“Performance evaluation of Saudi equity mutual funds: Fama decomposition model”

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PERFORMANCE EVALUATION OF SAUDI EQUITY MUTUAL FUNDS: FAMA DECOMPOSITION MODEL

Abstract

This paper is in pursuit of analyzing and elongating prior research on the performance evaluation of mutual funds by a comparative analysis with three categories of 82 Saudi equity funds during 2011 to 2016 using Fama's decomposition model. The paper also made an attempt to explore the relationship with the risk reward ratio to the relative performance measure in predicting the future performance of the Saudi equity fund returns. The empirical results show that Saudi local equity funds perform better followed by Arabian and international/global equity funds in terms of expected signs and diagnostic tests.

Keywords mutual funds, Saudi Arabia, performance evaluation, Fama decomposition measure

JEL Classification G0, G1

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INTRODUCTION

Asset and wealth management industry has long played a prominent role in the sphere of Saudi Arabian financial market. Saudi Arabia is a regional leader in mutual fund activity and has led to the recent GCC expansion of the segment, both in terms of fund classes and volumes, in areas such as private equity and venture capital. In 1979, Saudi Arabia became the first country in the Gulf Cooperation Council (GCC) to feature a mutual fund, a short-term US dollar-denominated instrument established by National Commercial Bank, sparking an appetite for similar investment vehicles in markets around the Gulf (The Report: Saudi Arabia, 2016). As a regional leader and center of mutual fund activity, Saudi Arabia is the largest fund domicile in the GCC and the second largest in the Middle East and North Africa (MENA) region, accounting for USD 26.2 billion of the USD 79.6 billion MENA fund market as of mid-2015, according to Zawya. The saturated market of developed economies and the recent opening of Saudi Arabian Stock Exchange (Tadawul) to qualified foreign investors in June 2015, Saudi Arabian mutual fund industry and its performance of the funds grabs the attention of international investors. According to EY GCC wealth and asset management report 2015, as of July 2015, GCC mutual fund market accounted for USD 36 billion in assets, across 375 funds, the major contributor Saudi Arabia accounts for 80% of the total. Saudi Arabia hosts a total of 276 funds with 44 fund managers as of November 2016. Table 1 summarizes the category wise funds domiciled in Saudi Arabia.

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Table 1. Category wise funds domiciled in Saudi Stock Exchange

Source: Saudi Stock Exchange: Tadawul (2016).

S.No	Funds by category	Number of funds
1	Equity funds – local	102
2	Equity funds – international/global	28
3	Equity funds – US	4
4	Equity funds – European	3
5	Equity funds – Asian	7
6	Equity funds – Arabian	28
7	Bond/debt funds – international	7
8	Money market funds – international	5
9	Money market funds – local	12
10	Money market funds – foreign currency Murabaha	7
11	Money market funds – Saudi riyal Murabaha	20
12	Equity funds – GCC	5
13	Funds of funds	3
14	Balanced funds – international	22
15	Balanced funds – local	4
16	Real estate funds	12
17	Multi-asset funds	4
18	Other funds	3

It is evident from Table 1 that Saudi mutual funds are highly concentrated on equities, which account for nearly 62% of the total funds. The present research study thus focused on analyzing the performance of equity funds – local, equity funds – international and equity funds – Arabian for being the reason of high concentration and the type of funds that primarily invest in equities.

1. PERFORMANCE EVALUATION OF MUTUAL FUNDS

While evaluating the mutual funds, two factors are considered important, namely investment performance and risk, involved among a vast number of factors that affect the mutual fund records (Kothari & Warner, 2001). As highlighted by Strong (2008) the essence of performance evaluation of any investment is to associate the returns realized with a measure of risk. It is also evident from the previous literatures like Treynor (1965) that traditional measures, though evaluating the returns with beta as a measure of systematic risk, ignore the diversifiable risk or residual risk. In contrast to Treynor (1965), Sharpe (1964) measures and assesses the total risk to realized returns. On the other hand, Jensen (1968) ranked the mutual funds based on Jensen's Alpha estimated by applying Capital Asset Pricing Model.

Even though these measures evaluate the risk and returns of investment funds, it is instructive to investigate the reasons behind a superior or substandard performance of an investment fund. One method for doing so is Fama's return decomposition developed by Eugene Fama in 1972. As compared with any other performance evaluation measure, Fama decomposition measure manifests a superior performance in evaluating mutual funds competence to earn excess returns and also decomposes the returns at different risk levels. Fama decomposes the excess return from the risk free rate into two components: risk premium for bearing risk and risk premium due to selectivity. On the other hand, the total risk is decomposed into manager's risk and investor's risk.

The present research thus attempts to segregate the investment performance of Saudi equity funds into three components: the returns investor chose to take, the added return the manager chose to seek and the return from the manager's good selection of securities. A further attempt to identify the discrete contribution of each performance measure that greatly influences the fund returns using regression model is also made.

2. LITERATURE REVIEW

Literatures on performance evaluation of mutual funds date back in 1960's, initiated by Treynor (1965) who introduced the concept of fund performance and a measure for rating fund management performance. As further extension to Treynor's work, many performance evaluation measures were proposed by Sharpe (1964), Jensen (1968), and Fama (1972) and tested in various fund markets. Extensive available research in European and Asian markets unveils the development of mutual fund industry in those markets. However, in emerging markets like Saudi Arabia, few prior research on Saudi Arabian mutual funds were concentrated.

From Saudi Arabian context, Merdad, Hassan, and Alhenawi (2010) compared the performance of 12 Islamic funds and 16 non-Islamic during the years from 2003 to 2010. The study, which examined the market timing and selective ability of HSBC fund managers in Saudi Arabia, identified the superior performance of Islamic fund during periods of financial crisis and conventional funds surpassed Islamic fund over bullish period.

At the same time, Barakat, Nazmy, and Al-Jabli (2011) made an attempt to identify the constraints affecting the efficiency of mutual funds in Saudi Arabian financial market. The study identified weakness in the organizational structure including the management style and lack of expertise as few constraints and proposed a set of recommendations to overcome the constraints.

Also Mosallamy (2011) investigated the performance of Egyptian and Saudi open ended mutual funds during the financial crisis period of 2008. The study concluded that even though the markets were informationally inefficient, lots of opportunities to realize abnormal returns were present in both the markets. But the markets were unable to realize this opportunity to transform this to investors in the form of affirmative returns.

Over the same period, Al Hamdan Anas (2012) examined the investor's attitude towards Zakah, its subjective norms and the intention to pay Zakah on Saudi mutual funds using the theory of reasoned action. The study concluded that the investors' attitude and the subjective norms greatly influence the Zakah compliance among owners of mutual funds.

A study by BinMahfouz and Hassan (2012) compared the characteristics of conventional and Islamic equity mutual funds in Saudi Arabia. As compared to their market benchmarks and conventional fund, the risk adjusted performance measures of Islamic mutual funds in Saudi Arabia remain unstirred with Sharia screening process. The systematic risk analysis results of the study highlighted that the Islamic funds in Saudi Arabia are less exposed to market risk compared with conventional and benchmark funds.

Ashraf (2013) who empirically tested the performance of selected 159 mutual funds from Saudi Stock Exchange during the years from 2007 to 2011 found similar outcomes consistent with the results of Merdad et al. (2010). Sivakumar and Shahid (2016) investigated the returns on currency based Saudi mutual funds using individualistic approach on three fund categories. The study identified a significant difference in the performance of Sharia and non-Sharia mutual funds highlighted that capital preservation fund performed better than growth and income mutual funds.

3. DATA SOURCES

To analyze the performance of the Saudi equity funds, a data set is created with a total of 82 equity funds comprising 45 mutual funds listed under the category of equity funds – local, 20 funds listed under the category of equity funds – international/global and 17 funds listed under the category of equity funds – Arabian, all listed on Tadawul Exchange. The present study focused on analyzing the equity funds performance due its predominance and a high concentration of 62% of the total funds. Inclusion in the data set is restricted only for funds that have continuous data of their Net Asset Value (NAV) for a time frame of 6 years from 2011 to 2016. The monthly NAV of the selected mutual funds are collected from Thomson Reuters website, 91 weeks returns of Saudi Arabian Monetary Authority (SAMA) bills are used as proxy for risk free rate is gathered from Saudi Arabian Monetary Agency website

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and the monthly returns of Tadawul Index, proxy for market returns is collected from Saudi Stock Exchange: Tadawul.

4. PERFORMANCE EVALUATION MEASURES OF SAUDI EQUITY FUNDS

Proper performance evaluation always involves a recognition of both the return and the riskiness of the investment. For measuring the returns, the monthly NAV of the funds has been used in this paper. Standard deviation is used to capture the total risk and beta to measure the systematic risk of the investment.

4.1. Fund returns

The *NAV* of a mutual fund as a bottom line in evaluating its performance is the market value of the securities owned by the fund in addition to due receivables and cash after deducting any fund commitments. Indefinitely, the percentage returns of the fund is thus measured by comparing the prices of mutual fund's *NAV* at the beginning and the end of the investment period.

$$R_t = \frac{NAV_t - NAV_{t-1} + D}{NAV_{t-1}}. \quad (1)$$

The fund returns R_p are calculated by the average of the R_t of the mutual funds in period t.

4.2. Risk measures

The essence of performance evaluation of mutual funds greatly lies in associating a measure of risk with the fund returns. The degree of risk taken in the fund by the manager must be completely evaluated regardless of the fund returns.

4.2.1. Standard deviation: proxy for total risk

Standard deviation, the measure of dispersion, is used to capture the total risk of the investment, besides, beta measures the systematic risk of the same. To measure the fund's total risk, we use the equation:

$$\sigma = \sqrt{\frac{1}{n-1}\sum_{t-1}^{n}\left(Rp - \overline{Rp}\right)^2}, \quad (2)$$

where Rp: monthly return of the mutual fund p, $\overline{Rp}$: average monthly return of the mutual fund p, n: number of observations.

4.2.2. Beta: proxy for systematic risk

To estimate the systematic risk of the funds, Beta measure is calculated initially. Beta measure investigates the average sensitivity of an individual mutual fund in response to the market returns:

$$\beta = \frac{Covariance\ between\ fund\ return\ and\ benchmark\ return}{Variance\ of\ benchmark\ return}. \quad (3)$$

In calculating the benchmark returns, the present study used the month end closing balances of Tadawul All Share Index, calculated as

$$R_t = \frac{Index_t - Index_{t-1}}{Index_{t-1}}, \quad (4)$$

where $Index_t$ – closing price in period t, $Index_{t-1}$ – closing price in period $t-1$. The benchmark returns R_t are calculated by the average of the R_t of the mutual funds in period t.

4.3. Fama's components of investment performance

Fama's decomposition measure shows how to fragment the funds realized returns into three components:

1. Excess returns: the return the investor should earn for the risk he/she chose.
2. Compensation for systematic risk: additional return for the risk chosen by the manager.
3. Return from selectivity: returns from the manager's ability in selecting the good securities.

Return from selectivity is further decomposed into compensation for diversification and net selectivity. Diversification measures additional return that compensates the portfolio manager for bear-

ing diversifiable risk. After accounting for diversification, the residual performance on selectivity is attributed to net selectivity (Saritha, 2012).

5. EMPIRICAL RESULTS AND DISCUSSION: OUTCOMES OF FAMA'S COMPONENTS OF PERFORMANCE

The portfolio performance evaluation on the selected 82 Saudi equity funds carried out using the Fama's components of performance measure are shown in Table 2.

5.1. Returns of Saudi equity funds

Table 2 clearly depicts that more than 88 percent of the equity funds – local, 95 percent of international/global funds and 88 percent of Arabian funds have earned positive returns during the sample period. The study also found that 86 percent of the local funds, 45 percent of international funds and 65 percent of Arabian funds have outperformed the market returns, which indicates the active management of the fund managers as the aim of the active management is always to beat the market. Active managers depend on superior stock selection and market timing to beat the benchmark. Notwithstanding the positive returns earned by

Table 2. Fama's break up of Saudi equity funds returns

Fund category	Fund no.	Returns, %	Excess return, %	Compensation for systematic risk, %	Return for selectivity, %	Return for diversification, %	Return for net selectivity, %
Equity funds – local	1	0.41803	–0.09969	–0.27906	0.17937	–0.15699	0.33636
	2	0.57232	0.05460	–0.38650	0.44110	–0.00035	0.44145
	3	0.47616	–0.04155	–0.40200	0.36044	0.03066	0.32978
	4	0.25511	–0.26261	–0.27190	0.00929	–0.17425	0.18354
	5	0.51216	–0.00556	–0.38951	0.38395	–0.00750	0.39145
	6	–0.66505	–1.18277	–0.07553	–1.10724	–0.77074	–0.33650
	7	–0.64357	–1.16128	–0.08228	–1.07901	–0.78833	–0.29067
	8	0.46451	–0.05321	–0.35082	0.29761	–0.04920	0.34681
	9	0.58654	0.06883	–0.39198	0.46081	0.01122	0.44959
	10	0.51971	0.00200	–0.34193	0.34393	–0.06247	0.40640
	11	0.56159	0.04387	–0.35202	0.39589	–0.04255	0.43845
	12	0.80665	0.28893	–0.37285	0.66178	–0.04676	0.70854
	13	0.46115	–0.05656	–0.36262	0.30605	–0.04864	0.35469
	14	0.58003	0.06231	–0.34492	0.40723	–0.04427	0.45150
	15	0.48676	–0.03095	–0.49046	0.45951	0.18757	0.27194
	16	0.86438	0.34666	–0.31516	0.66182	–0.12314	0.78496
	17	1.31067	0.79295	–0.20569	0.99865	–0.26963	1.26828
	18	0.51891	0.00119	–0.32097	0.32216	–0.13914	0.46130
	19	0.48106	–0.03665	–0.32724	0.29058	–0.09236	0.38294
	20	0.39508	–0.12264	–0.31535	0.19271	–0.11219	0.30490
	21	0.10428	–0.41344	–0.29272	–0.12072	–0.16925	0.04853
	22	0.67496	0.15724	–0.22040	0.37765	–0.07869	0.45634
	23	0.49715	–0.02057	–0.31544	0.29487	–0.14208	0.43695
	24	0.12133	–0.39639	–0.23940	–0.15698	–0.24246	0.08548
	25	0.61126	0.09355	–0.30062	0.39417	–0.18409	0.57826
	26	0.48303	–0.03469	–0.29718	0.26249	–0.17141	0.43391
	27	0.21365	–0.30406	–0.27603	–0.02804	–0.21044	0.18240
	28	0.50932	–0.00839	–0.22250	0.21410	–0.36674	0.58085
	29	1.00029	0.48258	–0.37152	0.85409	–0.02581	0.87990
	30	0.25705	–0.26067	–0.35596	0.09529	–0.06321	0.15850
	31	0.32862	–0.18909	–0.38465	0.19556	0.00931	0.18625
	32	1.03289	0.51517	–0.32535	0.84052	–0.11556	0.95608
	33	1.30819	0.79047	–0.29000	1.08047	–0.17404	1.25451
	34	0.62421	0.10650	–0.36696	0.47346	–0.04309	0.51655
	35	–0.18411	–0.70182	–0.31942	–0.38240	–0.12514	–0.25726
	36	0.45991	–0.05781	–0.34877	0.29097	–0.06656	0.35753
	37	0.30817	–0.20954	–0.36617	0.15663	–0.02118	0.17781
	38	0.02990	–0.48782	–0.34421	–0.14361	–0.06493	–0.07868
	39	0.60080	0.08308	–0.35500	0.43808	–0.07241	0.51049
	40	0.47526	–0.04246	–0.35048	0.30802	–0.08242	0.39044
	41	1.00029	0.48258	–0.37152	0.85409	–0.02581	0.87990
	42	–0.89910	–1.41682	–0.07725	–1.33956	–0.80205	–0.53751
	43	0.69251	0.17479	–0.35707	0.53186	–0.07063	0.60249
	44	0.43005	–0.08767	–0.35075	0.26309	–0.05136	0.31445
	45	–0.56843	–1.08614	–0.19542	–0.89073	–0.39841	–0.49232

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Table 2 (cont.). Fama's break up of Saudi equity funds returns

Fund category	Fund no.	Returns, %	Excess return, %	Compensation for systematic risk, %	Return for selectivity, %	Return for diversification, %	Return for net selectivity, %
Equity funds – international	1	0.42835	–0.08936	–0.16111	0.07175	–0.25507	0.32683
	2	0.29997	–0.21775	–0.56789	0.35014	0.33402	0.01612
	3	0.04294	–0.47477	–0.15341	–0.32137	–0.29243	–0.02894
	4	0.54725	0.02954	–0.20360	0.23314	–0.08511	0.31825
	5	0.32219	–0.19553	–0.18786	–0.00767	–0.17094	0.16328
	6	0.70644	0.18872	–0.14762	0.33634	–0.18525	0.52159
	7	0.73285	0.21514	–0.13865	0.35379	–0.16983	0.52362
	8	0.17602	–0.34169	–0.16981	–0.17188	–0.24541	0.07354
	9	0.63671	0.11900	–0.20824	0.32723	–0.14561	0.47285
	10	0.68427	0.16655	–0.13032	0.29688	–0.20340	0.50027
	11	0.39529	–0.12243	–0.15693	0.03451	–0.23891	0.27342
	12	0.10474	–0.41298	–0.17187	–0.24111	–0.22841	–0.01270
	13	0.52282	0.00510	–0.24201	0.24711	–0.05236	0.29947
	14	–0.96544	–1.48315	–0.13958	–1.34357	–0.23915	–1.10442
	15	1.18945	0.67173	–0.12853	0.80026	–0.27107	1.07133
	16	0.49343	–0.02428	–0.17010	0.14582	–0.12480	0.27062
	17	0.17513	–0.34258	–2.12002	1.77744	2.05540	–0.27796
	18	0.35997	–0.15774	–0.17606	0.01832	–0.20792	0.22624
	19	0.63975	0.12203	–0.19151	0.31354	–0.08844	0.40198
	20	0.55948	0.04176	–0.22999	0.22636	–0.16828	0.39464
Equity funds – Arabian	1	0.77844	0.26072	–0.38293	0.64365	0.01599	0.62766
	2	0.65839	0.14068	–0.37378	0.51446	0.01150	0.50296
	3	0.56370	0.04598	–0.30741	0.35339	–0.09466	0.44806
	4	0.69547	0.17776	–0.39080	0.56856	0.03518	0.53338
	5	0.38806	–0.12966	–0.37908	0.24942	0.01499	0.23443
	6	0.64728	0.12956	–0.34453	0.47409	–0.03500	0.50909
	7	0.95863	0.44091	–0.37543	0.81634	0.00428	0.81206
	8	1.01300	0.49528	–0.37114	0.86642	–0.01040	0.87682
	9	0.26949	–0.24822	–0.37959	0.13137	0.00690	0.12447
	10	0.67113	0.15342	–0.25979	0.41321	–0.05946	0.47267
	11	0.48774	–0.02998	–0.34999	0.32001	–0.03720	0.35721
	12	0.64829	0.13057	–0.34460	0.47517	–0.05520	0.53037
	13	0.07888	–0.43883	–0.42253	–0.01630	0.12527	–0.14157
	14	1.20786	0.69015	–0.23503	0.92517	–0.17512	1.10029
	15	–0.45968	–0.97740	–0.15356	–0.82383	–0.14282	–0.68101
	16	–0.52184	–1.03956	–0.07360	–0.96596	–0.77436	–0.19159
	17	0.65115	0.13344	–0.34767	0.48111	–0.01427	0.49538

a great number of funds, the total excess returns earned by most of the mutual funds are comparatively negative. The total excess returns resulted negative as the mutual funds were able to earn the returns less than the risk free rate.

5.2. Compensation for systematic risk of Saudi equity funds

In mutual fund investments, the incremental returns that the investors earn for taking some risk than the target level are labelled as investors' risk and the added returns the managers choose to seek for their systematic risk constitute risk premium. The additional returns earned by the market above risk free times the mutual fund's beta represent compensation for systematic risk.

$$Compensation\ for\ systematic\ risk = \left(R_m - R_f\right)\cdot\beta. \quad (5)$$

The study identifies that the Saudi equity funds strive hard to compensate their investors for the systematic risk inherited as the market returns during the sample period is comparatively low. Even though the compensation for systematic risk earned by the funds is negative, the fund managers are active on superior stock selection and market timing to beat the benchmark, which is reflected in the funds returns on selectivity.

5.3. Return for selectivity of Saudi equity funds

Return for selectivity is the returns earned by the fund over the returns on the Security Market Line. As it is evident from Table 2, 80 percent of the Saudi equity funds – local, 75 percent of the Saudi funds – international/global, 82.35 percent of the Saudi funds – Arabian return for selectivity are positive indicating that the mutual fund managers

are able to select superior stocks that are available within the Saudi market.

5.4. Compensation for improper diversification of Saudi equity fund

Compensation for improper diversification is the difference the return corresponding to the beta implied by the total risk of the portfolio and the return corresponding to its actual beta, i.e., systematic risk (Strong, 2008). With the increasing size of the portfolio, the diversifiable risk increases. Apparently the diversification return should be close to zero for well diversified portfolios, as the beta of actual and implied will be almost equal.

$$Compensation\ for\ improper\ diversification = \\ = \left[\left(\frac{\sigma_p}{\sigma_m}\right) - \beta\right]\left[R_m - R_f\right]. \quad (6)$$

Table 2 shows that 41 percent of the equity funds – Arabian, 10 percent of equity funds – international and 8.8 percent of the equity funds – local, are perfectly diversified, whereas majority of the funds suffer of diversification. It can be further interpreted that though most of the sample funds deprive proper diversification, the long-term track records of the funds have to be monitored. Apparently, the fund managers also have to strive hard in the area of security analysis to create well diversified and better performing funds.

5.5. Net selectivity of Saudi equity funds

Net selectivity estimates the portion of the return for security selection in excess of the returns imparted by the diversification component (Strong, 2008). A positive value of net selectivity indicates superior performance and negative net selectivity designates fund managers have taken diversifiable risk that has not been compensated by the extra returns.

$$Net\ selectivity = \left(R_p - R_f\right) - \left\{\left(\frac{\sigma_p}{\sigma_m}\right)\cdot\left(R_m - R_f\right)\right\}. \quad (7)$$

Table 2 unveils that 86.67% of Saudi equity funds – local, 80% of equity funds – international and 82.35% of equity funds – Arabian have earned positive net selectivity depicting the superior performance of the fund managers ability in stock selection. Surprisingly the study identifies that majority the sample funds though earned positive net selectivity, their compensation for improper diversification is negative. Apparently, the research infers that the fund managers' stock selection ability is though superior they lack proper diversification of their portfolios.

Positive net selectivity of the vast majority of the funds indicate that though the fund managers did a fairly good job in generating positive returns, the numbers are not striking owing to reduced percentages.

In consideration of the bright future of the Saudi mutual funds market, an attempt is made by the researchers in predicting the future performance of the Saudi equity funds using econometric techniques.

5.6. Relationship of risk reward ratio to future returns of Saudi equity funds

5.6.1. Regression model for equity funds – local

As an extension of further analysis on the outcomes of Fama decomposition, a regression model is developed with risk reward ratio as dependent variable for each of the fund performance categories during the sample period. Risk reward ratio in general estimates the prospective future returns for each dollar we risk and is calculated as a ratio of current fund returns to the total risk. This model is carried out to identify the discrete contribution of each performance measure that greatly influences the fund returns using the statistical software E-views.

$$Rrl_i = \alpha + \gamma_1 dr_i + \gamma_2 Sis_i + \gamma_3 Ns_i + e_i. \quad (8)$$

In this model, the three components of performance measures, Compensation for improper diversification dr, Compensation for systematic risk Sis and Net selectivity Ns, are regressed separately with the Risk reward ratio Rrl of local funds, Error term e_i γ_1, γ_2, γ_3 represents regression coefficient models and the results of the model are presented below:

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$$Rrl_i = 0.049 + 8.490dr_i + 12.165Sis_i + 1.75Ns_i$$

$$P\text{-value } (0.00)\ (0.00)\ (0.00)$$

$$R^2 0.93\ \ d = 1.83\ \ F = 178.34$$

$$Prob(F\text{-statistics } 0.00)$$

As the above results show, each of the estimated regression coefficients is individually and statistically highly significant. So, we reject null hypothesis of that each individual independent variable influence on the relative return equals zero. Collectively, all three variables are also highly statically significant, because the *p*-value of the computed *F*-value (for 3 and 41 d.f.) of 178.3425 is extremely low.

The most significant findings of the above model is that all signs of the model parameters as expected, are positive indicating that incorporation of related risk to the model will bring better results in the fund returns, which reflect the theory and the reality of the analysis. Partially, the crucial variable among the individual variables of the model is the Compensation for systematic risk (*Sis*), where it has the highest influence on the relative return of the equity funds. A one percent point change in this variable will enhance the relative change of the dependent variable by 12.702%. The results of the model shows that the Compensation for systematic risk will play an important influence on the future return of Saudi equity funds – local. As stated earlier, as the sample funds as a whole lack compensation for systematic risk, a change in the risk inheritance might bring attractive fund returns in the future. Compensation for improper diversification (*dr*) also has a vital effect on the return on equity funds – local, as the coefficient size is 8.491.

Despite that the Net selectivity (*Ns*) has the lowest impact on equity return, but incorporating net selectivity will enhance the return of the Saudi equity funds – local as the coefficient of determination $r^2 = 0.9288,$ which is very high. This means that approximately 93% of variation of the relative return on equity funds – local are explained jointly by the variation of all the three independents variables of this model, so we can reject the null hypothesis that all partial slopes simultaneously equal to zero *H0*: $\gamma_2 = \gamma_2 = \gamma_3 = 0$ or $r^2 = 0.$

5.6.2. Model test

With an attempt to preserve the validity of the data and variables included in models and to maintain the robustness of the results, the Classical Linear Regression Model (CLRM) will be tested using autocorrelation and heteroskedasticity tests. Towards that end, to detect the presence of autocorrelation in the residuals, Durbin-Watson test and White's heteroskedasticity test is used to examine the existence of heteroskedasticity on the model. The (D-W) value of the model at 1.826, which is closer to 2 shows more evidence of no autocorrelation. For heteroskedasticity, the results showed that n^* (R^2 of the auxiliary regression model) $\approx \chi^2_{k-1}$ equals 24.99, which is greater than critical value of 12.6, and is also significant at 5% level, thus rejecting the null hypothesis.

5.6.3. Regression model for equity funds – international/global

A regression model estimating the risk reward ratio relationship with performance measures of equity funds – international (RrI) takes the following form:

$$RrI_i = \alpha + \gamma_1 dr_i + \gamma_2 Sis_i + \gamma_3 Ns_i + e_i. \qquad (9)$$

The results of the model is depicted below in the following equation:

$$RrI_i = 0.002255 + 0.0525dr_i -$$
$$-0.217Sis_i + 3.0558Ns_i$$

$$P\text{-value } (0.965)\ (0.876)\ (0.00)$$

$$R^2 0.96\ \ d = 1.99\ \ F = 169.756$$

$$Prob(F\text{-statistics } 0.00)$$

The model indicates that the risk reward ratio is less influential on the fund performance measures *dr* and *Sis*. Inclusion of more risk in international equity funds will have a positive influence on the net selectivity returns of the funds, while holding the other variables constant, since the *p*-value is highly significant for this variable. Collectively, the model is highly significant in term of *F*-test, where *F*-value is quite large (169.75), and the probability of *F* is significant at 1%.

Diagnostic tests were conducted to test the validity of the estimated model with the test for heteroskedasticity by deploying White's heteroskedasticity test again. The calculated χ^2 is 11.62, which is greater than critical values, and this value is insignificant at any level, so we accept the null hypothesis of homoskedasticity. Secondly, the autocorrelation test has been estimated using Durbin-Watson test. The value of D-W test approximately equals 2.0 (1.997), which means that we accept the null hypothesis of no autocorrelation (absence of autocorrelation).

5.6.4. Regression model for equity funds – Arabian

Classic Linear Regression Model similar to the above two models on Arabian equity funds (RrA) takes the following form:

$$RrA_i = \alpha + \gamma_1 dr_i + \gamma_2 Ns_i + \gamma_3 Sis_i + e_i.$$

The outcomes of the above estimated model are presented below.

$$RrA_i = 0.0187 + 5.145 dr_i + 5.543 Sis_i + 1.921 Ns_i$$

$$P\text{-value } (0.00)\ (0.00)\ (0.00)$$

$$R^2 0.97 \quad d = 1.954 \quad F = 126.795$$

$$Prob(F\text{-statistics } 0.00)$$

The signs of all parameters are as expected and highly significant at 1%. It can also be further interpreted that incorporating increased risk in Arabian equity funds are expected to generate more of fund returns. The proposed model is highly significant at 1% with R^2 of 97% and *F*-value at 126.795. The result of White's test also reveal sthat we accept the null hypothesis of homoskedasticity (no hetero), at 10% level of significance. Concerning the autocorrelation test, the value of Durbin-Watson is around 2 (1.95), which indicates the rejection of any kind of autocorrelation.

A close examination of the above three models reveal that among the three equity funds categories, local funds perform superior compared to the other two followed by equity funds – Arabian. As the findings of the study reveal that local equity funds performance is superior, a further attempt is made to implement Vector Auto Regression (VAR) to capture the relative importance of various shock and their impacts on the performance variables.

5.7. Variance decomposition

The investigation of the dynamic relations among the variables in the particular sample period is carried out through variance decompositions. The unrestricted Vector Auto Regression (VAR) model is implemented to capture the relative importance of various shock and their impacts on the variables of our concern.

Tables 3 to 6 show the variance decomposition of all variables of the model; the relative significance of each structure shock to other variables. Table 1 indicates that over 10 period ahead, 100% of relative return can be accounted for its own innovation in the 1st period. It was noted as time goes on; its contribution will be high till last period. Therefore, we can say that over the 10 years risk reward ratio of local equity funds is highly explained by its own shocks. The succeeding

Table 3. Variance decomposition of RELRETURN

Period	S.E.	RELRETURN	DIVER	NETSELT	SISRISK
1	0.013695	100.0000	0.000000	0.000000	0.000000
2	0.014487	92.75668	1.418953	5.732142	0.092228
3	0.014570	91.77582	2.285254	5.738687	0.200244
4	0.014635	91.07603	2.304830	6.183876	0.435260
5	0.014644	90.97204	2.361771	6.192019	0.474169
6	0.014648	90.95739	2.374531	6.188581	0.479498
7	0.014650	90.93872	2.393434	6.187854	0.479987
8	0.014650	90.93753	2.393963	6.188467	0.480045
9	0.014650	90.93453	2.396851	6.188586	0.480029
10	0.014650	90.93404	2.397088	6.188846	0.480030

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Table 4. Variance decomposition of DIVER

Period	S.E.	RELRETURN	DIVER	NETSELT	SISRISK
1	0.002119	64.18933	35.81067	0.000000	0.000000
2	0.002223	61.99947	33.01022	4.990139	0.000162
3	0.002240	61.79308	32.73236	5.466883	0.007678
4	0.002268	60.33608	32.41837	7.113170	0.132377
5	0.002270	60.25122	32.37425	7.118968	0.255561
6	0.002275	59.99709	32.50912	7.212168	0.281617
7	0.002275	59.95680	32.53129	7.230343	0.281560
8	0.002276	59.92762	32.55582	7.232705	0.283846
9	0.002276	59.90567	32.56982	7.240774	0.283737
10	0.002276	59.90495	32.57029	7.240694	0.284063

Table 5. Variance decomposition of NETSELT

Period	S.E.	RELRETURN	DIVER	NETSELT	SISRISK
1	0.004018	72.78467	3.787687	23.42765	0.000000
2	0.004176	69.16082	8.122636	21.94183	0.774712
3	0.004296	65.68284	12.19259	20.89913	1.225434
4	0.004335	64.60023	13.57079	20.52020	1.308782
5	0.004342	64.41757	13.78697	20.47845	1.317001
6	0.004351	64.21794	13.97389	20.49671	1.311472
7	0.004351	64.20889	13.97259	20.50256	1.315962
8	0.004353	64.16862	14.00295	20.51066	1.317764
9	0.004353	64.16021	14.00664	20.51557	1.317586
10	0.004353	64.15593	14.01039	20.51540	1.318277

Table 6. Variance decomposition of SISRISK

Period	S.E.	RELRETURN	DIVER	NETSELT	SISRISK
1	0.000901	44.95791	49.01587	1.194124	4.832095
2	0.000926	45.02936	46.96019	3.391558	4.618895
3	0.000938	44.89649	46.32390	3.935463	4.844145
4	0.000949	44.02170	45.72325	5.429353	4.825698
5	0.000950	43.93933	45.63792	5.425492	4.997256
6	0.000952	43.76325	45.68903	5.550379	4.997339
7	0.000952	43.74273	45.69493	5.567469	4.994868
8	0.000953	43.71899	45.71316	5.572287	4.995564
9	0.000953	43.70539	45.72059	5.580109	4.993912
10	0.000953	43.70459	45.72126	5.580028	4.994123

contribution of shock of relative return comes from the shock of the net selectivity; where the highest was approximately over 6% starting from the 6th period. This contribution continue to be the same until last period; the 10th. The other essential following contributions to the relative return come from net selectivity; where the highest 72.78% is as indicated in Table 3, followed by diversification; where the highest was 64.18% and systematic risk was around 45%. All of the above results are consistent with the estimated regression model.

CONCLUSION AND SCOPE FOR FURTHER RESEARCH

The primary focus of this study is to evaluate the performance of the Saudi equity funds listed on Tadawul Stock Exchange using Fama decomposition measures. The empirical results shows that Saudi equity funds – local perform better followed by Arabian and international/global equity funds. The re-

gression model developed on local funds is highly significant in terms of expected signs and diagnostic tests indicating that a change in the risk inheritance level might bring attractive fund returns in the future. The results of the variance decompositions also reveal that more relative important changes come from the changes in net selectivity, diversification, and systematic risk.

These results suggests that Saudi Arabia is prepared for a new stage of development including mutual funds, which will see the Tadawul integrate further with global capital flows in the new era. The development of capital markets in the region is promising and the asset management industry is set for a significant growth in the future, which merits further investigation of different investment vehicles under different market situations and provides an avenue for future research.

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