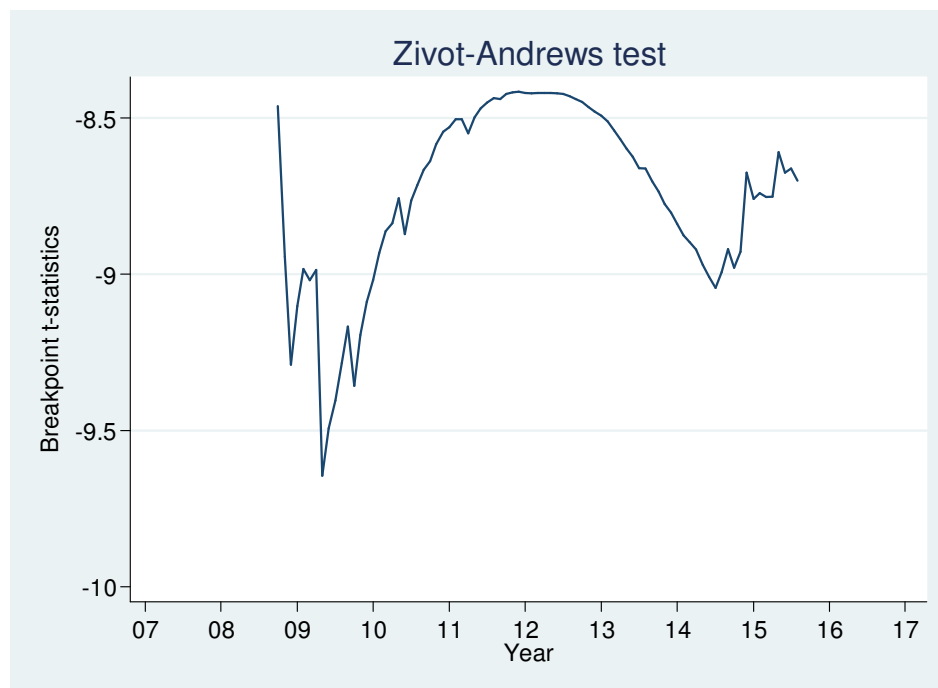
Figure 8: Zivot and Andrews (2002) Structural Break Test
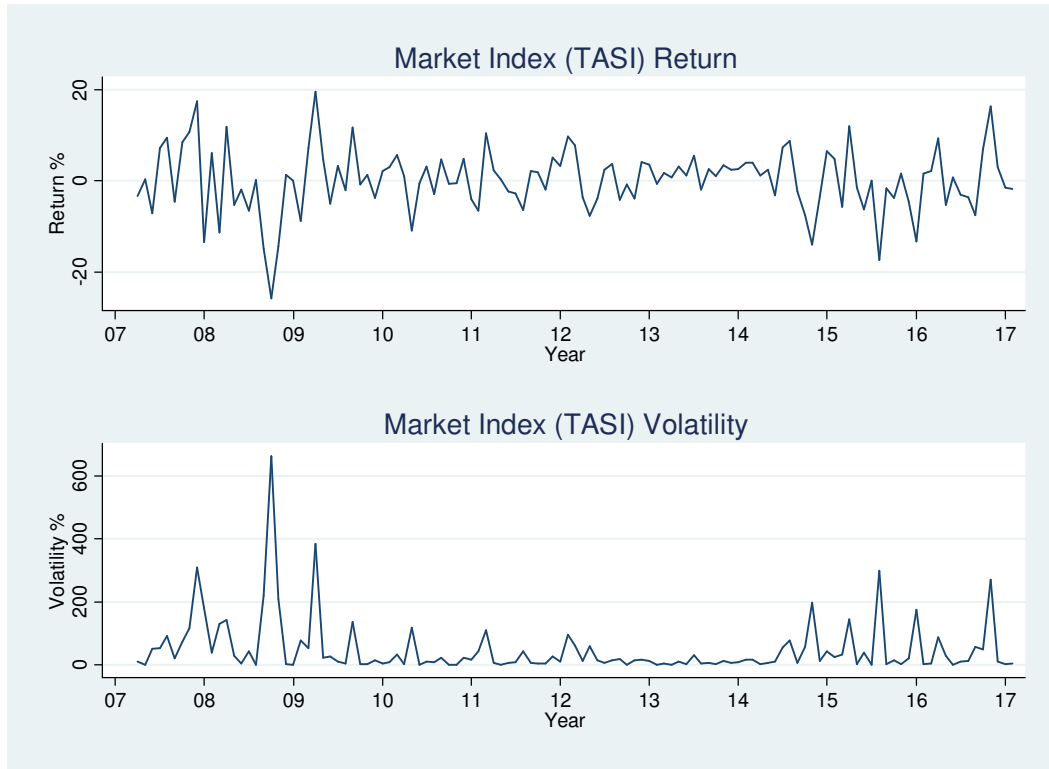
Figure 9: Tadawul All Shares Saudi Index (TASI) return and volatility

To assess any differences between the fund returns and the TASI returns and whether the fund returns outperform the market return index, we perform the *t*-test difference in mean for the non-risk-adjusted returns with the TASI for all the equity funds and NSC funds and with the S&P Saudi Arabia Domestic Shariah index for all the SC funds during the full sample period and for the volatility sub-periods. We observed that all the locally focused equity funds produced a significantly higher return than the market index did for the full sample and for the low-volatility period (June 2009 to June 2014). However, the mean difference between the fund returns and the TASI is positive but not significant for the high- and medium-volatility sub-periods.

To look more closely at the non-risk-adjusted return performance for all types of funds, we report the descriptive statistic and the mean difference for the non-risk-adjusted returns

with the TASI for NSC funds and with the S&P Saudi Arabia Domestic Shariah index for all the SC funds during the full sample period and for the volatility sub-periods. The results for these funds are presented in **Table 3** and **4**, respectively.

Table 3: Average Monthly Return for NSC Equity Mutual Funds – Locally Focused and the TASI

	NSC funds		TASI		Difference
	M (%)	SD	M (%)	SD	in mean
2007	4.838	7.535	4.330	8.306	0.508
2008	-4.586	9.994	-6.157	10.454	1.572
2009	1.825	5.425	2.305	7.784	-0.480
2010	1.216	4.736	0.751	4.484	0.465
2011	-0.070	5.039	-0.150	4.921	0.080
2012	0.665	5.087	0.616	5.372	0.050
2013	2.312	2.363	1.929	2.010	0.383
2014	1.083	6.441	-0.002	6.461	1.084[***]
2015	-0.826	6.254	-1.285	7.417	0.459
2016	-1.159	6.556	-1.175	6.753	0.016
Full sample	0.447	6.370	0.029	6.960	0.418**
High-volatility period	0.179	9.527	-0.461	10.788	0.640
Low-volatility period	1.207	4.191	0.977	4.263	0.230
Medium-volatility period	-0.813	6.742	-1.368	7.200	0.556[**]

Note. The high-volatility period refers to April 2007 to May 2009. The low-volatility period refers to June 2009 to June 2014. The medium-volatility period refers to July 2014 to October 2016. ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

We used these results to test the following hypotheses:

H_2: The average return for the NSC equity funds invested locally differs significantly from the average return for the TASI.

H_3: The average return for the SC equity funds invested locally differs significantly from the average return of the S&P Saudi Domestic Shariah index.

Table 4: Average Monthly Return for SC Equity Mutual Funds – Locally Focused and the S&P Saudi Domestic Shariah Index

	SC funds		S&P Saudi Shariah		Difference
	M (%)	SD	M (%)	SD	in mean
2007	4.497	7.373	4.484	8.326	0.012
2008	-4.466	8.992	-5.938	10.653	1.472
2009	2.217	5.311	2.937	7.782	-0.719
2010	1.121	4.622	1.150	4.607	-0.029
2011	0.111	4.543	0.298	4.596	-0.187
2012	0.987	4.800	1.101	5.141	-0.115
2013	2.270	2.208	2.152	2.285	0.118
2014	0.805	6.198	-0.200	6.643	**1.005**[***]
2015	-1.061	6.438	-1.065	7.676	0.004
2016	-1.394	6.355	-0.538	6.793	**-0.856**[*]
Full sample	0.438	6.094	0.350	7.027	0.088
High-volatility period	0.217	9.045	-0.134	11.041	0.351
Low-volatility period	1.312	3.871	1.329	4.031	-0.017
Medium-volatility period	-1.129	6.612	-1.141	7.396	0.012

Note. The high-volatility period refers to April 2007 to May 2009. The low-volatility period refers to June 2009 to June 2014. The medium-volatility period refers to July 2014 to October 2016. *******, ******, and ***** represent significance at the 1%, 5%, and 10% levels, respectively.

Our results indicate that (1) the NSC funds produced a higher monthly mean return percentage than did their benchmark, although the difference is not significant. One exception, however, is for the year 2014 in which the non-risk-adjusted returns for NSC funds significantly outperformed the returns of their benchmark (**Table 3**); (2) the NSC funds outperformed their benchmark during the full sample period and the medium-volatility period (**Table 3**); (3) In summary, the results for the NSC funds presented in **Table 3** suggest that H_2 cannot be rejected for the year 2014 or for the medium-volatility period or for the full sample period.

As of the SC funds our results presented in **Table 4** indicate that (1) the SC funds produced a significantly higher monthly mean return percentage than did their benchmark during the year 2014 and a lower monthly return than did their benchmark, the S&P Saudi Domestic Shariah index during the year 2016, while there is no significant evidence for the mean difference between the returns of SC funds and their benchmark for the other years; (2) the non-risk-adjusted returns analysis for SC funds shows that there is no evidence that the SC funds either underperformed or outperformed their benchmark in any of the sub-periods or in the full sample period ; (3) In summary, the results for the SC funds presented in **Table 4** mean that H_3 should be rejected for all the sub-periods. However, neither H_3 can be rejected for years 2014 and 2016.

Table 5 presents the yearly returns for all funds, NSC funds, SC funds, and the two benchmarks indices. The yearly return results are also consistent with the average monthly returns for all funds, NSC funds, and SC funds.

6.1.2.   Results for the Risk-Adjusted Return Analysis

In this sub-section, we report results pertaining to the comparative performance of SC and NSC local Saudi equity mutual funds for the entire focal period of 2007 to 2016. The risk-adjusted performance measures are the Sharpe Ratio (SR), the Treynor index (TR), and the Modigliani-Modigliani measure (M^2).

Table 5: Annual Return for All Funds, NSC, and SC Equity Mutual Funds

| | All funds (%) | NSC (%) | SC (%) | Benchmark | |
				TASI (%)	S&P Saudi Shariah (%)
2008	-49.820	-51.8691	-48.402	-56.489	-55.420
2009	26.140	22.250	29.196	27.457	37.245
2010	13.440	14.087	12.983	8.151	13.355
2011	-0.715	-2.143	0.142	-3.066	2.462
2012	9.390	6.719	11.015	5.975	12.439
2013	31.143	31.576	30.891	25.501	28.757
2014	9.107	11.405	7.869	-2.370	-4.831
2015	-13.558	-11.135	-14.732	-17.059	-14.976

Note. The year of 2007 and 2016 are not included in Table 5 as the analysis doesn't cover all months in these two years.

The results of these ratios for all types of funds and their benchmarks, the TASI and the S&P Saudi Domestic Shariah index, are presented in **Table** 6. The results presented in the columns of **Table** 6 for the full sample and the sub-periods can be summarized as follows:

For the full sample (April 2007–October 2016) and in reference to the overall performance of all the local equity mutual funds (39 funds), the Shariah-Compliant funds (25 funds), and the non-Shariah-Compliant funds (14 funds), we observed that (1) all the local equity mutual funds and NSC equity funds have a better SR and TR than their benchmark, the TASI, such that all the local equity mutual funds and NSC equity funds outperformed the market benchmark; (2) the benchmark has a better SR and TR than that of the SC equity mutual funds such that SC equity mutual funds underperform their benchmark.

Table 6: Risk-Adjusted Return Performance Measurements

		Full sample	High-volatility period	Low-volatility period	Medium-volatility period
Benchmark					
TASI	SR	-0.155	-0.360	0.036	-0.372
	TR	-1.501	-3.885	0.152	-2.677
S&P Saudi Shariah	SR	-0.089	-0.322	0.125	-0.331
	TR	-1.180	-3.558	0.504	-2.450
Funds					
All funds	SR	-0.107	-0.350	0.113	-0.350
	TR	-1.260	-3.894	0.500	-2.543
	M^2	0.309	-0.357	1.305	-1.209
NSC funds	SR	-0.107	-0.341	0.091	-0.315
	TR	-1.221	-3.822	0.402	-2.295
	M^2	0.346	-0.250	1.213	-0.957
SC funds	SR	-0.105	-0.355	0.126	-0.369
	TR	-1.289	-4.016	0.522	-2.770
	M^2	0.241	-0.491	1.332	-1.418

Note. SR stands for Sharpe ratio, TR for Treynor Index, M^2 for Modigliani-Modigliani measure, and TASI for Tadawul All Shares Saudi Index. The high-volatility period refers to April 2007 to May 2009. The low-volatility period refers to June 2009 to June 2014. The medium-volatility period refers to July 2014 to October 2016.

For the high-volatility period (April 2007–May 2009), we observed that (1) All local equity mutual funds and NSC equity funds have a slightly better SR and TR than their benchmark; (2) The SR for SC equity funds (-0.355) shows negative risk-adjusted returns similar to their benchmark, i.e., the S&P Saudi Domestic Shariah index (-0.322), however, the benchmark has a better SR than that of the SC equity mutual funds. Similar patterns are also observed for TR, suggesting that SC equity mutual funds underperformed their benchmark.

For the low-volatility period (June 2009–June 2014), we observed that (1) All the local equity mutual funds and NSC equity funds have a better SR and TR than their benchmark ; (2) The SR for SC equity funds (0.126) show positive risk-adjusted returns similar to their benchmark, i.e., the S&P Saudi Domestic Shariah index (0.125), however, the SC equity mutual funds have a slightly better SR than their benchmark; (3) the SC equity mutual funds have a better TR than their benchmark; and (4) The M^2 measure produced the highest value for all funds, NSC funds, and SC funds during this period, indicating that locally focused funds tend to do better during low-volatility periods than other times.

For the medium-volatility period (July 2014–October 2016), we observed the following: (1) All local equity mutual funds and NSC equity funds have a better SR and TR than their benchmark does; and (2) The S&P Saudi Domestic Shariah index has a better SR (-0.331) than the SC equity mutual funds do (-0.369). Similar patterns are also observed for TR, which indicates that the SC equity mutual funds underperformed their benchmark.

In sum, all local equity mutual funds and NSC equity funds outperformed their benchmark for the full sample and in all the volatility sub-periods. However, the SC equity funds underperformed their benchmark for the full sample and in the volatility periods.

6.2.   Empirical Results of Single-Factor CAPM

In this section, we examine the performance of all the local equity mutual funds in the sample including the SC and the NSC funds. To investigate the return performance of the SC and NSC funds, we examine the single-factor CAPM regression for the monthly returns on the equally weighted portfolio of funds for the full sample period and for the volatility sub-

periods: the high-volatility period (April 2007–May 2009), the low-volatility period (June 2009–June 2014), and the medium-volatility period (July 2014–October 2016).

The estimated alpha, beta, and gamma coefficients are presented in **Table 7:** Panel A for all local funds, Panel B for the NSC funds, and Panel C for the SC funds. Note that all equity funds and NSC funds are evaluated against the TASI[10] whereas the SC mutual funds are evaluated against the S&P Saudi Domestic Shariah index.

Table 7: Panel A shows that all the betas are positive, less than 1, and highly significant at the 1% level for the full sample period and for all the volatility sub-periods. This result implies that the fluctuation in the stock market is greater than that of any specific fund per se. In other words, the higher the beta of a fund portfolio, the more volatile the fund compared to the market overall. We observed similar results in estimating the betas for the NSC and SC funds.

A positive alpha denotes that a given fund has outperformed the market return benchmark as well as better fund selectivity on the part of the fund manager of the given fund, whereas a negative alpha demonstrates the opposite. Based on the information reported in **Table 7**, we observed that the alpha values are positive and significant for all the local equity funds and NSC funds during the full sample period and the low-volatility period. This means that these funds outperform the TASI and suggests good fund selectivity on the part of the fund managers of those funds. However, alpha is not significant during the

---

[10] We repeat the regression analysis on the Saudi value-weighted stock market benchmark (SVW) and the results do not change qualitatively (for both CAPM; the single factor and the multifactor model). We constructed SVW using the monthly return of the size-weighted portfolio of all the stocks in the six size-BE/ME portfolios.

Table 7: CAPM Single-Factor Regression

	Full sample		High-volatility period		Low-volatility period		Medium-volatility period	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Panel A: All local funds (39 funds)								
Alpha	0.209	0.314**	-0.008	0.295	0.312**	0.559***	0.123	0.165
	(1.44)	(2.00)	(-0.02)	(0.50)	(2.20)	(3.55)	(0.50)	(0.57)
(R_M-R_F)	0.867***	0.847***	0.829***	0.799***	0.897***	0.896***	0.914***	0.908***
	(43.60)	(36.81)	(18.81)	(15.17)	(26.68)	(28.38)	(28.36)	(22.71)
$(R_M-R_F)^2$		-0.003*		-0.003		-0.014***		-0.001
		(-1.69)		(-1.05)		(-2.95)		(-0.29)
N	115	115	26	26	60	60	28	28
Adj. R^2	0.943	0.944	0.934	0.934	0.923	0.932	0.967	0.966
Panel B: NSC funds (14 funds)								
Alpha	0.248	0.327*	0.053	0.347	0.237*	0.404**	0.353	0.407
	(1.58)	(1.91)	(0.09)	(0.53)	(1.69)	(2.49)	(1.33)	(1.29)
(R_M-R_F)	0.887***	0.872***	0.849***	0.819***	0.949***	0.949***	0.924***	0.916***
	(41.39)	(34.93)	(17.15)	(13.77)	(28.48)	(29.14)	(26.34)	(21.06)
$(R_M-R_F)^2$		-0.002		-0.003		-0.009*		-0.001
		(-1.17)		(-0.90)		(-1.94)		(-0.33)
N	115	115	26	26	60	60	28	28
Adj. R^2	0.938	0.938	0.921	0.921	0.932	0.935	0.962	0.961
Panel C: SC funds (25 funds)								
Alpha	-0.092	-0.064	-0.366	-0.251	0.017	0.209	-0.281	-0.227
	(-0.66)	(-0.42)	(-0.79)	(-0.46)	(0.14)	(1.59)	(-0.96)	(-0.66)
(R_M-R_F)	0.847***	0.842***	0.798***	0.787***	0.933***	0.934***	0.880***	0.873***
	(44.80)	(37.91)	(20.26)	(16.25)	(32.35)	(34.11)	(22.98)	(19.22)
$(R_M-R_F)^2$		-0.001		-0.001		-0.012***		-0.001
		(-0.47)		(-0.43)		(-2.71)		(-0.31)
N	115	115	26	26	60	60	28	28
Adj. R^2	0.946	0.946	0.942	0.940	0.947	0.952	0.951	0.950

Note. The table presents the regression results for equally weighted portfolio of all local equity funds, Shariah Compliant (SC) funds and non-Shariah Compliant (NSC) funds during the study sample period 2007:04 to 2016:10. The high-volatility period refers to April 2007 to May 2009. The low-volatility period refers to June 2009 to June 2014. The medium-volatility period refers to July 2014 to October 2016. R_M stands for the market return for the corresponding benchmark, R_F for the risk-free return proxies by the three-month Saudi Interbank Offering Rate (SIBOR), N for the number of observations in panels A, B and C, respectively. The t statistics values are in parentheses and *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

medium- and high-volatility sub-periods. For the SC funds, the alpha is not significant for the full sample or for all the volatility sub-periods. This result suggests that SC fund managers do not show any significant fund selectivity. These findings are consistent with the various risk-adjusted measures presented in **Tables 4** to **6**.

Moreover, **Table 7** shows that the coefficients associated with the quadratic term (i.e., gamma coefficient) of excess returns for all the portfolios (**Equation 6**) are not significant for the SC funds or the NSC funds for either the medium- or the high volatility sub-periods. This result suggests that the fund managers tried to time the market but that their activities ended up showing perverse or no market timing. However, the quadratic term of all the funds, the SC funds, and the NSC funds is negative and significant during the low-volatility period. The market timing coefficient is also significantly negative for all local funds during the full sample period. That is, the negative value for market timing indicates that fund managers do not demonstrate superior selection ability in terms of adjusting their fund exposure to the market before it swings in regard to capturing the upside and avoiding the downside.

6.3.   Empirical Results of the Four-Factor Model

The regression results from **Equation 7**, the Carhart (1997) four-factor model, on the equally weighted portfolio of all local funds, are reported in **Table 8**. Note that all the alpha values are significantly positive for all local funds and NSC funds for the full sample period and the low-volatility sub-period. However, alpha is not significant for the other two sub-periods. This result means that after small stocks, book-to-market, and momentum are

Table 8: Equally Weighted Four-Factor Model

	Full sample	High-volatility period	Low-volatility period	Medium-volatility period
Panel A: All local funds (39 funds)				
Alpha	0.256*	0.291	0.329**	0.263
	(1.68)	(0.57)	(2.13)	(0.94)
R_M-R_F	0.862***	0.828***	0.902***	0.914***
	(42.41)	(18.83)	(25.33)	(26.07)
SMB	0.086	0.302	-0.007	0.162
	(1.51)	(1.71)	(-0.13)	(1.19)
HML	-0.007	-0.012	0.000	-0.025
	(-0.26)	(-0.17)	(0.01)	(-0.26)
MMC	0.046	0.202*	-0.029	0.113
	(1.34)	(2.05)	(-0.89)	(0.95)
N	115	26	60	28
Adj. R^2	0.944	0.940	0.920	0.967
Panel B: NSC funds (14 funds)				
Alpha	0.303*	0.378	0.273*	0.453
	(1.85)	(0.66)	(1.79)	(1.53)
R_M-R_F	0.880***	0.848***	0.949***	0.914***
	(40.31)	(17.09)	(26.90)	(24.50)
SMB	0.111*	0.338	0.009	0.260*
	(1.80)	(1.69)	(0.16)	(1.80)
HML	0.016	0.004	0.018	0.077
	(0.54)	(0.05)	(0.65)	(0.75)
MMC	0.066*	0.234**	-0.022	0.200
	(1.80)	(2.10)	(-0.68)	(1.58)
N	115	26	60	28
Adj. R^2	0.938	0.928	0.930	0.963
Panel C: SC funds (25 funds)				
Alpha	-0.048	-0.118	0.043	-0.173
	(-0.33)	(-0.25)	(0.34)	(-0.52)
R_M-R_F	0.843***	0.798***	0.934***	0.880***
	(43.81)	(19.97)	(30.78)	(21.25)
SMB	0.090	0.242	0.012	0.210
	(1.64)	(1.47)	(0.26)	(1.28)
HML	-0.005	-0.023	0.007	0.007
	(-0.19)	(-0.34)	(0.32)	(0.06)
MMC	0.057*	0.172*	-0.017	0.189
	(1.73)	(1.88)	(-0.65)	(1.30)
N	115	26	60	28
Adj. R^2	0.947	0.946	0.944	0.950

Note. The table presents the times series regression results for all the local equity funds, Shariah Compliant (SC) funds, and non- Shariah Compliant (NSC) funds during the study sample period of April 2007 to October 2016. The high-volatility period refers to April 2007 to May 2009. The low-volatility period refers to June 2009 to June 2014. The medium-volatility period refers to July 2014 to October 2016. The equally weighted portfolio is constructed monthly by measuring the average returns of all funds for that month. R_M stands for the market return for the corresponding benchmark, R_F for the risk-free return and as risk proxies by the three-month Saudi Interbank Offering Rate (SIBOR), *SMB* and *HML* for the factor-mimicking portfolios for size and book-to-market, and *MMC* for a factor-mimicking portfolio for the 12-month return momentum. The t statistics values are in parentheses and * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

controlled for, on average, no local equity mutual funds or NSC local equity mutual funds significantly outperformed the Saudi stock market during the high- and medium-volatility sub-periods. The results reported for **Table 8**: Panel A and B show that the monthly abnormal performance of all local funds and NSC local equity funds relative to the TASI are 0.329 and 0.273, respectively, during the low-volatility period. Furthermore, the monthly abnormal performance reported for all local funds and NSC local equity funds relative to the TASI index are 0.256 and 0.303, respectively, during the full sample period. On the other hand, the alpha values for the SC local equity mutual funds were non-significant at all levels and for all the volatility sub-periods.

Table 8 also shows that all the market betas are positive, less than 1, and highly significant for the full sample and for all the volatility sub-periods. For the other factors (i.e., SMB, HML, and MMC), we observed the following: (1) The coefficient of the SMB for all the local funds and for the NSC funds is positive for the high- and medium-volatility sub-periods, which indicates that small-cap companies increase abnormal performance. However, the SMB coefficient is not significant. One exception is that during the medium-volatility period and the full sample period, the SMB of the NSC funds is positive and significant; (2) The results from the HML risk factor indicate that none of the local equity mutual funds, none of the NSC local equity mutual funds, and none of the SC local equity mutual funds is sensitive to the HML risk factor: that is, none of these funds has significant exposure to the growth stock factor. Further, the results from the MMC risk factor indicate that the NSC local equity mutual funds and the SC local equity mutual funds are sensitive to the MMC risk factor during the full sample period. The results also indicate that all the local equity mutual funds,

NSC funds, and SC funds are sensitive to the MMC risk factor during the high-volatility period. However, none of these funds has significant exposure to the momentum factor during the low- and medium-volatility periods.

As a step further, we estimate the exposure that each fund has to each of the four risk factors by estimating the Carhart (1997) four-factor model for each fund (**Equation 7**). **Table 9** shows the average estimates for the alpha and the other factors for all individual funds. These results are based on the benchmark results of TASI for all the local equity funds and NSC equity funds and on the S&P Saudi Domestic Shariah Index for the SC funds. The table presents the average loadings for each equity mutual fund and the percentage of equity mutual funds with a coefficient statistically significant at the 5 and 10% levels. The coefficients are estimated using the pooled Ordinary Least Squares (OLS) method.

Table 9: Local Equity Funds Loadings on the Four-Factor Model Results

		α	β_M	β_{SMB}	β_{HML}	β_{MMC}
Panel A: Full sample						
All funds	Mean	0.247	0.872	0.067	-0.014	0.027
	% sig. at 5% level	25.64	0.00	12.82	2.56	7.69
	% sig. at 10% level	43.59	100.00	25.64	10.26	12.82
NSC funds	Mean	0.283	0.874	0.101	0.023	0.058
	% sig. at 5% level	28.57	0.00	14.29	7.14	14.29
	% sig. at 10% level	50.00	100.00	35.71	7.14	14.29
SC funds	Mean	-0.042	0.861	0.077	-0.013	0.043
	% sig. at 5% level	4.00	0.00	20.00	0.00	8.00
	% sig. at 10% level	20.00	100.00	28.00	0.00	16.00

		α	β_M	β_{SMB}	β_{HML}	β_{MMC}
Panel B: High-volatility period						
All funds	Mean	0.195	0.821	0.289	-0.029	0.197
	% sig. at 5% level	4.35	0.00	13.04	0.00	8.70
	% sig. at 10% level	13.04	100.00	26.09	8.70	30.43
NSC funds	Mean	0.278	0.843	0.338	-0.009	0.239
	% sig. at 5% level	0.00	0.00	22.22	0.00	22.22
	% sig. at 10% level	0.00	100.00	33.33	22.22	33.33
SC funds	Mean	-0.263	0.789	0.219	-0.042	0.158
	% sig. at 5% level	14.29	0.00	0.00	0.00	0.00
	% sig. at 10% level	14.29	100.00	21.43	0.00	21.43
Panel C: Low-volatility period						
All funds	Mean	0.329	0.913	-0.016	-0.004	-0.024
	% sig. at 5% level	33.33	0.00	2.56	2.56	0.00
	% sig. at 10% level	53.85	100.00	7.69	10.26	0.00
NSC funds	Mean	0.243	0.937	0.018	0.019	-0.014
	% sig. at 5% level	42.86	0.00	0.00	7.14	0.00
	% sig. at 10% level	57.14	100.00	7.14	14.29	0.00
SC funds	Mean	0.083	0.944	0.003	-0.001	-0.008
	% sig. at 5% level	12.00	0.00	8.00	4.00	0.00
	% sig. at 10% level	12.00	100.00	20.00	8.00	0.00
Panel D: Medium-volatility period						
All funds	Mean	0.263	0.914	0.162	-0.025	0.113
	% sig. at 5% level	7.69	0.00	2.56	2.56	5.13
	% sig. at 10% level	12.82	100.00	10.26	2.56	10.26
NSC funds	Mean	0.453	0.914	0.260	0.077	0.200
	% sig. at 5% level	7.14	0.00	7.14	0.00	7.14
	% sig. at 10% level	14.29	100.00	14.29	0.00	21.43
SC funds	Mean	-0.173	0.880	0.210	0.007	0.189
	% sig. at 5% level	8.00	0.00	8.00	4.00	8.00
	% sig. at 10% level	8.00	100.00	24.00	8.00	16.00

Note. The table shows the results from the estimation of the Carhart four-factor model during the study sample period of April 2007 to October 2016 for each fund individually. The high-volatility period refers to April 2007 to May 2009. The low-volatility period refers to June 2009 to June 2014. The medium-volatility period refers to July 2014 to October 2016. *Mean* is the average value of the estimated coefficient. *% sig. at 5% (10%) level* is the proportion of funds with significant coefficient values at 5% (10%). *SMB* and *HML* factor-mimicking portfolios for size and book-to-market. *MMC i*s a factor-mimicking portfolio for the 12-month return momentum.

The empirical results presented in Table 9 can be summarized as follows: (1) During the full sample period (Panel A) 25.64% (43.59%) of all the equity mutual funds significantly outperformed the TASI Index at the 5% (10%) significance level. In terms of the NSC funds, 28.57% (50%) produced a significant abnormal return when evaluated against the TASI at the 5% (10%) significance level. However, 4% (20%) of the SC funds significantly underperformed the S&P Saudi Domestic Shariah at the 5% (10%) significance level, with an average estimated alpha of -0.042 per SAR per month; (2) During the high-volatility period (Panel B), 4.35% (13.04%) of all equity mutual funds significantly outperformed the TASI at the 5% (10%) significant level. However, none of the NSC funds produced a significant abnormal return when evaluated against the TASI index. In terms of the SC funds, 14.29% of the funds significantly underperformed the S&P Saudi Domestic Shariah with an average estimated alpha of -0.263 per SAR per month; (3) During the low-volatility period (Panel C) and for all the equity funds and NSC funds, the average fund significantly outperformed the TASI: 33.33% (42.86%) of all funds (NSC funds) produced a significant abnormal return at the 5% significance level with an average estimated alpha of 0.329 (0.243) per SAR per month. Further, 53.85% (57.14%) of all funds (NSC funds) produced significant abnormal returns at the 10% significant level. In regard to the SC funds, 12% outperformed the S&P Saudi Domestic Shariah index. This confirms the results of Table 8, as it shows a significant positive alpha for all local funds and NSC funds in the period of low volatility; (4) During the medium-volatility period (Panel D), 7.7% of all equity funds produced a significant positive alpha at the 5% significant level and 7.14% of NSC funds outperformed the TASI at the 5 % significant alpha. Further, 12.82% of all equity funds produced a significant positive alpha at the 10%

significance level and 14.29% of NSC funds outperformed the TASI at the 10% significance level. On the other hand, 8% of the SC funds underperformed the S&P Saudi Domestic Shariah index at the 10% significance level with an average estimated alpha of -0.17 per SAR per month; (5) All the results associated with the market loading, under column β_M, are on average positive (less than 1) and highly significant, as 100% of funds produced significant β_M at the 10% significance level; (6) The size, the growth stock, and the momentum effect have no effect or very little effect on the local, NSC, or SC equity funds portfolio returns across the volatility periods.

6.4. Subscribers and Fund Alpha

As noted in Section 4, the equity funds showed the greatest decline in the number of subscribers. More specifically, we considered here the subscribers to the locally focused equity mutual funds and its relation with the growth of these funds and found a similar pattern to that shown in
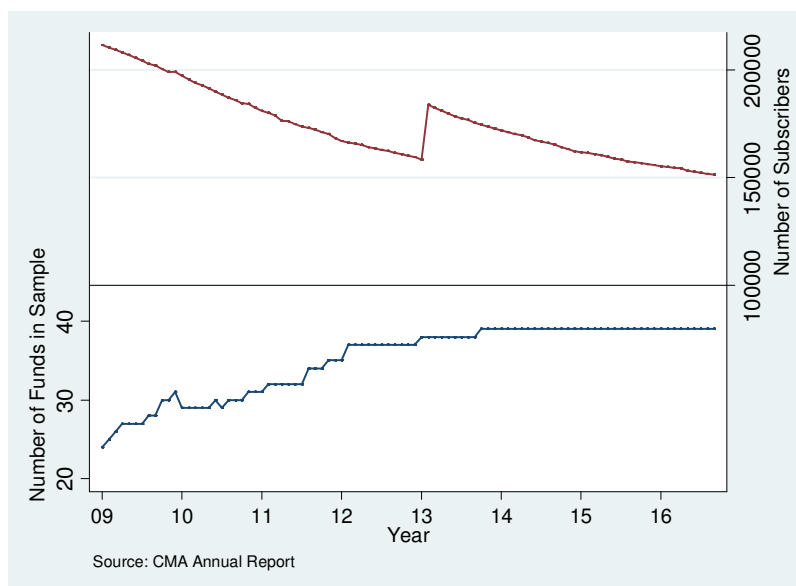

Source: CMA Annual Report

Figure 10: Growth in locally focused equity mutual fund market and number of subscribers

Figure 6, i.e., locally focused mutual equity funds witnessed a growth in the number of funds over the last decade, however, the subscribers to such funds decreased at an average annual rate of 516 subscribers (Figure 10).

We speculate that one of the reasons for this decrease is the performance of the equity mutual funds and whether they outperform or underperform the market more generally. In order to test this claim, we studied how the number of subscribers changed over time especially for the funds with the highest estimated alphas and with the lowest estimated alphas for the SC funds and for the NSC funds (**Figure 11–14**).
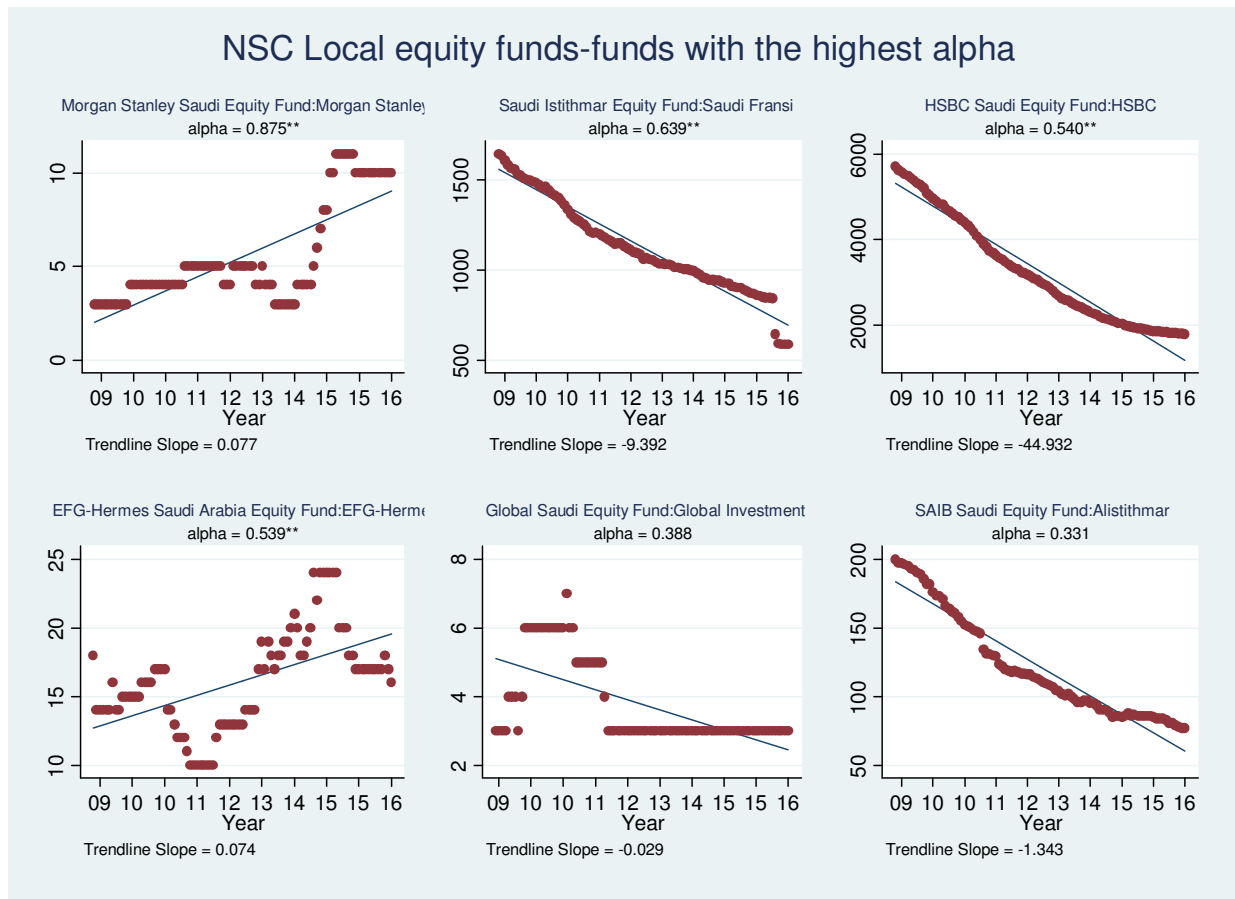

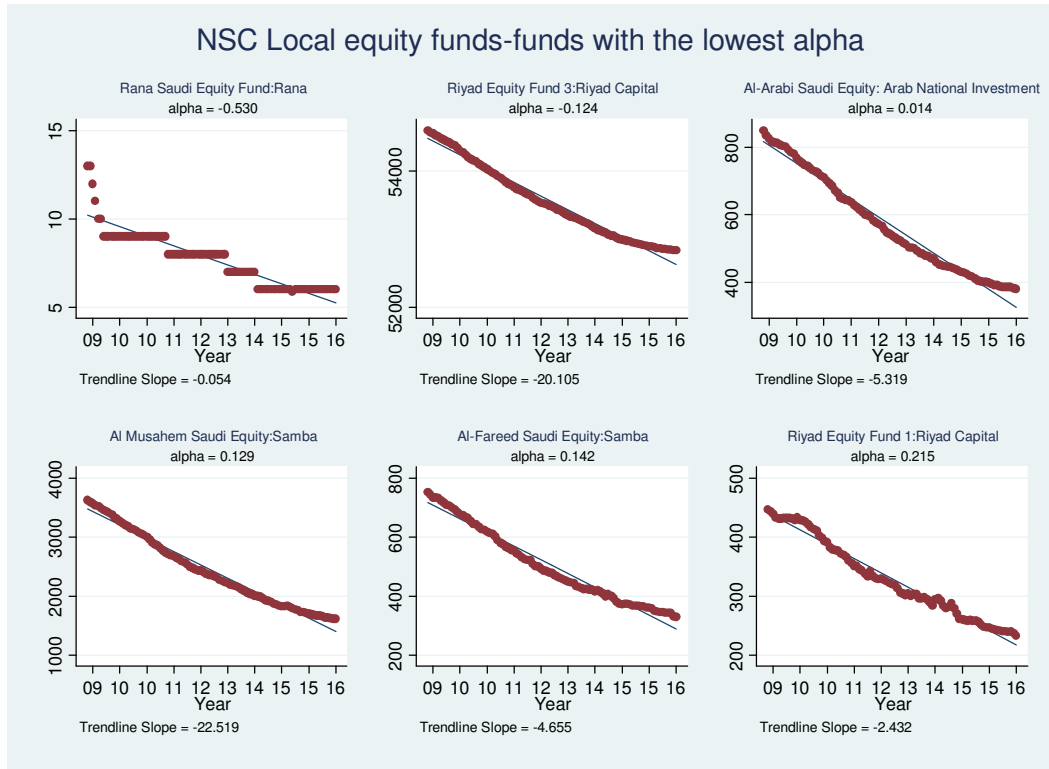**Figure 11: Locally invested NSC funds with the highest estimated alpha**

Figure 12: Locally invested NSC funds with the lowest estimated alpha

As can be seen in **Figure 11** and **Figure 12**, the number of subscribers declined for the NSC funds with the highest-estimated alpha (with some exceptions where the trend line has a positive slope for few funds) and for the funds with the lowest-estimated alpha. However, the decline is more pronounced with the lowest-ranked alpha. In other words, NSC funds that are outperforming the market are losing subscribers at a slower rate than those underperforming the market. We regressed the number of subscribers on alpha, and the results showed that the number of subscribers is highly positively correlated with the alpha ($R^2 = 0.98$). These results confirm the trend line results above whereby the decline is more pronounced for funds with the lowest-ranked alpha. These results are not surprising given our earlier results (Sections 6.2 and 6.3).
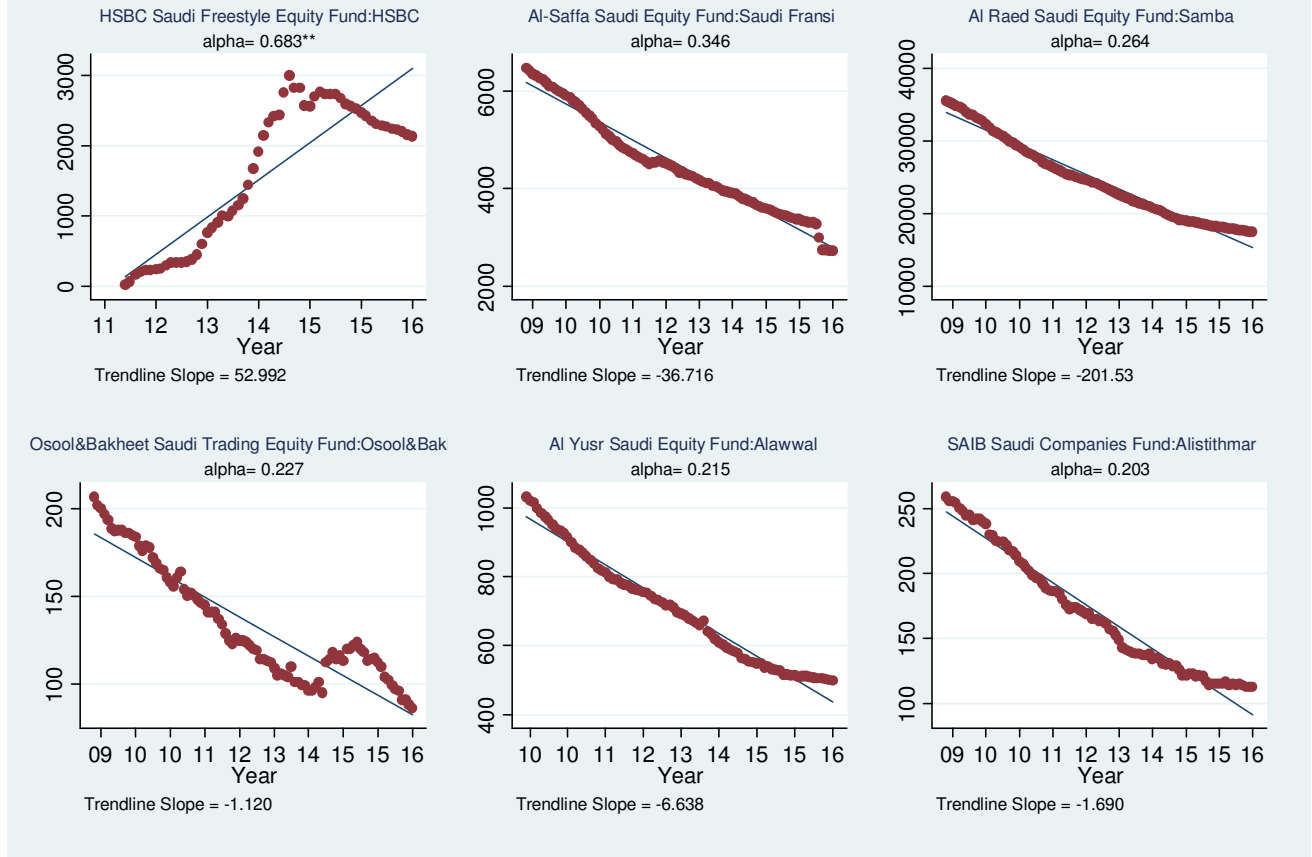
Figure 13: Locally invested SC funds with the highest estimated alpha

In regard to the SC funds (**Figure 13** and **Figure 14**), we found that the number of subscribers declined both for funds with the highest-estimated alpha and for funds with the lowest-estimated alpha. However, the decline is equally pronounced with the lowest-estimated alpha. This means that other factors have a role in accounting for the reported pattern for subscribers. Examples of these factors could be the subscribers' past experiences, fund fees, investor's attitudes.
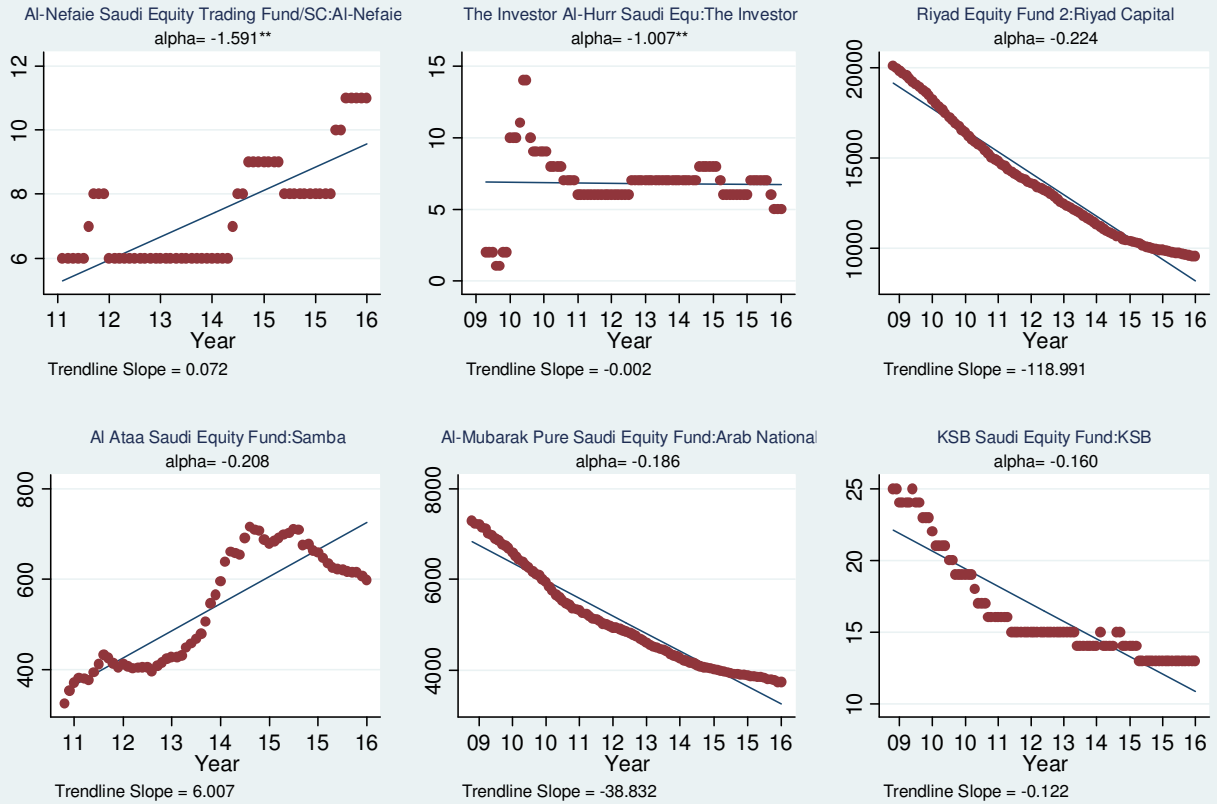
Figure 14: Locally invested SC funds with the lowest estimated alpha

Section 7

Conclusion and Policy Recommendations

In this study, we investigated the performance of locally focused equity mutual funds in order to identify funds that have the greatest expected return for a given level of risk, specifically using the risk-adjusted return performance measurements, i.e., the Sharpe ratio, TR, M^2, the CAPM single-factor, and the Carhart four-factor model. A summary of our findings for the performance of locally focused funds is given next.

7.1.   Conclusion

- **The non-risk-adjusted returns analysis reveals the following:**

- The locally focused equity funds produced a significantly higher return than the TASI for the full sample period and during the low-volatility period (January 2010–June 2014). Further, the locally focused equity funds also produced a significantly higher mean return percentage than the TASI return for the years 2008 and 2014.

- The NSC funds produced a significantly higher return than the TASI for the full sample period and during the medium-volatility period (July 2014–October 2016). Further, the NSC funds also produced a significantly higher mean return percentage than the TASI for the year of 2014. Please note that there is no statistical evidence that the NSC funds produced a higher return percentage than the TASI returns for the other years, as the differences between the NSC mutual funds return and their respective benchmark turned out to be non-significant.

- There is no evidence that the SC funds underperformed or outperformed their benchmark, the S&P Saudi Domestic Shariah index, in any of the sub-periods. However, the SC funds produced a significantly higher mean return percentage than did their benchmark during the year 2014 and a significantly lower return than did their benchmark during the year 2016.

- **Results based on the risk-adjusted risk measures (SR, TR, and M^2) indicate the following:**

- All the local equity mutual funds and NSC equity funds have a slightly better SR and TR than their benchmark during the high-volatility period. However, SC equity mutual funds slightly underperformed their benchmark on the basis of the SR and TR measures.

- All the local equity mutual funds and NSC equity funds outperformed their benchmark for the full sample and during the low- and medium-volatility period on the basis of the SR and TR measures. However, the SC equity mutual funds underperformed their benchmark on the risk measures, i.e., the SR and TR ratios.

- The M^2 measure produced the highest value for all funds, NSC funds, and SC funds during the low-volatility periods, indicating that locally focused funds tend do better during low-volatility periods than other times.

- In sum and on the basis of the SR and TR measures, all the local equity mutual funds and NSC equity funds outperformed their benchmark. However, the SC equity mutual funds underperformed their benchmark on the basis of the SR and TR measures.

- **When the single-factor CAPM is used, the major results are as follows:**

- The alpha values are positively significant for all the local equity funds and NSC funds for the full sample and during the low-volatility period. Put differently, all the equity funds and NSC funds appeared to outperform their benchmark for the full sample and during the low-volatility period. Further, none of the SC funds outperformed the market, as Jensen's alpha for these funds is not significant for the full sample period or for any of the volatility sub-periods.

- All betas (i.e., systematic risk) are positive, less than 1, and highly significant for the full sample period and for all the volatility sub-periods. In other words, the NSC funds are less volatile than the TASI and the SC funds are less volatile than the S&P Saudi Domestic Shariah index.

- The market-timing coefficient for all the local funds, SC funds, and NSC funds is negative but not significant. One exception is that during the low-volatility period, the market-timing coefficient of all the funds and the NSC funds is negative and significant. The market-timing coefficient is also significantly negative for all local funds during the full sample period. Put differently, the fund managers for the NSC funds, SC funds, and all locally focused funds did not demonstrate market-timing skills during the low-volatility period. Neither did the fund managers for all the local funds demonstrate market-timing skills during the full sample period. However, we did not find any evidence pertaining to market timing for the other periods.

- **When the average estimates for the alpha and the other factors for all the individual funds are used, we made the following observations for the full sample period and the low-volatility period:**

  - During the full sample period: (1) 25.64% (43.59%) of all equity mutual funds significantly outperformed the TASI at the 5% (10%) significance level; (2) 28.57% (50%) of the NSC funds outperformed the TASI at the 5% (10%) significance level; (3) 4% (20%) of the SC funds significantly underperformed the S&P Saudi Domestic Shariah index at the 5% (10%) significance level.

  - During the low-volatility period: (1) 33.33% (53.85%) of all equity mutual funds significantly outperformed the TASI at the 5% (10%) significance level; (2) 42.86% (57.14%) of the NSC funds outperformed the TASI at the 5% (10%) significance level; (3) 12% (12%) of the SC funds significantly outperformed the S&P Saudi Domestic Shariah index at the 5% (10%) significance level.

- **Based on the four-factor model, we offer the following results:**

- When small stocks, book-to-market, and momentum are controlled for, the locally focused equity mutual funds and NSC funds outperformed the Saudi stock market for the full sample and during the low-volatility period, which confirms the results of the single-factor model.

- When small stocks, book-to-market, and momentum are controlled for, none of the SC mutual funds outperformed or underperformed their benchmark, which confirms the results of the single-factor model.

- All local funds, NSC funds, and SC funds are less volatile than their benchmarks, as their betas are positive, less than 1, and highly significant for the full sample and for all the volatility sub-periods.

7.2.   Policy Recommendations

Based on the findings of this study, we summarize policy recommendations that are relevant to both the CMA and the mutual funds industry:

1. Create and build a coherent and comprehensive database for the mutual funds industry in Saudi Arabia: A database of this kind could be used to assess the industry more frequently if the following steps are taken:

    a. A clear data template for the mutual funds industry to fill out is created and used.

    b. Training and clear instructions on how to fill out the template in order to ensure consistency are provided.

    c. The mutual funds industry is encouraged to disclose data in a timely way.

    d. The data collection process is monitored by checking the received data and making sure that all fields are filled out.

    e. The data are cleaned and made available to researchers and industry professionals.

2. Encourage independent bodies to produce and disseminate consumer reports on the mutual funds industry: These reports could serve as a reliable source for investors seeking to purchase mutual funds shares and as a reference for investors to consult in order to select appropriate mutual funds. Internationally, reports of this nature

are regarded as a reliable reference from which mutual funds consumers can obtain ratings of various products. This could enhance the competitive environment among mutual funds and assist consumers seeking to exceed average market returns. Further, reports might also reduce the decline in the total number of subscribers to equity mutual funds, which has been a marked trend in recent years.

3. Conduct research on mutual funds investors: A diagnostic study should be conducted with the purpose of examining mutual funds subscribers' satisfaction, trading behavior, and the reasons behind the marked decline in the total number of subscribers to equity mutual funds is essential at this stage.

4. Continue and strengthen the collaboration between the mutual funds industry and academia to enable a more accurate and broader understanding of issues important to the industry. Additional ongoing research on mutual funds industry issues should be pursued.

5. Formulate a shared strategy whereby the mutual funds industry can play a role in improving the operation of the industry as a whole. It is recommended that the CMA and the mutual funds industry make it a priority to engage in an in-depth discussion of their most pressing respective concerns to determine whether these can best be addressed via a shared strategy.

References

Abdelsalam, O., Duygun, M., Matallín-Sáez, J. C., & Tortosa-Ausina, E. (2014). Do ethics imply persistence? The case of Islamic and socially responsible funds. *Journal of Banking & Finance, 40*(3), 182-194.

Agnesens, J. (2013). A statistically robust decomposition of mutual fund performance. *Journal of Banking & Finance, 37*(10), 3867-3877.

Amin, G. S., & Kat, H. M. (2003). Hedge fund performance 1990-2000: Do the "money machines" really add value? *Journal of Financial and Quantitative Analysis, 38*(2), 251-274.

Ashraf, D. (2013). Performance evaluation of Islamic mutual funds relative to conventional funds: Empirical evidence from Saudi Arabia. *International Journal of Islamic and Middle Eastern Finance and Management, 6*(2), 105-121.

Babalos, V., Mamatzakis, E. C., & Matousek, R. (2015).The performance of US equity mutual funds. *Journal of Banking & Finance, 52,* 217-229.

Bertin, W. J., & Prather, L. (2009). Management structure and the performance of funds of mutual funds. *Journal of Business Research, 62*(12), 1364-1369.

Bodie, Z., Kane, A., & Marcus, A. (2011). *Investment and portfolio management.* New York: McGraw-Hill Irwin.

Carhart, M. M. (1997). On persistence in mutual fund performance. *The Journal of Finance, 52*(1), 57-82.

Chen, F., Sanger, G. C., & Slovin, M. B. (2013). Asset sales in the mutual fund industry: Who gains? *Journal of Banking & Finance, 37*(12), 4834-4849.

Eling, M., & Faust, R. (2010). The performance of hedge funds and mutual funds in emerging markets. *Journal of Banking & Finance, 34*(8), 1993-2009.

Ernst & Young (2015). Mutual Funds: Ready for the next leap. Retrieved from http://www.ey.com/Publication/vwLUAssets/ey-mutual-funds-ready-for-the-next-leap/$FILE/ey-mutual-funds-ready-for-the-next-leap.pdf

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics, 33*(1), 3-56.

Hunter, D., Kandel, E., Kandel, S., & Wermers, R. (2014). Mutual fund performance evaluation with active peer benchmarks. *Journal of Financial Economics, 112*(1), 1-29.

Jensen, M. C. (1968). The performance of mutual funds in the period 1945–1964. *The Journal of Finance, 23*(2), 389-416.

Mahmud, M., & Mirza, N. (2011). An evaluation of mutual fund performance in an emerging economy: The case of Pakistan. *The Lahore Journal of Economics, 16*, 301-316.

Matallín-Sáez, J. C., Soler-Domínguez, A., & Tortosa-Ausina, E. (2014). On the informativeness of persistence for evaluating mutual fund performance using partial frontiers. *Omega, 42*(1), 47-64.

Merdad, H., Hasan, M. K., & Alhenawi, Y. (2010). Islamic versus conventional mutual funds performance in Saudi Arabia: A case study. *Islamic Economics, 23*(2), 157-192.

Merdad, H., Hassan, M. K., & Khawaja, M. (2016). Does faith matter in mutual funds investing? Evidence from Saudi Arabia. *Emerging Markets Finance and Trade, 52*(4), 938-960.

Modigliani, F., & Modigliani, L. (1997). Risk-adjusted performance. *The Journal of Portfolio Management, 23*(2), 45-54.

Namvar, E., & Phillips, B. (2013). Commonalities in investment strategy and the determinants of performance in mutual fund mergers. *Journal of Banking & Finance, 37*(2), 625-635.

Patro, D. K. (2001). Measuring performance of international closed-end funds. *Journal of Banking & Finance, 25*(9), 1741-1767.

Sharpe, W. F. (1966). Mutual fund performance. *The Journal of Business, 39*(1), 119-138.

Treynor, J., & Mazuy, K. (1966). Can mutual funds outguess the market? *Harvard Business Review, 44*(4), 131-136.

Vidal-García, J. (2013). The persistence of European mutual fund performance. *Research in International Business and Finance, 28*, 45-67.

Zivot, E., & Andrews, D. W. K. (2002). Further evidence on the great crash, the oil-price shock, and the unit-root hypothesis. *Journal of Business & Economic Statistics, 20*(1), 25-44.