EXAMINING THE WEAK FORM OF MARKET EFFICIENCY RISK: EVIDENCE FROM MUSCAT SECURITY MARKET FINANCIAL INDEX SECTOR

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Abstract: This study investigates the weak form market efficiency of indices for the Financial returns as listed in the Muscat Securities Market (MSM30 index) in Oman, by conducting monthly observations from January 2010 until December 2014. All macroeconomic variables, covered under Financial Sectoral Index , were found to be co-integrated. Furthermore, the findings exhibit that oil prices as a determinant have the most significant relationship on the Financial Stock Index. It was found that the CPI to exert no influence on the Financial index prices. Whilst inflation appears to be a third determinant, there is a significant effect on the Financial and Service indices prices. The overall findings from the period suggest that the Financial Index Prices listed in MSM30 is inefficient in weak form market efficiency, which is consistent with previous studies examining the weak form of market efficiency.

Keywords: Financial Risk; Efficiency; Oman; Capital Market.

I. INTRODUCTION

After the 2008 stock market crash, the most considerable event to globally impact the stock market is the significant plunge in the price of crude oil, beginning in 2013. The per-barrel-pricing of crude dropped 50% in late 2014 (Bloomberg, 2015). Globally, this has had its effect on the international stock market, and from there, beyond, to other Financial, Service, and Industrial sectors, especially those of countries which are heavily reliant upon the economic contribution of crude oil to their gross domestic product (GDP). For Gulf Cooperation Council (GCC) countries, oil is the main economic contribution to the GDP. Using Oman as an example, the price of oil contributes to 80% of Oman‟s GDP (National Center for Statistics & Information, 2015).

Declining oil prices have impacted the investments of, and into, GCC financial markets, and GCC members find that their economies, and other Financial, Industrial, and Service sectors, are not immune to the effects of events such as falling oil prices, or severe crashes or slow-downs in markets and economies elsewhere in the world. Research by Sedik and William (2011) finds that the GCC stock markets are less protected against global crashes, as they are highly correlated. In fact, the Muscat Securities Market1 (MSM30) index dropped

[1]The Muscat Securities Market (MSM) was founded in 1988. It lists over 152 companies coming from Financial, Industrial and Service indices sectors. The market capitalization posted its highest record in 2014, reaching OMR 14.560 billion over OMR 14.160 billion in 2013 (Muscat Securities Market, 2015).over 7% in late 2014 as a result from the sharp fall of oil prices (Muscat Securities Market, 2015). The MSM30 market has quite recently been improved and developed in terms of the corporate governance, market regularity, and disclosure over the last five years (Capital Market Authority, 2015). A solid trading and monitoring system, and increased informational transparency and disclosure, as well as the low price to earnings ratio (P/E) and cash dividends distributed by the listed companies in the MSM30 index, are theorized to be key factors towards securing stability in the MSM30 index performance. This could be surmised to have led to increased market efficiency.

Market inefficiency causes risk for two reasons, these being adverse selection and moral hazard (Chepkoech Kemei, J., and Kenyatta, J., 2014). If there is no viable information on the averaging of insurance premiums, the less risky buyer hazards borrowing at a higher rate than warranted by the actual market. Inaccurate information leads the investor to invest or sell more heavily than actual performance of the market would warrant, had the investor proper knowledge of it (Langevoort, D., 2002). Having late or inaccurate information opens the investor up to chances of higher losses, as it enables the seller/lender to take greater than warranted risks with the buyer/investor‟s funds (Bernard, C., and Boyle, P., 2009; Langevoort, D., 2002). Also, having doctored or falsified information means the seller may not put acquired funds to the best use, or even the intended use for those funds (Bernard, C., and Boyle, P., 2009; Hurt, C., 2010). In cases of falsified or doctored information, this is almost always at cost to the investor/buyer (Bernard, C., and Boyle, P., 2009; Hurt, C., 2010). Needless to say, late information is of no use to the investor/buyer whatsoever (Bernard, C., and Boyle, P., 2009). For investors in the Bernard L. Madoff Investment Securities LLC ponzi scheme for example, the results of the simple quantitative diagnostics run by Bernard, C., and Boyle, P. (2009) would surely have raised

suspicions about the firm‟s performance. Of course, would have, could have, and should have are no balm for the losses incurred by Madofff‟s investors.

Abuse of information by agents in investment and lending organizations can go beyond poor and minimal performance on stocks and individual investor and organizational losses; systemic market inefficiency upsets the entire banking system, and as such, can lead to banks failing abruptly, creating inefficiencies on an economic-wide and, worryingly, global scale (Chepkoech Kemei, J., and Kenyatta, J., 2014). Of market inefficiency authors Chepkoech Kemei, J., and Kenyatta, J. conclude that "information asymmetries of capital markets constitute the backbone of financial ineffectiveness and financial crisis" (2014, pp. 2). The purpose of this study is to examine weak form efficient market hypothesis (EMH) on three different sectors listed in the MSM30 index. These sectors are Financial, Industrial and Service, and they are observed in their entirety. This is done to determine the impact of macroeconomic variables, such as oil prices and other factors, on three sectoral indices. This has been done by conducting monthly analysis from the closing period of January, 2010, up until December, 2014. We also observe whether or not the average returns on those indices, made on the historical time (days: t-1, t-2, t-3 and so on) are statistically significant or different from today (t). Significance determines the impact of macroeconomic factors on the three sectoral indices prices volatility in a long-run relationship.

In the literature, to the best of our knowledge, there has been no attempt to assess the weak form EMH in respect to main indices sectors prices (Financial, Industrial and Service) in their entirety. Among the three sectoral indices listed in MSM30, macroeconomic variables determinates instigate prices volatility. Differences represent the first major factor to justify further research concerning this market.

Another factor of relevance to researchers, stakeholders, and investors, is that the monthly analysis period selected (from 2010 to 2014) of this study is current and up to date, and uniquely focuses on the development of Oman‟s stock market after the market crashes in 2008.

Additionally, this study demonstrates the market level in respect to the Financial, Service and Industrial sectors, in whether or not they are efficient.

Further, the study itself provides the rational for efficiencies and inefficiencies.

Finally, the previous, aids investment decisions[2].

This study is organized as follows. Section 2 provides a review of the relevant literature on weak form market efficiency and the existence of co-integrating vectors and determinants. Section 3 represents the data used and Section 4 describes the research methodology. Section 5 provides all data analysis and our empirical results. Lastly, the conclusion of weak form market efficiency and determinates of the prices impact on the three sectoral index is addressed in Section 6.

II. LITERATURE REVIEW

2.1 Capital Market Efficiency & Efficient Market Hypothesis

Capital market efficiency is described by researchers to exist in three forms: operational, allocative and informational efficiency (Fama, 1970; Alexander and Bailey, 1995; Muslumov, Aras, and Kurtulus, 2003 Jones, 2007; Redhead, 2008;).

Efficient market hypothesis (EMH) embodies the form of informational efficiency. This form consists of the premise that all relevant information is immediately reflected into current market prices and reflects the determination of the market value (Fama, 1970). It refers to a perfect capital market, which assumes that all investors are rational and have direct access to all available information, and that accessible information and transactions are supposedly without costs. However, in real practice the market participants are addressed to cover the transaction costs on their daily trading. EMH also assumes that all stocks are fairly priced, and market participants will only be able to earn a normal return on their stock prices, consistent with inherent market risk.

2.2 Approaches of Efficient Market Hypothesis

According to Fama (1970), the efficient market hypothesis (EMH) can be defined by different approaches, each depending on the type of information revealed to investors. Types of

[2]Investment decisions are aided thus: attempts to find mispriced assets have no benefit in an efficient market. In the efficient market investors may decide to invest considerably in selecting passive management in one of the sector, over another. Alternatively, if the market is inefficient in a particular sector, it is an opportunity for the rational investor to use common analysis tools to outperform the market in order to achieve abnormal returns. In the inefficient market greater funds invested in active management of a particular sector which appears to be inefficient in EMH provides the opportunity to enhance returns adjusted with risk, by recognizing the misprices in securities, and thus short selling the overvalued securities and buying the undervalued securities.

information revealed to investors are often defined or groups as Weak-form efficient market hypothesis, Semi-strong form efficient market hypothesis and Strong-form efficient market hypothesis.

The Weak-form efficient market hypothesis which considered in this study, suggests that current stock prices fully incorporate all historical information, reflecting better estimates of intrinsic values (Malkiel, 1999). Hence, future prices cannot be predicted in advance based on the study of past stock

prices. Thus, there is no benefit towards using technical analysis to gain excessive stock returns if the market is weak form efficient. Conversely, rational investors still have the opportunity to gain abnormal return on stock prices for value and growth of stocks throughout their efforts of using fundamental analysis relative to accounting measures such as earnings, cash flow, or book value (Dyckman and Morse, 1986). Dyckman and Morse (1986) demonstrate several tests of the market efficient hypothesis to try weak form, which are the variance ratio, serial correlation data, and the running of tests which include smaller unit root tests.

2.3 Testing weak form EMH

The randomness test can be considerably examined by the weak form market efficient when implementing the weak form test, which demonstrates the independence of price changes at any given point of time. Bachelier (1900) has iterated that the stock prices directions and financial assets are weak form efficient in respect to the irrelevancy of historical prices‟ movement with current financial securities prices.

Moreover, Fama (1965) examined market efficiency by implementing tests of serial correlation and running tests which generated daily data of approximately 30 stocks listed in the Dow Jones Industrial Average (DJIA) from 1956 to 1962. The findings were not significantly different from zero, and illustrate very low correlation, leading to the conclusion that the DJIA is efficient in weak form market efficiency. Perhaps, the research by Solnik (1973) points out that these markets diverge more from the „Weak-form‟ compared to what has been found in the United States. Nevertheless, correlation coefficient is low, which may suggest that when the correlation is zero by using serial correlation and run tests, the market is considered to be efficient at the weak form of EMH.

On the other hand, Summers (1986) exhibits that the efficiency test of serial correlation can mislead the short term returns horizon. Despite, Fama and French (1988) have asserted that negative serial correlations at the short term horizon become stronger as the return of the short term horizon increases. Moreover,the variance ratio and run tests methodology3 used by Abraham, Seyyed, and Alsakran (2002) have emphasized, that upon implementing adjusted returns in Bahrain and Saudi Arabia covering markets, the period from October 1992 and December 1998, these markets are weak form EMH, and when using the raw data, these markets are inefficient in weak form EMH.

2.4 Testing weak form Market Efficiency in the MSM30 Index

Apart from the above research findings on testing weak form EMH, certain studies conducted randomness tests on the MSM30 index.Kharusi and Weagley (2014) they found that MSM30 index prices returns observed a positive correlation returns pre financial crisis (January 1, 2007 to June 8, 2008), whereas, a negative correlation for returns during the financial crisis from June 9, 2008 to January 22, 2009 proceeded. Whilst, the results varied between positive and negatives correlation returns on all index prices at post crisis levels from January 23, 2009 to January 17, 2011 the overacting result was that the MSM30 index during the financial crisis 2008 did not really follow the „Weak-form‟ pattern, and thus it can be labeled inefficient during that period.

On the other hand one must not ignore a crucial study by Jawad (2011), found that on monthly analysis reflect that the market is efficient in WFE. Whereas his finding on daily analysis is that the market is inefficient in WFE. Arguably, Al-Jafari (2012) points out that the MSM is efficient and the market prices, and that stock returns are unpredictable in advance, as all available information is reflected more or less in the stock prices themselves.

2.5 The Impact of Macroeconomic variables on stock indices returns

Various empirical researchers have investigated the impacts of macroeconomic variables on stock indices examines the influence of oil price changes on U.S stock indices prices with varied results, illustrating that the reaction of U.S stock indices returns may considerably fluctuate depending on the crude oil market. They returns.An empirical study by Kilian and Park (2009) found insignificance of effect on stock indices returns relevant to the shocks of crude oil supply, whilst the positive shocks of the demand on crude oil prices. Other studies by Jones and Kaul (1996), and Kling (1985) report that declines of stock indices returns are correlated with increases in crude oil prices, demonstrating a negative relationship.

Research by Park and Ratti (2008) explains that the negative relationship between those variables exists

[3]The variance ratio and run tests methodology was developed by Beveridge and Nelson (1981).

on the oil importing countries, whilst the positive relationship substantially exists on the oil exporting countries.

In contrast, Huang, Masulis, and Stoll (1996) have found no existence of a negative relationship between stock returns and oil prices, which is in line with findings from Chen, Roll, and Ross (1986), who had previously suggested that the oil prices have no influence on stock returns. More recently, an empirical study by Cong et al. (2008), demonstrated4 that the shocks of crude oil prices had no significant impact on the majority of Chinese stock indices returns.

From the literature is can be argued that the relationship between macroeconomic variables and stock market indices partially reveals the informational market efficiency.

III. DATA AND VARIABLE SELECTION

Initially, the data in this study is based on time series. The data implemented herein was collected in May 2015. The method of data collection is based on secondary information collected from two main financial institution sources, the Muscat Securities Market (MSM) and the National Center for statistics and information - Directorate General of Economic Statistics in Oman. The data was divided into two samples based on the research purpose.

For the first sample, the data was obtained in the monthly closing prices for Financial Index Prices, since this index listed in the MSM30 index. The former were collected for a period of five years, from the closing period of January, 2010 to December, 2014. There were a total of 60 observations. This was done to investigate whether the entire sectors listed in MSM30 follow a random walk and efficient in weak form market efficiency.

For the second sample, the data sought and captured firstly consisted of monthly macroeconomic factors which are oil prices, CPI index (Consumer Price Index) and inflation rates as independent variables. Secondly, the three entire indices sectors monthly prices listed in MSM30 as dependent variables for five years from closing period of January, 2010 to December, 2014. There were a total of 60 observations. This was done to investigate the significance of the impact of the macroeconomic factors on the return of the sectoral index listed in MSM30.

Normally, the monthly closing which provides 60 observations are excluding the closing, due to public holidays.[4]The demonstration was rendered using multivariate vector auto regression, Johansen-Jueslius co-integration, Phillips-Perron and Kwiatkowski and Philips unit root tests, on monthly data collected from January 1996 to December 2012.

IV. RESEARCH METHODOLOGY

Essentially, the prices of sectoral index used to obtain the index returns. The following equation was deployed:

$$R_t = [(P_t) / P_{t-1}] - 1 \qquad (4.1)$$

Where the:

R_t - The daily returns of the index,

P_t - Index price at time t,

P_{t-1} - Index price at time t-1.

The correlation coefficient test is the statistical tool commonly used to indicate whether or not there is randomness in indices prices changes. According to Gujarati (2012), the serial correlation coefficient known as autocorrelation test and it is defined as a measure of time series of returns and a different lagged period of the return within the same time series. Thus, autocorrelations accurately tests the independence and dependence of the random variables in a time series. Additionally, the former is calculated by using the beta coefficient from the following estimated regression formula:

$$R_{i,t} = a_i + \beta_i R_{i,t-k} + \varepsilon i, t \qquad (4.2)$$

Where the:

$R_{i,t}$ – Represents the monthly return of sectoral indices at time t,

a_i – Constant,

β_i - The correlation coefficient of the current and lagged returns,

$\varepsilon i, t$ - The random error or white noise,

k - Reflects different time lags in months.

To clarify further, the suggestion of the weak-form is that the existence of insignificant correlation coefficient between sectoral indices prices returns implies that:

$$\beta_1 = \beta_2 = \beta_3 = \cdots = \beta_J = 0 \qquad (4.2.a)$$

The serial correlation test or autocorrelations will be used to examine correlation coefficient between the sectoral index monthly return listed in MSM30 index by employing 30 lags. Thus, if the correlation coefficient is zero, then this entails that the return of the sectoral indices follow random walk and thus the market is efficient. Conversely, if the correlation coefficient shows positive or negative then it demonstrates a trend on the monthly prices returns of the sectoral indices, and therefore the market is inefficient. Accordingly, the equation of the correlation coefficient is calculated as:

$$\rho(k) = \frac{cov[r_t, r_{t-k}]}{\sqrt{var[r_t]}\sqrt{var[r_{t-k}]}} = \frac{cov[r_t, r_{t-k}]}{var[r_t]} \qquad (4.3)$$

In which signifies the sample of autocorrelation, where the:

$\rho(k)$ = Autocorrelation coefficient of sectoral indices returns at time series t,

r_t = Sectoral indices prices returns at time t,

k = the lag of the period,

$cov[r_t, r_{t-k}]$ = represents the covariance between the sectoral indices return at time period $(t-1, t)$, where the lagged return $t-k$ represents prior periods,

$var[r_t]$ = Shows the variance of sectoral indices returns over time period $(t-1, t)$.

Moreover, Ljung and Box (1978) have shown how the Q-Statistics5 are deployed to test the serial correlation or autocorrelation between stock prices. The Q-Statistics is considered to show if there is any departure at different time lags from the zero serial correlation. The Q-Statistics is computed as follows:

$$Q = n(n+2)\sum_{k=1}^{h} \frac{\rho^{-}(\kappa)}{(n-k)} \qquad (4.4)$$

Where:

n - The sample size or number of observation,

h - Represents the number of lags,

$\rho\kappa$ - The sample serial correlation at lag k. whilst, n is number of observations,

Q - Statistic test is distributed from chi-squared with I degrees of freedom.

The null hypothesis implies that the sectoral indices are efficient, whereas the alternative hypothesis signifies that these indices are not efficient. Accordingly, the null hypothesis is rejected when the value of exceeds the critical value of from chi-squared distribution at a significant level for the degree of freedom. As a result, the null hypothesis shows insignificant autocorrelation and thus the market is weak form EMH. This entails that the series of data do not follow the random walk if the autocorrelation shows statistical significance. This is when the is indicated with positive autocorrelation greater than zero and negative autocorrelation when less than zero. Both results signify appearance of autocorrelation and thus the sectoral indices tend to be inefficient, and the alternative hypothesis is accepted. The critical value of at 5% significance level is equals to (43.77).

With characteristics of infrequent trading existing in the Muscat Securities market, and Oman being defined as a developing country, Miller, Muthuswamy, and Whaley[5]'s (1994) recommendation for data adjustment for infrequent trading has been applied so that the results might be more accurate. The adjustments of infrequent trading days has been

devised by computing the residuals as following equation:

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + \epsilon_t \quad (4.9)$$

Therefore, using this equation to calculate the adjusted returns of non-trading days as following:

$$R_t^{adj} = \epsilon_t/(1-\alpha) \quad (4.10)$$

In addition, this paper will further examine the existence of any Co-integration equilibrium long-run relationship between the selected three macroeconomic variables and the stock indices prices. Hence, this paper uses the Johansen co-integration test and vector correction model (VECM) to examine the co-integrating vectors between integrated time series. The Johansen co-integration test suggests that data must be non-stationary and this test can be run, only if all variables $X_t \sim I(1), Y_t \sim I(1)$ *and* $Z_n \sim I(1)$,where considering more data or variables are integrated of same order (1), thus after first difference the former becomes stationary, only then can the Johansen co-integration test be applied to unrestricted variables. This method also determines trends and estimates how many co-integrating vectors distinct the long-run equilibrium relationship between the variables; which means these variables move together in the long term, therefore:

$$\Delta X_t = A_t X_{t-1} + X_{t-1} + \epsilon_i \quad (4.11)$$

Where X_t and ϵ_i are $nx1$ vectors, whereas A_t is nxn matrix of n variables.

The raw data are applied to run the model for the second and third hypothesis; and then the trace and max tests are derived from the Johansen co-integration test are carried out to help identify whether there exists of co-integration long-run relationship between variables (Johansen and Juselius, 1990). Thus, the number of co-integrating vectors that are significantly different from zero are t tested through implementing trace and max test statistics methods which derived from Johansen test of co-integration, as follows:

$$\lambda_{trace}(r) = -T\sum_{i=r+1}^{n} ln\,(1-\hat{\lambda}_i) \quad (4.12)$$

$$\lambda_{max}(r, r+1) = -T\,ln(1-\hat{\lambda}_{r+1}) \quad (4.13)$$

Where $\hat{\lambda_i}$ indicates the estimated values of trace and max tests, T is the number of observation and r is co-integrating vectors against the alternative of $r+1$.

Consequently, for any co-integrating vectors, the vector error correction model (VECM) is constructed6. This is in order to check the model specification of co-integrating vectors if the long-run relationship is existed between all variables from the first difference. The specification of the latter is verified and performed to obtain the significance of long-run relationship between the macroeconomic variables and the stock prices indices. The sample period used to conduct this test is over the monthly time period from 2010 to 2104. The following model is developed to test significance coefficients after determining the impact among macroeconomic variables on each indices prices, as following estimated equation:

$$\Delta P_i = \alpha_0 + \beta_{1\,(Oil\,prices)} + \beta_{2\,(CPI)} + \beta_{1\,(Inflation)} + \epsilon i \quad (4.14)$$

Where the:

ΔP_i- The sample prices changes of i sectoral indices prices which are Financial, Industrial and Service as dependent variable,

α_0- Represents the constant,

$\beta_{1\,(Oil\,prices)}$ = The slop or correlation coefficient for the oil prices as an independent variable,

$\beta_{2\,(CPI)}$ = The slop or correlation coefficient for the CPI as an independent variable,

$\beta_{1\,(Inflation)}$ = The slop or correlation coefficient for the inflation as an independent variable,

ϵi = The error term or residuals.

Correspondingly, the data is plotted based on the logarithmic scale, so that all variables are converted into natural logarithm; the reason is based on monthly statistics, all indices returns data are estimated. Gujarati (2014) has suggested this approach in order reduce the gap among the variables. Hence, the model considered for regression, is as follows:

$$\Delta Ln(P_i) = \alpha_0 + \beta_1 Ln(oil\ prices) + \beta_2\, Ln(CPI) + \beta_1\, inflation + \epsilon i \quad (4.15)$$

Where Ln = the natural logarithm.

Therefore, the elasticities of estimated coefficients for the long run relationship between variables can be interpreted, since the four variables are transferred to natural logarithm.

V. RESULTS AND DISCUSSION

5.1 Results of monthly Serial Correlation Test for Financial Sector Index

Table 1 contains the results of the serial correlation test up to 30 lags using monthly arithmetic return of the Financial sector index over the period [6]The term (VECM) model term was first named by Sargan (1964) and later simplified by Engle and Granger (1987).from January 2010 to December 2014. The basic assumption is that the null hypothesis of weak form EMH is rejected if the Financial index returns are serially correlated. Thus, all lags correlation coefficients are not statistically significant at the 5% significant level in Financial sector index except for lags 10 and 20 are statistically significant at 10%.

Table 1: Results of monthly Serial Correlation Test for Financial Sector Index

Lags	AC	Q-Stat	Probability
1	-.0.017	0.018	0.897
2	-0.034	0.083	0.805
3	0.143	1.171	0.315
4	0.029	1.191	0.841
5	-0.113	1.864	0.440
6	0.115	2.938	0.441
7	-0.088	3.233	0.563
8	0.199	4.620	0.195
9	0.193	6.612	0.121
10	-0.279	10.465	*0.0751
15	-0.199	11.732	0.238
20	-0.347	16.923	*0.0617
25	-0.323	23.032	0.133
30	0.088	27.188	0.719

This table shows the results of descriptive statistics for all stock indices returns listed in MSM30 index and macroeconomic variables, for the monthly period from January 2010 to December 2014.

Hence, the significance at 5% level of AC coefficients shows that the index returns series exhibit serial independence for all intervals. Thus, the null hypothesis of random walk is accepted. In this particular sample, the tendency of serial dependence for these lags shows the returns cannot be easily used to predict the future returns. On the other hand, the Q-Statistics exhibit that all Q values for all lags are lower than the critical value of 43.77. Thereby they are inside critical interval. Therefore, the Q-statistics confirm that the lags from 1 to 30 fail to reject the null hypothesis and thus the Financial index return has no autocorrelation. As a result, the Financial index return is efficient in efficient market hypothesis.

5.2 The monthly results of Johansen long-run co-integration test and vector error correction model (VECM) for all three macroeconomic variables and the Financial Index prices

Table 2 demonstrates the monthly results of Johansen long-run co-integration method which exists of one co-integrating equations. Commonly, the process performed on raw data over the sample monthly period from 2010 to 2014 for the all four variables and selecting lag 2 of level intervals in the first differences. The lag order selection based on the minimum scale criteria of Akaike criterion (AIC) and Hannan-Quinn criterion (HQC) with 26.396 and 26.894, respectively. The multivariate tests of co-integrating says that the null hypothesis of no co-integration is rejected which states the model is not stationary if the p-value is less of 5% significance level and accepted if it is greater than 5%. Hence, the p-value of trace and max tests is approximately 4% which is less than 5% significance level. This implies to reject the no co-integration relationship. While the p-value of both tests are greater than 5% significance level which means to accept the null hypothesis which obtain there at least an existence of one co-integration long-relationship between all three macroeconomic variables and the Financial index prices. Which means the model possess one error term. Therefore, the VECM model will be constructed to obtain the significance relationship between the three macroeconomic variables and the Financial index prices.

Table 2: The monthly results of Johansen co-integration test for Financial index prices

Rank	Eigenvalue	Trace Test	p-value	Max test	p-value
0*	0.0387	49.001	0.037	28.427	0.036
1	0.169	20.574	0.396	10.735	0.681
2	0.126	9.839	0.299	7.837	0.404
3	0.034	2.002	0.157	2.002	0.157

This table shows the outcome of Trace and Max tests indicates 1 co-integrating equations at the 0.05 significance level. * Signifies rejection of the null hypothesis at the 0.05 level. The information criteria of AIC and HQC are 26.396* and 26.894*, respectively for selected lag order.

Table 3 demonstrates the monthly results of vector error correction model (VECM) performed for lag 2 of level intervals in the first differences; for the target equation variable of Financial index prices as dependent variable and oil prices, CPI and inflation variables as independent variables. The results show the adjustment effect of each macroeconomic variables to Financial index prices are varied towards long-term equilibrium relationship. The adjusted coefficient of oil prices signifies positive relationship with Financial index prices. In other word, the positive changes in oil prices of one unit leads to increase in prices of Financial index approximately of 5%. While the adjusted coefficients have negative signs of CPI and inflation, which indicates that the one unit increase of CPI and inflation leads to

decrease of Financial index prices of nearly twice and 0.8%, respectively.

Table 3: The monthly results of vector correction model (VECM) for the targeted equation of Financial index prices

	Coefficient	std. error	t-ratio	p-value
Const	**-0.0612	0.028	-2.213	0.031
D_Ln(FIP)_1	0.0802	0.126	0.635	0.529
D_Ln(OP)_1	0.0463	0.137	0.337	0.737
D_Ln(CPI)_1	***-2.2365	0.570	-3.922	0.000
D_Inf_1	-0.0078	0.006	-1.331	0.189
EC1	**-0.1452	0.066	-2.187	0.033

R-squared: 0.297 Adjusted R-squared: 0.230

This table exhibits the results of vector error correction model (VECM) of lag order 2 for the targeted equation of Financial index prices and the three macroeconomic variables, the *, **, *** represents the significance at 10, 5 and 1 per cent significance levels respectively. The dependent variable is the Financial Index prices, here (D) is the difference of D times to be integrated from first order to make it stationary, Ln stands for natural logarithm, FIP is the Financial index prices, OP is the oil prices, CPI is the consumption index prices, Inf. stands for inflation, 1 interval refers to lagged order and EC1 is the error term of one period lagged of residual.

This means the higher CPI is more severe in inflation. Thus, both factors have negative impact and inverse relationship to Financial index prices. The error correction of coefficient is about −15% which suggests the differences between long run and short term that is corrected within monthly in the equation of Financial index prices. In which, this signifies a modest rate of adjustments to the long term balance relationship among variables. On the other hand, the results determines that the oil prices have significant effect on the Financial index prices, that is because of p-value of oil prices factor equals to 74% is significantly greater than 5% significance level. Considering the p-value of the inflation factor is statistically significant at 5% significance level, which implies that this factor has strong relationship to the Financial index prices, but less compared to the factor of oil prices.

Whereas, the p-values of CPI shows less than 5% significance level which mean that CPI is non-significant at 5% significance level, which implies the null hypothesis for lag 2 is rejected for the CPI and accepted for the oil prices and inflation factors. Furthermore, this specifies that Financial index prices is considerably affected and has significant impact by oil prices in comparison to the inflation factor, whilst CPI factor have no influence to Financial index prices in the long term balance relationship. The R square of the model statistically obtains 30%, which means that 30% of variability in Financial index prices can be explained by the differences in macroeconomic variables. The adjusted R square is equal to 23%. Hence both measures suggests that R square quite modest to fill the desirable of this model. Thus, the estimated long run stable relationship of targeted model for Financial index prices is applied as following:

$$\Delta Ln(FIP)_1 = -0.0612 + 0.0463Ln(OP) - 2.2365Ln(CPI) - 0.00784Inf - 0.1452 \quad (4.1)$$

CONCLUSIONS

This research ultimately considers and examines the „random walk‟ theory and investigates the „weak form‟ market efficient hypothesis of the Financial index returns which are listed in the MSM30 index, over the monthly data period from January 2014 to December 2014.

Tests are conducted to measure the „weak form‟ market efficiency of these indices, and of these, there are serial correlational variants. Consequently, this test is parametric, which is the most appropriate method for testing normal distributed data. This area however, could be one of the limitations of the study, as other studies have used non-parametric tests in order to examine the „weak form‟ market efficiency.

Overall results of this study exhibit a clear reference of co-integrating relationships among the variables. The results infer that index prices is predictable based on historical information and other macroeconomic factors. Therefore, based on such inference, investors do and will have a chance to outperform the stock indices and thus gain profit above market average through use of information regarding macroeconomic variables in order to improve the prediction of the indices prices. Concluding thus is the inherent finding sought for, that the stock index of Financial listed in MSM30 is inefficient in the „weak form‟ of market efficiency.

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