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An Empirical Investigation of the Price Relationship between Open-end Mutual Funds and Amman Stock Exchange Index

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Abstract

This study examines the short and long-run price relationship between mutual funds (Jordinvest First Trust Fund, Growth Fund, Horizon Fund, and Jordan Securities Fund) and Amman Stock Exchange Index over the time period from March, 2005 till the end of November, 2009. The study findings are obtained with respect to various testing methods utilized, including Error Correction Model and Granger causality tests. These tests were applied on series of data for the monthly returns of mutual funds and Amman Stock Index. The empirical results show a long-run relationship of Amman Stock Index on mutual funds. However, the study also reveals no long-run relationship of mutual funds on Amman Stock Index. Furthermore, the empirical findings show that the relationship of Amman Stock Index on mutual funds is significantly more established than the relationship of mutual funds on Amman Stock Index. Finally, the results find a significant causal relationship in one way manner from mutual funds, with the exception of Jordinvest First Trust Fund, to Amman Stock Index.

JEL classification numbers: C22, C32, G12, G23.
Keywords: Mutual Funds, Amman Stock Exchange Index, Unit Root Test, Error Correction Model Test, Granger Causality Test.

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1 Introduction

In an atmosphere of changing economic conditions, it is evident that mutual funds have been at the top of the agenda over the last decade. Nowadays an increasing number of investors are relying on mutual funds as investment and retirement vehicles. The mutual funds industry has registered a spectacular growth worldwide. The wider acceptance of equity investments by scholars paved the way to launch mutual funds. Thus, mutual funds have attracted the attention of academics and practitioners alike. A mutual fund is an indirect investment product created to serve as an alternative to direct stock market investment for investors.

In Jordan mutual funds have experienced considerable growth over the last decade in terms of the volume of capital managed by them. For their successful operations and developments, it is logical to think that mutual funds prices have a good degree of responsiveness to the direct equity market. Mutual funds also require well-developed securities markets with a high level of market integrity and liquidity. The literature on the performance of mutual funds is extensive for the past several decades and many of these studies compare the fund's return with that of the market. Early studies by Sharpe (1966) and Jensen (1968) confirm the inability of mutual funds to outperform the market benchmarks or indices. Mutual funds underperform the market, especially when fees are taken into account. Therefore, funds that heavily underperform have very high expense ratios, while funds that are successful do not increase revenues by raising their fees but benefit from the increased size of their funds (Elton et al., 1996).

Mutual funds offer investors the advantages of portfolio diversification and professional management at low cost, and to perform as an alternative to direct stock market investment to investors when the cointegration presence as the relationship between mutual funds and the stock market index (Ben-Zion et al., 1996; Matallin and Nieto, 2002), which mean that the mutual funds are replicating the stock market index over the long-run. While the lack of cointegration suggests that mutual funds don't show parallel movement with the market index over the long-run will provide a further evidence for the existence of active fund management activities among the fund manager. Therefore, investors will choose mutual funds that are consistent with their perspective of the market and upon their preferences.

Unfortunately, there is a lack of attention to the contemporaneous mutual fund/index returns relationship specifically in the literatures that are related to Arab financial markets. Therefore, the main objective of this paper is to investigate the short and long-run price relationship between Jordanian mutual funds (Jordinvest First Trust Fund, Growth Fund, Horizon Fund, and Jordan Securities Fund) and Amman Stock Index. In addition, it provides further evidence for the existence of active fund management among the fund's managers. The degree to which fund prices are related to the stock market index has several important implications for investors with regard to their investment strategies.

This paper is organized into five sections as follows: Section two details the literature review. On the other hand, section three describes the methodology while section four discusses the empirical results. Finally, section five presents the concluding remarks.

2 Literature Review

Many previous studies make a comparison between the fund's return with that of the market, which allows investors to gauge the differences in the performance between actively and passively managed portfolio. This section begins with the review of Sharpe (1966) as it forms the backbone of the following studies by developing a performance measure that leads other studies in this field.

In his study, Sharpe (1966) found evidence of persistence for both high and low ranked mutual funds without considering that past performance is the best predictor. Also, he found that expense ratios explain the differences clearly and low expense ratios are related to superior performance. Finally, he found weak evidence that funds with larger assets base generate better performance. On the other hand, Jensen (1967) showed that mutual funds generally underperform a buy and hold portfolio, and funds do not perform well enough to cover even their brokerage expenses, which is in contrast with the findings from Swinkels and Rzezniczak (2009) and Elton et al., (1996) who point out the underperformance of passive strategies. Also, the results found that there is only very little evidence of fund managers with forecasting ability, which is in line with the findings from Comer et al., (2009) who found very weak evidence of timing ability (negative timing ability). On the other hand, Fama and French (1993) showed that common variation in stock returns is captured by overall market factor, size and B/M ratio, while in bond returns it is captured by term structure factors.

In a complement study to Sharpe (1966), Malkiel (1995) showed that equity mutual funds perform worse than the market after deducting management expenses. In contrary evidence to Elton et al., (1996) and Swinkels and Rzezniczak (2009) and in line with Comer et al., (2009), they documented that actively managed mutual funds underperform passive investing (negative attribution returns). Also, in a contrast study to Sharpe (1966), Elton et al., (1996) showed that low ranked funds have a relatively higher expense ratio which is the reason why they fare significantly poorer. They showed that past performance is a good predictor of future performance in both short and long-run. Moreover, Jayadev (1996) indicated that the relationship between fund excess return and the market excess return is not linear and it is due to the reverse relationship of beta securities (high/low) between the portfolio and the market return. He concluded that passive management is the best.

Providing a solid foundation for the concept of stock-picking ability, Kacperczyk et al., (2005) found evidence of size and momentum effects and that mutual funds managers give more weight to growth. They also found that mutual funds differ considerably in terms of their industry concentration and these concentrated mutual funds have a tendency to pursue distinct investment styles, and concentrated funds outperform diversified funds. Furthermore, Alexander et al., (2007) showed that managers are able to value stocks. When it comes to buying, they found that mutual fund managers are not able to beat the market since they are compelled to pump additional cash from inflows. However, when it comes to selling, they found that mutual fund managers are forced to sell their stocks to hold longer on valuation beliefs. On the other hand, Boudreaux et al., (2007) showed that the performance of nine out of ten of the international mutual funds was higher than the US market. In a comprehensive study that provides a solid foundation for the concept of market-timing ability, Cuthbertson et al., (2007) showed that only a low proportion of managers are able to time the market. As to fund age, they showed that better market timers tend to be shorter-lived funds in general since market timing ability is negatively correlated with fund age. On the other hand, with respect to fund size, they showed that small sized funds possess no significant positive timing.

In a different study, Low and Ghazali (2007) showed that unit trust funds and the stock market index do not have a long-run equilibrium relationship. Their results also showed that index funds are found not to be cointegrated with the stock market index. With respect to causality tests, one-way Granger causality test showed that the prices of unit trust funds are related to the stock market index. On the other hand, Ainsworth et al., (2008) showed that managers put themselves in a unique position because they are remaining loyal to their self-stated investment style. However, they found that almost there is no relationship between performance persistence and fund drift. Another study by Arugaslan et al., (2008) did not find evidence of the momentum effect. They found that returns on international mutual funds with low level of risk can be boosted by means of financial leverage. On one hand, Cuthbertson et al., (2008) indicated that less than half of funds with significant alphas outperform their respective benchmarks, and the best performers are concentrated in the right tail of performance distribution. As for the poor performing funds, they seem to be relatively small, and that the worst performers are likely to be in the left tail. They concluded that the average performance of all UK funds represents overall neither underperformance nor over-performance. On the other hand, Mazumder et al., (2008) showed that equity mutual funds are the most predictable funds in comparison with international bond and hybrid funds. They found that developed trading strategies are more useful in international equity funds. However, due to the general market decline in the testing period, the second strategy leads to the highest returns which is consistent with the third strategy, whereas a buy and hold strategy possesses negative returns. Results related to the load/no-load funds found no significant difference in returns between them.

Thanou (2008) found significant differences in rankings between up and down market conditions. However, as for the selection skills, he found evidence of the passive management while results related to market timing ability found that the timing ability of the fund managers is negative or non-existent. Similarly, Tower and Zheng (2008) showed that actively managed fund families have not performed well in general. However, when they are considered without loads, with low expenses in their least expensive class and with low average turnover, they beat the corresponding indexes. Finally, they conclude that indexing tends to provide superior returns to most managed mutual funds.

From a different point of view, Comer et al., (2009) showed that managers possess neither market timing ability nor selectivity. As for the role of survivorship, they found that hybrid funds are not adding value. However, the results showed that an allocation shift during the bear market conditions would result in higher positive attribution returns, and returns in this period are reflective of a persistent pattern in performance. On the other hand, Hyde and Triguboff (2009) showed that there is no significant difference in results between the two specifications (basic and augmented models) and also the results for equal and value-weighted portfolios are the same. In addition, they found that value spread as a signal of style timing is considered to be a helpful and accurate predictor of value premium. Finally, their results found a positive relationship between value premium and value spread and that the short-side positions (growth stocks) are entirely responsible for the positive relationship, and it would serve a useful purpose as the value spread increases.

Russian mutual funds were tested by Lukashin and Lukashin (2009). They found a positive correlation between the profitability of Russian mutual funds and stock indexes (RTS and MICEX). In addition, their findings showed that the higher the volatility, the more sensitive is mutual funds' profitability to market fluctuations. Also, their results showed that the optimal portfolio of investment equities embraces 14 equities being mainly bond funds and silver, where profitable funds, bond and money market funds are the least sensitive and profitable funds and index funds and share mutual funds are the most sensitive. They conclude that the mutual funds market in Russia appears to be defensive. From another perspective, Sensoy (2009) showed that self-designated benchmarks of some funds do not represent the precise exposures of funds to size and growth/value factors. The results found that fund size and age are negatively correlated with fund flows. In addition, the finding showed that naive investors perceive performance of a mismatched benchmark as a guide to detect the patterns of flows. Finally, the results indicate that purchasing a fund with a matched benchmark provides investors with a better risk-return trade-off than purchasing a fund with a mismatched one.

Furthermore, Swinkels and Rzezniczak (2009) showed that majority of the funds perform better than a passive stock market index for private investors. However, as for the bond mutual funds, they found that only a few of them outperform their benchmarks. On the other hand, the balanced funds showed a better results compared to their benchmarks, equity and bond indices. Finally their findings showed that timing coefficients are usually negative and managers do not possess equity and bond market timing skills. In another study by Jiang et al., (2011), evidence of active management was found, and that mutual funds acquire superior information that is not fully reflected in the prices of these stocks. Similarly, Soongswang and Sanohdontree (2011) found evidence of active management for 3-month time-period of investment. In addition, they found that the DEA technique can be used to assist investors in selecting appropriate funds, especially in the sense of robustness check. Contrary results were found by Hsu et al., (2012) where they found no statistical significant evidence of the momentum effect.

3 Data and Research Methodology

3.1 Description of the Data

This paper investigates the relationship between Jordanian open-end mutual funds (Jordinvest First Trust Fund, Growth Fund, Horizon Fund, and Jordan Securities Fund) and Amman Stock Exchange Index (ASEI) over the time period between 2005 and 2009. The financial data comprised of the monthly Net Asset Value (NAV) of four Jordanian mutual funds and the monthly weighted closing prices of the stock market portfolio as proxy for ASEI. These time series data are obtained from a published monthly fund prospectus, annual reports of the fund management companies (http://www.jordinvest.com.jo, http://www.ajib.no.com.jo, http://www.hbtf.com, http://ww.capitalbank.jo/horizon_fund, http://www.zawaya.com) and from the website of Amman Stock Exchange (http://www.ase.com.jo) from the period of 31 March 2005 until 30 November 2009. Monthly data have been chosen to avoid a spurious correlation problem, often found in quarterly and annual data, while not compromising on the available degrees of freedom required in selecting appropriate lag structures.

3.2 The Research Methodology

Monthly returns for mutual funds were measured for each fund as following:

$$R_f = \frac{NAV_t - NAV_{t-1}}{NAV_{t-1}} \qquad (1)$$

Where, R_f is the monthly return of the fund, NAVt is the Net Asset Value for time t, and NAVt-1 is the Net Asset Value for time t-1. Monthly returns for Market Stock Index were measured as following:

$$R_m = \frac{GI_t - GI_{t-1}}{GI_{t-1}} \qquad (2)$$

Where, R_m is the monthly return of the market index, GI_t is the General Index for time t, and GI_{t-1} is General Index for time t-1. The analytical framework of the study is based on Granger causality tests. It also based on two cases. The first case is the dependent variable of Amman Stock Index, and the second one, is the dependent variable of mutual funds.
A prior condition for cointegration and causality tests is that the time series or variables are stationary. If a time series is stationary, any shock to the variable will temporarily or momentarily draw the variable away from its long-run mean values. However, if the series is non-stationary, the deviation from the long-run mean values will be permanent. By definition, a series or variable which is integrated at level I(0) is said to be stationary at the level form. The problem of non-stationarity can be eliminated by taking differences in the series. Therefore, if the series is characterized by I(d), that is integrated of order d, it means that the series need to be differenced d times before becoming a stationary series. If all variables under consideration are at level form, I(0), and they are not cointegrated, then we will need to implement the Granger tests using the first differences of the variables.

3.2.1 Unit Root Test

Before conducting estimation and in order to avoid possible spurious regression, it is necessary to distinguish stationary from non-stationary variables. The first step undertaken would be to establish the order of integration of variables used in the model. This is accomplished by applying first the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller (1979; 1981)) on each of the series in the estimated equations, standard unit root tests. The well-known ADF test for a unit root in y_t, omitting a linear deterministic trend is:

$$\Delta yt = \alpha + \beta yt\text{-}1 + \sum \delta i\ \Delta yt\text{-}i + \varepsilon t \qquad (3)$$

Where Δ is the difference operator, εt is a white noise disturbance term with variance σ2, and t = 1, …, T indexes time. The Δyt-i terms allow for serial correlation and are designed to ensure that εt is white noise. The empirical evidence suggests that there is no time trend in the data. The ADF test has a null hypothesis of non-stationarity against an alternative of stationarity.
The appropriate number of lagged difference (k) is determined by Akaike Information Criteria (AIC) as in Akaike (1970). Optimal choice of lag length removes autocorrelations in the error term.

3.2.2 Regression Model

Regression model is implemented in order to examine the relationship between mutual funds and stock market index. Regression of non-stationary time series on another non-stationary time series may cause a spurious regression or non-sense regression. The symptom of a spurious regression is R-Squared value would be greater than Durbin-Watson statistic, where R^2 is practically zero, as it should be, where $0 \le R^2 \le 1$. On the other hand, the Durbin–Watson (d) is about 2, where Durbin–Watson is used for detecting serial correlation (Gujarati, 2004). Since $d \approx 2(1 - \hat{\rho})$, where $\hat{\rho}$ is an estimator of r and which is the first-order coefficient of autocorrelation, and as $-1 \le r \le 1$, it can be implied that $0 \le d \le 4$. The two values 0 and 4 are the bounds of d, and any estimated d value must lie within these limits. Where:

If $\hat{\rho} = 1$, then $d \approx 0$, and one may assume that there is no first-order autocorrelation.

If $\hat{\rho} = 0$, then d=2, indicating perfect positive serial correlation in the residuals.

If $\hat{\rho} = -1$, then $d \approx 4$, indicating that there is perfect negative serial correlation in the residuals.

The case of spurious and not spurious regression for the tests may be written as:

The first case: R-Squared > Durbin-Watson statistic

The second case: R-Squared < Durbin-Watson statistic

Where under the first case, the model is spurious or non-sense regression, while under the second case; the model is not spurious or has sense regression.

Engle and Granger (1987) note that even though economic or financial time series may be described as a random walk process, it is possible that the linear combinations of the series or variables would over time converge to equilibrium. If two series are non-stationary in their level forms, that is I(1) and the series are integrated of the same order (d) and if the error term from regressing one series on the other is stationary, then the series are said to be cointegrated. Thus, cointegration exists if two variables are individually I(1) and the error term from the linear regression between the two variables is I(0).

We performed ADF test on the error term, εt from the following linear combinations between the mutual funds and the market index:

$$y_t = \beta_1 + \beta_2 x_t + \varepsilon \tag{4}$$

Where:

yt: is the dependent variable.

xt: is the independent variable.

β1: is the intercept.

β2: is the coefficient of the independent variable / or the long-run coefficient.

εt: is the residual of the model /or equilibrium error.

The residual of the model is found stationary by testing the t-statistic against Engle-Granger 5% and 10% critical value (equal to -3.34 and -3.04, respectively). The null and the alternative hypotheses for the tests may be written as:

*H*0: t-statistic < Engle-Granger critical value

*H*1: t-statistic > Engle-Granger critical value

Where under the null hypothesis, there is a unit root, while under the alternative, there is no unit root. In order to test the validity of the model whether if the model is spurious or

not, the R-Squared testing was implemented; where the symptom of a spurious regression is R-Squared value would be greater than Durbin-Watson statistic.
The stationarity of the residual and the validity of its model, mean that stock market index and mutual funds in the model are cointegrated or they have long-run relationship between them. On the other hand, if the residual is found to be non-stationary, then there is an existence of no long-run equilibrium relationship between mutual funds and the stock market index.

3.2.3 Error Correction Model

The Granger representation theorem, states that if two variables such as, stock market index and mutual fund return, are cointegrated, then the relationship between the two can be expressed as Error Correction Mechanism (ECM). Engle and Granger (1987) state that "For a two variable system a typical error correction model would relate the change in one variable to past equilibrium errors, as well as to past changes in both variables." ECM states that the past change in dependent variable (y_{t-1}) depends on past change in independent variable (x_{t-1}) and also on the equilibrium error term.
If the equilibrium error term is non-zero, then the model is out of equilibrium. When $D(x_t)$ is zero and Ut-1 is positive. This means $D(y$t) is above its equilibrium value of ($\beta_3 + \beta_4 D(x_t)$). Since β_5 is expected to be negative, the term $\beta_5 U$t-1 is negative and, therefore, yt will be negative to restore the equilibrium. That is, if y_t is above its equilibrium value, it will start falling in the next period to correct the equilibrium error. The absolute value of β_5 will decide how quickly the equilibrium is restored. The Error Correction Model is calculated as following:

$$D(y_t) = \beta_3 + \beta_4 D(x_t) + \beta_5 U_{t-1} + v \qquad (5)$$

Where:
D: is the first difference operator.
yt: is the dependent variable.
xt: is the independent variable.
β_3: is the intercept.
β_4: is the short-run coefficient.
β_5: is the coefficient of the speed of adjustment, and it should be negative.
U_{t-1}: is the error correction term (one-period lagged value of the error from the cointegrating regression).
v: is the white noise (random) error term.

Finally, in order to test the validity of the model and whether if the model is spurious or not, the R-Squared testing is implemented; where the symptom of a spurious regression is R-Squared value would be greater than Durbin-Watson statistics. Breusch(1978) and Godfrey (1978) known as Breusch-Godfrey Serial Correlation LM (Lagrange Multiplier) Test also conducted for testing whether the residual of the Error Correction Model is serially correlated. The null hypothesis is no serial correlation. In addition, Jarque-Bera (1980) test of normality was utilized for testing whether the residual of the Error Correction Model is normally distributed. This test is asymptotic or large-sample test, and it has a chi-square distribution. The null hypothesis is normal distribution.

3.2.4 Causality Tests

The Granger (1969) approach to the question of whether x causes y is to see how much of the current y can be explained by past values of y, and then to see whether adding lagged values of x can improve the explanation. Y is said to be Granger-caused by x if x helps in the prediction of y, or equivalently if the coefficients on the lagged x's are statistically significant. Note that two-way causation is frequently the case; x Granger causes y and y Granger causes x. It is important to note that the statement "x Granger causes y" does not imply that y is the effect or the result of x. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term. In the causality test, the null hypothesis is that x does not Granger-cause y in the first regression and that y does not Granger-cause x in the second regression.

4 Results

4.1 Descriptive Statistics

As shown in Table 1, the mean value of the normal and natural logarithmic for Amman Stock Exchange Index (ASEI) is 0.32%, and 0.02%, respectively, and the standard deviation is 7.9% and 7.8%, respectively. On the other hand, the mean value of the normal and natural logarithmic for First Trust Fund return is 0.23%, and 0.20%, respectively, and the standard deviation is 2.54% and 2.52%, respectively. Similarly, the mean value of the normal and natural logarithmic for Growth Fund return is 0.24%, and 0.12%, respectively, and the standard deviation is 4.8% and 5%, respectively. As for the Horizon Fund, the mean value of the normal and natural logarithmic return is 0.19%, and 0.27%, respectively, and the standard deviation is 4% and 4.1%, respectively. Finally, the mean value of the normal and natural logarithmic for Securities Fund return is 0.10%, and 0.01%, respectively, and the standard deviation is 4.32% for both series.

4.2 Results of Normality Tests

The null hypothesis of normality in Amman Stock Exchange Index series and the natural logarithm of this series and the first difference for both are accepted and the series are normally distributed using Jarque-Bera test. On the other hand, the null hypothesis of normality in First Trust series and the natural logarithm of this series are rejected and the series are not normally distributed, while the first difference for both are normally distributed using the same test. As for the Growth Fund series, the null hypothesis of normality and the natural logarithm of this series and their first difference for both are rejected and the series are not normally distributed using Jarque-Bera normally distribution test. As for the Horizon Fund and Jordan Securities Fund, similar results were obtained. The null hypothesis of normality in the series and the natural logarithm series are rejected and the series are not normally distributed, while the first difference for both are normally distributed using Jarque-Bera test. This result was consistent with skewness and kurtosis statistical value.

Table 1: Descriptive Statistics

	ASEI	D(ASEI)	Ln(ASEI)	D(Ln(ASEI))	FST	D(FST)	Ln(FST)	D(Ln(FST))
Mean	0.00327	-0.0045	0.00022	-0.00406	0.00235	-0.00156	0.00203	-0.00151
Stand. Dev.	0.07908	0.09538	0.07886	0.09473	0.02541	0.0324	0.02524	0.0321
Skewness	0.23824	-0.4658	-0.08801	-0.41781	0.45429	-0.10393	0.33621	-0.07545
Kurtosis	3.7737	2.73881	3.866	254.216	4.35628	4.13923	4.25945	4.00466
Jarque-Bera	1.9265	2.14524	1.82219	2.08051	6.21834	3.07321	4.75615	2.36527
Prob.	0.38165	0.34211	0.40208	0.35337	0.04464	0.21511	0.09273	0.30647
	GRO	D(GRO)	Ln(GRO)	D(Ln(GRO))	HOR	D(HOR)	Ln(HOR)	D(Ln(HOR))
Mean	0.00242	-0.00101	0.00121	-0.00098	0.00195	-0.00208	0.00278	-0.002
Stand. Dev.	0.04801	0.05502	0.05039	0.05845	0.04058	0.04476	0.04155	0.04545
Skewness	-172.326	0.488249	-2.22094	0.64956	-0.84547	-0.49086	-114.171	-0.41875
Kurtosis	10.19545	7.48876	12.88257	9.15435	6.42318	4.10653	7.17539	4.22934
Jarque-Bera	148.5236	48.36203	273.9229	90.66702	34.01408	5.01459	52.84506	5.07071
Prob.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.07923
	JOR	D(JOR)	Ln(JOR)	D(Ln(JOR))				
Mean	0.00108	-0.00241	0.00016	-0.00225				
Stand. Dev.	0.0432	0.04978	0.04319	0.04956				
Skewness	0.16553	-0.43411	-0.13136	-0.40863				
Kurtosis	5.68235	354.262	5.62724	3.30714				
Jarque-Bera	17.0441	2.40221	16.26661	1.7468				
Prob.	0.0002	0.30086	0.00029	0.41753				

4.3 Unit Root Test Results

Table 2 depicts the results of the unit root test for both Amman Stock Index, Jordinvest First Trust Fund, Growth Fund, Horizon Fund, Jordan Securities Fund respectively. By using ADF test and applying Akaike Information Criterion with maximum lags of 10 and following the ordinary least square (OLS) estimation to test the unit root, ADF assumes individual unit root process with null hypothesis of unit root and an alternative hypothesis of no unit root. We reject the null hypothesis for tests which assumes individual unit root process and accept the alternative hypothesis of no unit root at the level, where the t-Statistic for both series (-6.47 and -7.05, -5.18, -5.39, -3.72 respectively) are larger than the critical value for 1%, 5% and 10%, respectively, and they are statistically significant at 1%, where P value equal to zero. Therefore, we can conclude that Amman Stock Index and Jordinvest First Trust Fund, Growth Fund, Horizon Fund, Jordan Securities Fund are individually integrated at the level $I(0)$, and they are stationary series.

Table 2: ADF Unit Root Test

Level				
ASEI	FST	GRO	HOR	JOR
-6.47***	-7.05***	-5.17972***	-5.393193***	-3.72178***

***Significance at 1%, * *Significance at 5% and *Significance at 10%

The results in Table 3 indicate that the coefficient of Jordinvest First Trust Fund FST (the long-run coefficient) equal to 2.27 and that the coefficient of ASEI (the long-run coefficient) equal to 0.23 and both are statistically significant at 1%, where *P* value equal to zero, which is less than 1%. Granger and Newbold (1974) assume that the model is spurious, where the null hypothesis of the model is spurious and the alternative hypothesis of the model is non-spurious or sense regression. We reject the null hypothesis for test which assumes spurious regression and accept the alternative hypothesis of non-spurious or sense regression at the level, where R-Squared value (equal to 0.52) is less than Durbin-Watson statistic (equal to 1.95) for the first regression, while where R-Squared value (equal to 0.52) is less than Durbin-Watson statistics (equal to 2.12) for the second regression.

Also in Table 3, the coefficient of Growth Fund (the long-run coefficient) equal to 1.23 and that the coefficient of ASEI (the long-run coefficient) equal to 0.45 and both of are statistically significant at 1%. We reject the null hypothesis for test which assumes spurious regression and accept the alternative hypothesis of non-spurious or sense regression at the level, where R-Squared value (equal to 0.55) is less than Durbin-Watson statistic (equal to 1.99) for the first regression, while where R-Squared value (equal to 0.56) is less than Durbin-Watson statistic (equal to 1.86) for the second regression.

Similarly, the coefficient of Horizon Fund (the long-run coefficient) equal to 1.51 and that the coefficient of ASEI (the long-run coefficient) equal to 0.40 and both are statistically significant at 1%. We reject the null hypothesis for test which assumes spurious regression and accept the alternative hypothesis of non-spurious or sense regression at the level, where R-Squared value (equal to 0.59) is less than Durbin-Watson statistic (equal to 1.90) for the first regression, while where R-Squared value (equal to 0.59) is less than Durbin-Watson statistic (equal to 1.66) for the second regression.

Finally, the coefficient of Jordan Securities Fund (the long-run coefficient) equal to 0.48 and that the coefficient of ASEI (the long-run coefficient) equal to 1.59 and both of them are statistically significant at 1%. We reject the null hypothesis for test which assumes spurious regression and accept the alternative hypothesis of nonspurious or sense regression at the level, where R-Squared value (equal to 0.76) is less than Durbin-Watson statistic (equal to 2.02) for the first regression, while where R-Squared value (equal to 0.75) is less than Durbin-Watson statistic (equal to 2.15) for the second regression.

Since all the models are statistically significant and non-spurious or sense regression model, there is no need to the unit root test on the error term (residual) of any of the models at level form.

Table 3: Regression Results

	Coeff.	t value	Sig.			Coeff.	t value	Sig.
Const.	-0.0021	-0.2804	0.7803		Const.	0.0016	0.6730	0.5038
FST	2.2705	7.8409	0.0000		ASEI	0.2345	7.8409	0.0000
Dependent Variable: ASEI					Dependent Variable: FST			
R-Squared		0.532385			R-Squared		0.532385	
Adjusted R- Squared		0.523725			Adjusted R- Squared		0.523725	
Durbin-Watson		1.947542			Durbin-Watson		2.115462	
	Coeff.	t value	Sig.			Coeff.	t value	Sig.
Const.	0.0003	0.0419	0.9667		Const.	0.0009	0.2165	0.8294
GRO	1.2313	8.2684	0.0000		ASEI	0.4537	8.2684	0.0000
Dependent Variable: ASEI					Dependent Variable: GRO			
R-Squared		0.5587			R-Squared		0.5587	
Adjusted R- Squared		0.5505			Adjusted R- Squared		0.550528	
Durbin-Watson		1.9997			Durbin-Watson		1.858352	
	Coeff.	t value	Sig.			Coeff.	t value	Sig.
Const.	0.0062	0.9214	0.361		Const.	-0.0033	-0.9390	0.3519
HOR	1.5106	9.0176	0.000		HOR	0.3978	9.0176	0.0000
Dependent Variable: ASEI					Dependent Variable: ASEI			
R-Squared		0.6009			R-Squared		0.6009	
Adjusted R- Squared		0.5936			Adjusted R- Squared		0.5936	
Durbin-Watson		1.8976			Durbin-Watson		1.66310	
	Coeff.	t value	Sig.			Coeff.	t value	Sig.
Const.	-0.0005	0.1668	0.8681		Const.	0.0016	0.2965	0.768
JOR	0.4752	12.962	0.0000		JOR	1.5926	12.9623	0.0000
Dependent Variable: ASEI					Dependent Variable: ASEI			
R-Squared		0.7568			R-Squared		0.7568	
Adjusted R- Squared		0.7523			Adjusted R- Squared		0.7523	
Durbin-Watson		2.0228			Durbin-Watson		2.1472	

4.4 Results of the Error Correction Model (ECM)

Up to now we conclude that the series are stationary at level and there is a long-run relationship between Amman Stock Index and Jordinvest First Trust Fund. We employ Engle-Granger (1987) Error Correction Model to test cointegration between Amman Stock Index and any one of mutual funds and vice versa, where ECM would relate the change in one variable to past equilibrium errors, as well as to past changes in both variables. The results of ECM are depicted in Table 4. As shown in Table 4, the results of Amman Stock Index and Jordinvest First Trust Fund indicate that the coefficient of the speed of adjustment is statistically significant at 1%, where $\beta 5$ is negative and equal to 0.99 and the P value equal to zero. In addition, there is a statistically significant short-run relationship at 1%, where $\beta 4$ is positive and equal to 1.81 and the P value equal to zero.

Finally, we reject the null hypothesis for test which assumes spurious model and accept the alternative hypothesis of non-spurious or sense model at the level, where R-Squared value (equal to 0.71) is less than Durbin-Watson statistic (equal to 1.88).

On the other hand, the results of Jordinvest First Trust Fund and Amman Stock Index indicate that the coefficient of the speed of adjustment is positive and equal to 0.30 and the P value equal to zero. Also, there is a statistically significant short-run relationship at

1%, where β4 is positive and equal to 0.31 and the P value equal to zero. In addition, we reject the null hypothesis for test which assumes spurious model and accept the alternative hypothesis of non-spurious or sense model at the level, where R-Squared value (equal to 0.56) is less than Durbin-Watson statistic (equal to 2.41).

Similarly, the results of Amman Stock Index and Growth Fund as shown in Table 4 indicates that the coefficient of the speed of adjustment is statistically significant at 1%, where β5 is negative and equal to 0.77 and the P value equal to zero. Moreover, there is a statistically significant short-run relationship at 1%, where β4 is positive and equal to 0.89 and the P value equal to zero. Finally, we reject the null hypothesis for test which assumes spurious model and accept the alternative hypothesis of non-spurious or sense model at the level, where R-Squared value (equal to 0.57) is less than Durbin-Watson statistics (equal to 2.52).

As for the results of Growth Fund and Amman Stock Index, Table 4 shows that the coefficient of the speed of adjustment is not significant, where β5 is positive and equal to 0.15 and the P value equal to 25%. In addition, there is a statistically significant short-run relationship at 1%, where β4 is positive and equal to 0.41 and the P value equal to zero. Also, we reject the null hypothesis for test which assumes spurious model and accept the alternative hypothesis of non-spurious or sense model at the level, where R-Squared value (equal to 0.41) is less than Durbin-Watson statistic (equal to 2.98).

The results of Amman Stock Index and Horizon Fund indicate that the coefficient of the speed of adjustment is statistically significant at 1%, where β5 is negative and equal to 0.75 and the P value equal to zero. Also, there is a statistically significant short-run relationship at 1%, where β4 is positive and equal to 1.23 and the P value equal to zero. Finally, we reject the null hypothesis for test which assumes spurious model and accept the alternative hypothesis of non-spurious or sense model at the level, where R-Squared value (equal to 0.64) is less than Durbin-Watson statistic (equal to 2.18).

Moving to the results of Horizon Fund and Amman Stock Index, Table 4 displays that the coefficient of the speed of adjustment is not significant and statistical at 10%, where β5 is positive and equal to 0.17 and the P value equal to 9%. In addition, there is a statistically significant short-run relationship at 1%, where β4 is positive and equal to 0.38 and the P value equals to zero. Also, we reject the null hypothesis for test which assumes spurious model and accept the alternative hypothesis of non-spurious or sense model at the level, where R-Squared value (equal to 0.50) is less than Durbin-Watson statistic (equal to 2.83).

As for the results of Amman Stock Index and Jordan Securities Fund, Table 4 shows that the coefficient of the speed of adjustment is statistically significant at 1%, where β5 is negative and equal to 0.59 and the P value equal to zero. However, there is a statistically significant short-run relationship at 1%, where β4 is positive and equal to 1.30 and the P value equal to zero. In addition, we reject the null hypothesis for test which assumes spurious model and accept the alternative hypothesis of non-spurious or sense model at the level, where R-Squared value (equal to 0.74) is less than Durbin-Watson statistic (equal to 2.47).

Finally, the results of Jordan Securities Fund and Amman Stock Index indicate that the coefficient of the speed of adjustment is not significant but statistical at 10%, where β5 is positive and equal to 0.15 and the P value equal to 9%. In addition, there is a statistically significant short-run relationship at 1%, where β4 is positive and equal to 0.47 and the P value equal to zero. However, we reject the null hypothesis for test which assumes spurious model and accept the alternative hypothesis of non-spurious or sense model at the level, where R-Squared value (equal to 0.65) is less than Durbin-Watson statistic (equal to 2.86).

Table 4: Error Correction Model (ECM)

	Coeff.	t value	Sig.			Coeff.	t value	Sig.
(Constant)	-0.0018	-0.2591	0.7966		(Constant)	-0.0001	-0.0383	0.9696
D(FST)	1.8063	8.1509	0.0000		D(ASEI)	0.3106	8.151	0.0000
U(-1)	-0.9894	-7.5187	0.0000		U(-1)	0.3040	4.5645	0.0000
Dependent Variable: D(ASEI)					Dependent Variable: D(FST)			
R-Squared	0.705406				R-Squared	0.561021		
Adjusted R- Squared	0.694076				Adjusted R-Squared	0.544137		
Durbin-Watson	1.881602				Durbin-Watson	2.409372		
	Coeff.	t value	Sig.			Coeff.	t value	Sig.
(Constant)	-0.0037	-0.4356	0.6650		(Constant)	0.0009	0.1467	0.8839
D(GRO)	0.8857	5.4446	0.0000		D(ASEI)	0.4099	5.4446	0.0000
U(-1)	-0.7721	-4.7068	0.0000		U(-1)	0.15069	1.1449	0.2575
Dependent Variable: D(ASEI)					Dependent Variable: D(GRO)			
R-Squared	0.572643				R-Squared	0.405552		
Adjusted R- Squared	0.556206				Adjusted R- Squared	0.382689		
Durbin-Watson	2.52105				Durbin-Watson	2.977255		
	Coeff.	t value	Sig.			Coeff.	t value	Sig.
(Constant)	-0.0021	-0.2629	0.7937		(Constant)	-0.0004	-0.0807	0.936
D(HOR)	1.2302	6.7162	0.0000		D(ASEI)	0.3776	6.7162	0.0000
U(-1)	-0.7457	-4.9628	0.0000		U(-1)	0.1697	1.726893	0.0901
Dependent Variable: D(ASEI)					Dependent Variable: D(HOR)			
R-Squared	0.640693				R- Squared	0.49923		
Adjusted R- Squared	0.626874				Adjusted R- Squared	0.47997		
Durbin-Watson	2.177318				Durbin-Watson	2.82833		
	Coeff.	t value	Sig.			Coeff.	t value	Sig.
(Constant)	-0.0015	-0.2171	0.829		(Constant)	-0.0003	-0.0701	0.9444
D(JOR)	1.3036	8.9855	0.0000		D(ASEI)	0.4666	8.9855	0.0000
U(-1)	-0.5934	-4.4831	0.0000		U(-1)	0.1539	1.6954	0.096
Dependent Variable: D(ASEI)					Dependent Variable: D(JOR)			
R-Squared	0.737145				R-Squared	0.65464		
Adjusted R- Squared	0.727035				Adjusted R- Squared	0.641357		
Durbin-Watson	2.467361				Durbin-Watson	2.862569		

Breusch-Godfrey Serial Correlation LM (Lagrange Multiplier) Test also conducted for testing whether the residual of the Error Correction Model is serially correlated. Table 5 depicts the result from Breusch-Godfrey Serial Correlation LM test. The test assumes that there is no serial correlation in the residual of ECM, where the null hypothesis of the test is no serial correlation and the alternative hypothesis of the test is serial correlation. Also, Jarque-Bera (JB) test of normality was also conducted for testing whether the residual of the ECM has normal distribution. Table 5 also depicts the results of Jarque-Bera test too. The test assumes that there is normal distribution in the residual of ECM, where the null hypothesis of the test is normal distribution and the alternative hypothesis of the test is no normal distribution.

According to Table 5, the results of Amman Stock Index and Jordinvest First Trust Fund lead us to accept the null hypothesis for the test which assumes no serial correlation in the residual of the model and reject the alternative which assumes serial correlation in the residual of the model, where the *P* value of Obs. R-Squared 41.74% is greater than 5%. Also, we accept the null hypothesis for the test which assumes normal distribution in the residual of the model and reject the alternative which assumes no normal distribution in the residual of the model, where JB equal to 2.15 and the *P* value 34% is greater than 5%.

On the other hand, the results of Jordinvest First Trust Fund and Amman Stock Index reject the null hypothesis for the test which assumes no serial correlation in the residual of the model and accept the alternative which assumes serial correlation in the residual of the model, where the *P* value of Obs. R-Squared 0.03% (almost zero) is less than 5%. In addition, we accept the null hypothesis for the test which assumes normal distribution in the residual of the model and reject the alternative which assumes no normal distribution in the residual of the model, where JB equal to 5.53 and the *P* value 6% is greater than 5%.

As for the results of Amman Stock Index and Growth Fund, we reject the null hypothesis for the test which assumes no serial correlation in the residual of the model and accept the alternative which assumes serial correlation in the residual of the model, where the P value of Obs. R-Squared 2.7% is less than 5%. Also, we accept the null hypothesis for the test which assumes normal distribution in the residual of the model and reject the alternative which assumes no normal distribution in the residual of the model, where JB equal to 1.22 and the P value 54% is greater than 5%.

Similarly, the results of Growth Fund and Amman Stock Index indicate reject the null hypothesis for the test which assumes no serial correlation in the residual of the model and accept the alternative which assumes serial correlation in the residual of the model, where the P value of Obs. R-Squared 0.04% is less than 5%. Moreover, we reject the null hypothesis for the test which assumes normal distribution in the residual of the model and accept the alternative which assumes no normal distribution in the residual of the model, where JB equal to 127.7 and the P value 0% is less than 5%.

As for the results of Amman Stock Index and Horizon Fund, we accept the null hypothesis for the test which assumes no serial correlation in the residual of the model and reject the alternative which assumes serial correlation in the residual of the model, where the P value of Obs. R-Squared 8.58% is greater than 5%. Also, we accept the null hypothesis for the test which assumes normal distribution in the residual of the model and reject the alternative which assumes no normal distribution in the residual of the model, where JB equal to 0.65 and the P value 72.34% is greater than 5%.

The results of Horizon Fund and Amman Stock Index as shown in Table 5 reject the null hypothesis for the test which assumes no serial correlation in the residual of the model and accept the alternative which assumes serial correlation in the residual of the model, where the P value of Obs. R-Squared 0.01% is less than 5%. Moreover, we reject the null hypothesis for the test which assumes normal distribution in the residual of the model and accept the alternative which assumes no normal distribution in the residual of the model, where JB equal to 9.48 and the P value 0.87% is less than 5%.

On the other hand, the results of Amman Stock Index and Jordan Securities Fund In Table 5 sows that we should reject the null hypothesis for the test which assumes no serial correlation in the residual of the model and accept the alternative which assumes serial correlation in the residual of the model, where the P value of Obs. R-Squared 0.37% is less than 5%. Also, we must accept the null hypothesis for the test which assumes normal distribution in the residual of the model and reject the alternative which assumes no normal distribution in the residual of the model, where JB equal to 5.60 and the P value 6.08% is greater than 5%.

Similarly, the results of Jordan Securities Fund and Amman Stock Index reject the null hypothesis for the test which assumes no serial correlation in the residual of the model and accept the alternative which assumes serial correlation in the residual of the model, where the P value of Obs. R-Squared is zero and it is less than 5%. In addition, we reject the null hypothesis for the test which assumes normal distribution in the residual of the model and accept the alternative which assumes no normal distribution in the residual of the model, where JB equal to 42.82 and the P value is zero, which is less than 5%.

Table 5: Breusch – Godfrey Serial Correlation LM Test

ASEI on FST					FST on ASEI			
F value	0.8203	Pro.F(2.5)	0.4462		F value	10.571	Pro.F(2.5)	0.0001
Obs* R^2	1.7472	Pro. χ^2	0.4174		Obs* R^2	16.3445	Pro. χ^2	0.0003
R^2	0.0318	Adj. R^2	-0.0457		R^2	0.2972	Adj. R^2	0.2409
Jarque-Bera Test – Normal Distribution test					Jarque-Bera Test – Normal Distribution test			
Skewness	0.4376	Kurtosis	2.5828		Skewness	-0.1668	Kurtosis	4.5178
Jarque-Bera	2.1547	Prob.	0.3405		Jarque-Bera	5.5346	Prob.	0.0628
Durbin - Watson stat		2.018441			Durbin -Watson stat		2.073924	
ASEI on GRO					GRO on ASEI			
F value	3.7576	Pro.F(2.5)	0.0302		F value	10.0386	Pro.F(2.5)	0.0002
Obs* R^2	7.1865	Pro. χ^2	0.0275		Obs* R^2	15.7576	Pro. χ^2	0.0004
R^2	0.1307	Adj. R^2	0.0611		R^2	0.2865	Adj. R^2	0.2294
Jarque-Bera Test – Normal Distribution test					Jarque-Bera Test – Normal Distribution test			
Skewness	-0.3512	Kurtosis	3.2004		Skewness	1.591058	Kurtosis	9.752684
Jarque-Bera	1.2227	Prob.	0.5426		Jarque-Bera	127.7022	Prob.	0.0000
Durbin - Watson stat		1.878452			Durbin - Watson stat		2.002761	
ASEI on HOR					HOR on ASEI			
F value	2.451716	Pro.F(2.5)	0.0964		F value	12.34459	Pro.F(2.5)	0.0000
Obs* R^2	4.9121	Pro. χ^2	0.0858		Obs* R^2	18.18075	Pro. χ^2	0.0001
R^2	0.08931	Adj. R^2	0.0165		R^2	0.330559	Adj. R^2	0.277004
Jarque-Bera Test – Normal Distribution test					Jarque-Bera Test – Normal Distribution test			
Skewness	-0.0215	Kurtosis	2.4702		Skewness	-0.45668	Kurtosis	4.817496
Jarque-Bera	0.6475	Prob.	0.7234		Jarque-Bera	9.481814	Prob.	0.008731
Durbin - Watson stat		1.867938			Durbin -Watson stat		1.90522	
ASEI on JOR					JOR on ASEI			
F value	6.4072	Pro.F(2.5)	0.0033		F value	14.72247	Pro.F(2.5)	0.0000
Obs* R^2	11.2203	Pro. χ^2	0.0037		Obs* R^2	20.38483	Pro. χ^2	0.0000
R^2	0.2040	Adj. R^2	0.140326		R^2	0.370633	Adj. R^2	0.320284
Jarque-Bera Test – Normal Distribution test					Jarque-Bera Test – Normal Distribution test			
Skewness	0.4515	Kurtosis	4.2759		Skewness	-1.1490	Kurtosis	6.661507
Jarque-Bera	5.5990	Prob.	0.0608		Jarque-Bera	42.8257	Prob.	0.0000
Durbin - Watson stat		2.044816			Durbin - Watson stat		2.05579	

4.5 Granger Causality Test

From the previous tests, we conclude that the series are stationary at level and there is a cointegration between ASEI and Jordinvest First Trust Fund, but it does not necessarily imply that a causality relationship exists. We employ Granger (1969) causality test to investigate the possible short-term relationship between ASEI and Jordinvest First Trust Fund, where the dependent variable can be said to be Granger-caused by the independent variable, if the independent variable helps in the prediction of the dependent variable, or if the coefficients of lagged independent variable are statistically significant.

The results of Granger-Causality test are depicted in Table 6. By using 11 time lags (AIC lags), the F-Statistic (equal to 2.07) was statistically significant for the second equation at 10%, but not to the first equation. By using 1 time lag (AIC lags); the F-Statistic (equal to 5.94) was statistically significant for the first equation at 5%, but not to the second equation. Finally, by using 1 time lag (AIC lags); the F-Statistics (equal to 7.30) was statistically significant for the first equation at 1%, but not to the second equation. Therefore, we accept the null hypothesis of the first equation that is Jordinvest First Trust Fund does not Granger cause Amman Stock Index. Also, we accept the alternative hypothesis that is Amman Stock Index Granger causes Jordinvest First Trust Fund. On the other hand, we accept the alternative hypothesis that is Growth Fund Grange cause Amman Stock index, and we accept the null hypothesis of the second equation that is Amman Stock index does not Grange cause Growth Fund. Similarly, we accept the alternative hypothesis that is Horizon Fund Granger cause Amman Stock Index. However, we accept the null hypothesis of the second equation that is Amman Stock index does not Granger cause Horizon Fund. Finally, we accept the alternative hypothesis that is Jordan Securities Fund Granger cause Amman Stock Index, and we accept the null hypothesis of the second equation that is Amman Stock Index does not Granger cause Jordan Securities Fund.

Table 6: Pairwise Granger Causality Test

Null Hypothesis	F– Statistic
FST does not Granger Cause ASEI (11)	0.55487
ASEI does not Granger Cause FST (11)	2.07446*
GRO does not Granger Cause ASEI	5.94402**
ASEI does not Granger Cause GRO	0.04501
HOR does not Granger Cause ASEI	7.29812***
ASEI does not Granger Cause HOR	1.92177
JOR does not Granger Cause ASEI	4.05493**
ASEI does not Granger Cause JOR	0.44435

***Significance at 1%, * *Significance at 5% and *Significance at 10%

5 Conclusion

This study investigated the price relationship between Jordanian mutual funds and Amman Stock Exchange during the period from March, 2005 to November, 2009. The results of ADF unit root tests show that both the fund and index prices are stationary at level. The results show a positive significant impact of Amman Stock Index on Jordinvest First Trust Fund on the long-run, but not vice versa. As for the ECM test between Jordinvest First Trust Fund and Amman Stock Index, the findings reveals a positive significant short-run relationship. In addition, Jordinvest First Trust Fund manager caused by the past changes in the stock market index over the short-run (11 months period).

On the other hand, the empirical results revealed a positive significant impact of Amman Stock Index on Growth Fund on the long-run, but not vice versa. Similarly, the ECM test for Amman Stock Index on Growth Fund showed a positive significant short-run relationship. However, the findings provided evidence of a positive significant short-run causality relationship between Amman Stock Index and Growth Fund in one way manner, from Growth Fund to Amman Stock Index.

The results of Amman Stock Index on Horizon Fund show a positive significant impact of Amman stock index on Horizon Fund on the long-run, but not vice versa. On the other hand, the short-run relationship regarding to ECM test for Amman Stock Index on Horizon Fund revealed a positive significant short-run relationship. It is also concluded that there is a positive significant short-run causality relationship between Amman Stock Index and Horizon Fund in one way manner, from Horizon Fund to Amman Stock Index.

As for the empirical tests of Amman stock index on Jordan Securities Fund, it was found that there is a positive significant impact of Amman Stock Index on Jordan Securities Fund on the long-run, but not vice versa. On the other hand, the short-run relationship regarding to ECM test for Amman Stock Index on Jordan Securities Fund revealed a positive significant short-run relationship. Also, the findings indicated to a positive significant short-run relationship between Amman Stock Index and Jordan Securities Fund in one way manner, from Jordan Securities Fund to Amman Stock Index.

The results of this study provide a further evidence for the existence of active fund management activities in Jordinvest First Trust, Growth, Horizon and Jordan Securities Funds managers whose were able to outperform the market through market timing and securities selection. Therefore, Amman Stock Market would present a greater opportunities for active fund managers to find abnormal returns. This conclusion is consistent with the finding of Huij and Post (2011) where they found that emerging markets are less efficient than developed markets, and that active fund managers can achieve an excess returns.

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