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The Causality Relationship between Financial Market Indexes and Financial Ratios: Evidence from Amman Stock Exchange

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Abstract
This study examines the effect of financial ratios on financial indexes. For this purpose, the financial indexes of ASE are examined. In the study, the relation between financial indexes performance and financial ratios are analyzed by time series data. In the analysis 4 financial indexes between 2010 and 2014 have been analyzed. The dependent variable of the study is financial indexes; the independent variables are financial ratios. This study contributes to the body of knowledge by estimating the presence and nature of theses causal associations. The results of Granger causality test revealed that the financial ratios have causal relationship with the performance of ASE indexes. Based on the analysis, the results showed that financial ratios (P/E, P/BV and DIV/YIELD) significantly caused financial indexes performance. The Johansen Cointegration test shows long run relationship among the variables. Some policy implications and recommendations are drawn in the conclusion for policy makers.
Keywords: Amman Stock Exchange (ASE), Financial Ratios, Financial market indexes, Grange Causality, VECM

Introduction

In recent years, various academic studies have paid great attention on the relation between the financial market indexes and financial ratios. While the investors invest on the financial market, they are to estimate the level of investment risk. Therefore, as investors invest on the financial market, they will have to analyse and measure factors that have influence on the performance of the financial indexes. Financial ratios are considered as channel to provide the investors with the valuable information of the real behaviour of the financial indexes. For example, Price to Operating Cash Flow ratio is important in determining the profits quality and liquidity of the companies.

Studies on the performance of companies listed in the financial market (financial indexes) are plenty. Results of these studies strongly suggest that the performance and value of firms' determinants vary across countries and also among regions of the world (e.g. Aras and Yilmaz, 2008). Kheradyar *et al* (2011); Karami and Talaeei (2013); Emamgholopour *et al* (2013) find that the financial ratios including: (dividend yield, earning yield and book to market ratios) significantly influence stock market indexes performance.

This paper seeks to determine the causal relationship between the Amman Stock Exchange indexes: including(financial sector index, services sector index, industrial sector index and ASE general index) and the main financial ratios: including (stock price to earnings ratio, stock price to operating cash flow ratio, stock price to book value ratio, dividends to yield ratio.

The paper is organized as followings. Section II discusses related literature on the determinants of financial indexes performance. The research method and its design are described in Section III. Section IV will show the analysis of the data and the results. Finally, the last section draws the conclusions.

Literature Review

There are a number of studies on the determinants of financial market indexes performance. Aras and Yilmaz (2008) investigate the relationship of predictability stock return in the 12 emerging stock markets and price-earnings ratio, dividend yield, and market-to-book ratio as predictive variables during the period of 1997-2003. The authors employ regression model to examine the value-weighted index monthly returns time-series data of 12 emerging market countries. The study reports that the investors in emerging market countries could depend on market value to book value ratio, partially dividend yield and price to earnings ratio to predicate the potential market stock returns for one–year period.

Kelly and McNamara (2008) investigate the relationship between the investment performance of Australian Industrial common stock and their P/E ratios. The results show the existence of a low P/E effect in the Australian capital market.

Mitra and Crumbley (2009) examine the potential role of various non-financial performance indicators in predicting future performance of 25 U.S oil and gas companies over a time period (2000-2006). The study concludes that the information concerning revisions, acquisitions and discoveries of proved reserves and about added ratio has an incremental role in predicting future firm performance in terms of abnormal earnings in the presence of earnings components, current abnormal earnings and equity book value.

Aono and Iwaisoko (2010) provide evidence of a lower link between financial ratios of Japanese firms and their stock price performance. On the other side of the coin, Lewellen (2004); Turk and Chapman (2006) and Indriani and Sugiharto (2010) conclude that financial ratios don not have any significant influence on the performance of stock price. Hao and Zhang (2007); Martani et al (2009); Cai and Zhang (2010); Shams et al (2011) find that financial ratios have a significant effect on the year-on-year in stock price. Therefore, there is evidence that different financial ratios have different effects on stock market performance.

kheradyar *et al* (2011) argue that financial ratios including: (dividend yield, earning yield and book to market ratios) can predict stock return. The authors employ generalized least squares (GLS) econometrics techniques to analyse panel data of Malaysia Stock Exchange over the period (2000-2009). The study concludes that the three financial ratios can predict Malaysia Stock Exchange return.

Liargovas and Repousis (2011) study the effect of twenty financial ratios on the operating performance of Greek banking sector over the period 1996-2008. The researchers employ two approaches; event study methodology and operating performance. The study finds that significant positive cumulative average abnormal returns (CAARs) before the announcement for a period of ten days.

Rostan and Rostan (2012) argue that the financial market indicators such as: book value, dividend yield, price to earnings, price to sale and volatility reflect the performance of financial market companies. The authors employ OLS and Root Mean Square Error (RMSE) methods in order to test the American Customer Satisfaction Index (ACSI) index of eighty-six public companies from 2004 to 2009. The study finds that Price-to-Earnings ratio is a better predictor of the financial and market performances of companies than Customer Satisfaction.

Tugas (2012), analyses the financial statements of three firms including: Centro Escolar University (CEU), Far Eastern University (FEU), and iPeople, Inc. (Malayan Colleges). The researcher uses using liquidity ratios, activity ratios, leverage ratios, profitability ratios, and market value ratios for the period 2009-2011. The author combines frameworks of (Brigham and Houston, 2009; Fraser and Ormiston, 2004). The study concludes that in terms of market value, CEU and FEU tied for first and then Malayan followed.

Capece *et al* (2013) perform a financial ratios (financial profitability and liquidity ratios) analysis for indexes of 111 companies operating in Italy for a six-year period (2004-2009) to evaluate business management. The study highlights that many of the companies in the sample are suffering from a decrease in profits and show serious financial weaknesses.

Muller and Ward (2013) study several of the more significant style-based strategies on the Johannesburg Stock Exchange to evaluate both the quantum of the potential benefit of the style and its persistence. The researchers find significant and persistent excess returns in the following variables: dividend yield, price to book, cash-flow to price, liquidity, return on capital, return on equity and interest cover.

Data and Econometric Methodology

The main aim of the study is to identify the determinants of Amman Stock Exchange (AES) indexes performance. It is also to analyse the empirical relationship between stock price to earnings ratio (P/E), stock price to operating cash flow ratio (P/OCF), stock price to book value ratio (P/BV), dividends to yield ratio (DIV/YIELD), ASE indexes and vice versa in order to determine the casual relationship of these variables by using several econometric methodologies: the Granger causality test, Johansen Co-integration test and Vector Error Correction Model (VECM). The data used for these tests are monthly data from 2010 to 2014. As it is well known, the results from these tests are highly sensitive to order of lags in the autoregressive process. An inadequate choice of the lag length would lead to inconsistent model estimates. Thus, the inferences drawn from them would be likely to misleading. In this paper, the lag length selection order is used based on autoregressive model (VAR). This study therefore specifies its model as follows:

$$FSI = \beta_0 + \beta_1 P/E + \beta_2 P/OCF + \beta_3 P/BV + \beta_4 DIV/YIELD \qquad (1)$$

$$ISI = \beta_0 + \beta_1 P/E + \beta_2 P/OCF + \beta_3 P/BV + \beta_4 DIV/YIELD \qquad (2)$$

$$SSI = \beta_0 + \beta_1 P/E + \beta_2 P/OCF + \beta_3 P/BV + \beta_4 DIV/YIELD \qquad (3)$$

$$ASX = \beta_0 + \beta_1 P/E + \beta_2 P/OCF + \beta_3 P/BV + \beta_4 DIV/YIELD \qquad (4)$$

In economic analysis, the unit root test is conducted to determine whether the time series data are stationary or non-stationary. There are many methods in calculating the stationary of time series in unit root test, among which are the Augmented Dickey Fuller (ADF, 1979) and Phillips Perron (PP, 1988). Both tests implement the presence of unit root as null hypotheses. The Phillips Perron test differs from the Augmented Dickey Fuller in terms of the handling of the serial correlation in error. This paper uses the ADF test which employs an auto regression parameter in approaching structural errors in regression test. The ADF unit root test based on normal regression is as follows:

$$\Delta y_t = \alpha + \delta_t + \beta y_{t-1} + \gamma \sum_{i=1}^{p} \Delta y_{t-1} + u_t \tag{5}$$

Where, Δy_t variable indicates unit root test for y_t that uses logarithm (level time series) for all variables at time$t$, Δy_{t-1} presents logarithm first difference lag where Δ the symbol for difference is and μ_t is the error terms.

Determining the lag order of the autoregressive lag polynomial is an important aspect of empirical research on the specification of VAR models, since all inferences in the VAR model depend on the correct model specification. Thus, the lag selection in VAR model criterion is the Aikaike's information criterion (AIC) (Aikaike 1973), Schwarz information criterion (SIC) (Schwarz1978), Hannan-Quinn criterion and (HQIC) (Hannan and Quninn 1978) which can be defined as follows:

$$IC(P) = In\left|\hat{\Sigma}\right| + \frac{2k^2p}{T} \tag{6}$$

$$SIC\ (P) = In\left|\hat{\Sigma}\right| + \frac{k^2p\ In(T)}{T} \tag{7}$$

$$HQIC(P) = In\left|\hat{\Sigma}\right| + \frac{2k^2p\ In\ In(T)}{T} \tag{8}$$

Where k is the number of equations in the VAR model, T is the effective sample size, p is the number of lag terms in the model and Σ̂ represents the estimated covariance matrix of the fitted VAR (p) model.

Johansen and Juselius test uses maximum the likelihood of full system that provides two test of max and trace statistics to conduct the number of co-integrating vectors. Therefore, in this paper, the Johansen and Juselius estimation technique is applied in order to define the co-integration as well as the number of co-integrating vectors Johansen (1988) and Johansen and Juselius (1990). The Johansen approach has two test statistics for co-integration which can be formulated as follows:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{g} In\left(1 - \hat{\lambda}_i\right) \tag{9}$$

$$\lambda_{\max}(r, r+1) = -TIn\left(1 - \hat{\lambda}_{r+1}\right) \tag{10}$$

Where T is the sample size, r is the number of co-integrating vectors under the null hypothesis and λ̂_i is the estimated value for the row of matrix ordered eigenvalue from the

Π matrix. Thus, a significantly non-zero eigenvalue indicates a significant co-integrating vector.

A standard bivariate dynamic model on which the Granger test is based can be expressed as follows:

$$y_t + \alpha x_t = L(\beta)^H y_{t-1} + L(\delta)^K x_{t-1} + \varepsilon_{1t}$$
$$x_t + \delta y_t = L(\lambda)^1 x_{t-1} + L(\mu)^N y_{t-1} + \varepsilon_{2t} \quad (11)$$

Where, x and y are jointly determined endogenous variable (ASE Indexes), and ε_1 and ε_2 are assumed to be, $\text{iid}(0, \sigma_i^2), i = 1, 2$. For the sake of simplicity let $E(\varepsilon_{1t}, \varepsilon_{2t}) = 0$.

Results and Discussion

Table 1

Unit Root Test (Amman Stock Exchange indexes and financial ratios)

Variables Jordan	t- Statistics in Log		t-statistics in Log First Differences	
	ADF	PP	ADF	PP
FS Index	-1.372598	-1.378846	-7.960650***	-7.959953***
P/E	-1.421332	-1.466849	-7.428333***	-7.448433***
P/OCF	-2.566703	-4.243169*	-9.308307***	-14.33234***
P/BV	-1.611529	-1.611529	-9.444522***	-9.444522***
DIV/YIELD	-1.607262	-1.694205	-12.80495***	-13.38295***
SS Index	-1.692674	-1.751356	-6.603358***	-6.589250***
P/E	-2.755169***	-2.951871***	-6.675776***	-7.366706***
P/OCF	-3.630958**	-3.578789**	-8.076975***	-14.61804***
P/BV	-2.267633	-2.265312	-6.428179***	-6.428179***
DIV/YIELD	-2.601747***	-4.065157**	-12.46689***	-12.84231***
IS Index	-0.803287	-0.746696	-8.001041***	-8.001041***
P/E (time)	-4.016440**	-3.690604**	-3.956784***	-16.06140***
P/OCF	-3.571053**	-4.036147**	-11.86765***	-11.97885***
P/BV	-2.494561	-2.494561	-8.100487***	-8.103100***
DIV/YIELD	-3.877932**	-3.839767**	-10.74835***	-15.52973***
ASE Index	-2.153257	-2.124951	-8.052760***	-8.052760***
P/E (time)	-1.288718	-1.288718	-8.605949***	-8.540158***
P/OCF	-5.454643***	-5.528075***	-10.72225***	-26.98856***
P/BV	-2.583629	-2.583332	-5.022157***	-7.794517***
DIV/YIELD	-1.407114	-1.834628	-7.789657***	-10.66044***

The critical values for ADF and PP test with intercept are at 1% level -3.467, 5% level -2.877 and 10% level -2.575.
***indicate statistical significant at 1% level
**indicate statistical significant at 5% level
*indicate statistical significant at 10% level

Table 1 shows that the null hypothesis of both tests cannot be rejected when all variables are in levels series. The data are transformed from levels to first difference test again, for stationary and non-stationary time series data. The results indicate that the acceptance of the alternative hypothesis at %1 level as the (t) statistic is smaller than the critical values of the ADF and PP tests. Therefore, the variables are stationary and integrated in the first order $(I(1))$ and it is appropriate to proceed to test for cointegration.

Table 2
VAR Lag Length Order Selection Criteria (ASE Indexes)

Lag FS	LogL	LR	FPE	AIC	SC	HQ
0	-150.6046	NA	0.000307	6.102141	6.291536	6.174514
1	15.96775	293.9512	1.2006	0.550284	1.686652*	0.984524
2	59.66344	68.54226	5.9307	-0.182880	1.900461	0.613226*
3	88.84689	40.05572*	5.4307*	-0.346937	2.683378	0.811036
4	103.8366	17.63497	9.3407	0.045623	4.022911	1.565462
5	127.8207	23.51378	1.2706	0.085464	5.009725	1.967170
6	152.6310	19.45910	2.0006	0.092901	5.964135	2.336473
7	189.8460	21.89118	2.6406	-0.386119*	6.432089	2.219320
Lag SS	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-1322.651	NA	2.8116	52.06476	52.25415	52.13713
1	-1201.786	213.2913	6.5914*	48.30534	49.44171*	48.73958*
2	-1186.283	24.31876	9.8414	48.67776	50.76111	49.47387
3	-1178.384	10.84204	2.0715	49.34838	52.37870	50.50636
4	-1153.088	29.75945	2.3815	49.33679	53.31408	50.85663
5	-1132.032	20.64300	3.6315	49.49147	54.41573	51.37317
6	-1082.074	39.18344*	2.1415	48.51269	54.38392	50.75626
7	-1019.497	36.80999	1.0415	47.03908*	53.85729	49.64452
Lag IS	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-3878.199	NA	5.0358	149.3538	149.5414	149.4257
1	-3752.938	221.6159	1.0757	145.4976	146.6233*	145.9292*
2	-3740.800	19.13940	1.8057	145.9923	148.0561	146.7835
3	-3722.030	25.98939	2.4657	146.2319	149.2338	147.3828
4	-3709.180	15.32121	4.5157	146.6992	150.6393	148.2097
5	-3677.522	31.65865	4.4857	146.4431	151.3212	148.3133
6	-3584.385	75.22548*	4.9556*	143.8225*	149.6387	146.0523
Lag ASE	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0	-151.5146	NA	0.000319	6.137828	6.327223	6.210201
1	-2.197515	263.5008	2.4506	1.262648	2.399016*	1.696887*
2	28.39415	47.98693*	2.0206*	1.043367	3.126708	1.839473
3	43.70715	21.01784	3.1906	1.423249	4.453564	2.581222
4	55.10164	13.40528	6.3106	1.956798	5.934086	3.476638
5	76.79497	21.26797	9.3906	2.086472	7.010733	3.968178
6	113.5410	28.82041	9.2906	1.625843	7.497078	3.869416
7	167.4810	31.72942	6.3406	0.490941*	7.309149	3.096380

*Indicates lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level).
FPE: Final prediction error.
AIC: Akaike information criterion.
SC: Schwarz information criterion.
HQ: Hannan-Quinn information criterion.

Table 2 shows the maximum possible lag length of ASE indexes. The results indicate that the choice is ambiguous, because apparently only one lag is needed by the SC and HQ, 7 lags with the AIC for financial sector index, services sector index and ASE indexes and 6 lags for industrial sector index. Further examination finds serial correlation at one lag. Therefore, the lag length of the VAR is selected by AIC information criteria, since they are not serially correlated.

The results of λ_trace and λ_max. tests for ASE Indexes and financial ratios are reported in Table 3 and suggest that the null hypothesis of no cointegrating vectors can be rejected at the 1% level of significance. More precisely, Table 3 shows that the Trace and Maximum eigenvalue tests accept the alternative hypothesis of existing long-term cointegration relationships.

Trace and λ_max. tests indicate that there are four and four cointegrating equations, respectively; at 1% level of significance between ASE Indexes and financial ratios. This indicates there is the possibility of causality between stock price to earnings ratio, stock price to operating cash flow ratio, stock price to book value ratio, dividends to yield ratio, ASE indexes. Therefore, the VECM is implemented to confirm cointegration, test exogeneity and investigate the speed of adjustment to equilibrium of the ASE Indexes model through examination of the error correction terms (ECTs).

Table 3

Johansen Cointegration Analysis of Unrestricted Cointegration Rank of Trace and Max. Eigenvalue Test (ASE Indexes and Financial Ratios)

Hypothesized No of CE(s) FS	Eigenvalue	Trace Statistic	0.05 Critical Value	Max.-Eigen Statistics	0.05 Critical Value
None	0.931951	230.1424	69.81889	134.3763	33.87687
At most 1	0.595463	95.76604	47.85613	45.25056	27.58434
At most 2	0.402648	50.51548	29.79707	25.76247	21.13162
At most 3	0.389792	24.75301	15.49471	24.69776	14.26460
At most 4	0.001104	0.055251	3.841466	0.055251	3.841466
Hypothesized No of CE(s) SS	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Max.-Eigen Statistics**	**0.05 Critical Value**
None	0.845607	214.2791	69.81889	93.41283	33.87687
At most 1	0.746016	120.8663	47.85613	68.52426	27.58434
At most 2	0.531031	52.34205	29.79707	37.86088	21.13162
At most 3	0.190554	14.48117	15.49471	10.57025	14.26460
At most4	0.075238	3.910922	3.841466	3.910922	3.841466
Hypothesized No of CE(s) IS	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Max.-Eigen Statistics**	**0.05 Critical Value**
None	0.880877	218.2052	69.81889	110.6352	33.87687
At most 1	0.736275	107.5700	47.85613	69.30802	27.58434
At most 2	0.362453	38.26195	29.79707	23.40664	21.13162
At most 3	0.170588	14.85531	15.49471	9.725959	14.26460
At most 4	0.093932	5.129351	3.841466	5.129351	3.841466
Hypothesized No of CE(s) ASE	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Max.-Eigen Statistics**	**0.05 Critical Value**
None	0.898085	269.0685	69.81889	114.1806	33.87687
At most 1	0.727030	154.8878	47.85613	64.91975	27.58434
At most 2	0.676192	89.96809	29.79707	56.38021	21.13162
At most 3	0.313631	33.58788	15.49471	18.81696	14.26460
At most 4	0.255780	14.77092	3.841466	14.77092	3.841466

Trace and Max.-eigenvalue testes indicate 4 and 4 cointegrating equations for ASE indexes and financial ratios at the 0.05 level.
* denotes rejection of the hypothesis at the 0.05 level.
**MacKinnon-Haug-Michelis (1999) p-values.
***indicate statistical significant at 1% level.

The results of the ECT for financial sector index including stock price to earnings ratio, stock price to operating cash flow ratio, stock price to book value ratio, dividends to yield ratio lagged endogenous variables have significant negative sign of the ECT. This indicates the existence of a long-term equilibrium relationship with financial sector index. The ECT of financial sector index and stock price to operating cash flow ratio suggests that about 81% and 96% of disequilibrium corrected each month by changes in FSI and P/OCF respectively.

The ECT of services sector index and stock price to book value ratio suggests that about 81% and 60% of disequilibrium corrected each month by changes in SSI and P/BV respectively. In case of industrial sector index, the ECT results indicate that about 84% and 30% of

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disequilibrium corrected each month by changes in ISI and P/OCF. The results of ETC for ASE suggests that about 15%, 90% and 53% of disequilibrium corrected each month by changes in ASE, P/E and P/OCF.

The results of Granger causality suggest that there is Granger causality running significantly at 1% from stock price to earnings ratio, stock price to operating cash flow ratio and stock price to book value ratio to the financial sector index and services sector index. In the short-term Grange causality, the null hypothesis of P/E, P/BV and DIV/YIELD is rejected for industrial sector index, indicating that there is Granger causality direction. The results of Granger causality suggest that there is Granger causality running significantly at 1% from all financial ratios to ASE indexes.

In terms of the reverse causality, there is strong reverse Grangers causality running from the P/E, DIV/YIELD to industrial sector index and P/BV and DIV/YIELD to services sector index. The Granger causality results of FSI and ASE suggest that the reverse hypothesis is rejected since the Wald test statistics are insignificant. This implies that there is uni-directional causality between FSI, ASE and the financial ratios.

Table 4

Vector Error Correction Model Results (ASE Indexes and Financial Ratios)

Financial Index	FI	P/E (time)	P/OCF	P/BV	DIV/YIELD
ECT(Coefficient)	-0.812315	0. 2795989	-0.9690069	0. 2537399	0.1545781
ECT (t-statistics)	[-1.40629]**	[1.06125]*	[-1.12808]*	[5.30803]***	[1.21632]*
R-squared	0.633856	0.634936	0.520632	0.806587	0.940432
Adj- R-squared	0.380080	0.376011	-0.806848	0.270981	0.775476
Services Index	**SS**	**P/E (time)**	**P/OCF**	**P/BV**	**DIV/YIELD**
ECT(Coefficient)	-0.811894	-0.14708	0.21007	-0.60710	0. 27909
ECT (t-statistics)	[-3.19516]***	[-0.39191]	[1.25776]*	[-3.81125]***	[1.56922]**
R-squared	0.943551	0.544637	0.650512	0.937864	0.819236
Adj- R-squared	0.787230	-0.716367	-0.317300	0.765794	0.318660
Industry Index	**IS**	**P/E (time)**	**P/OCF**	**P/BV**	**DIV/YIELD**
ECT(Coefficient)	0.841977	0.13107	0.30609	-0.2617119	-0.171224
ECT (t-statistics)	[1.15410*]	[0.57861]	[1.17546]*	[-1.84116]**	[-1.04271]*
R-squared	0.487025	0.931257	0.388634	0.976620	0.509118
Adj- R-squared	0.349935	0.819096	0.608858	0.938475	0.291796
Amman Indexes	**ASE**	**P/E (time)**	**P/OCF**	**P/BV**	**DIV/YIELD**
ECT(Coefficient)	-0.1526166	-0.9078539	0.5364880	-0.2004068	0.1511036
ECT (t-statistics)	[-1.73385]**	[-1.83921]**	[0.79528]	[-1.44623]**	[2.29716]***
R-squared	0.778375	0.701850	0.800215	0.755072	0.903665
Adj- R-squared	0.164643	-0.123795	0.246962	0.076810	0.636893

***indicate statistical significant at 1% level
**indicate statistical significant at 5% level
*indicate statistical significant at 10% level

Table 5
Granger Causality/ Block Exogeneity Wald Test (ASE Jordan)

Equations	Dependent Variable	P/E	P/OCF	P/BV	DIV/YIELD
FS Index		0.311085	0.280986	3.668637	1.059703
P/E	14.96836***		5.513626*	0.891090	0.707101
P/OCF	9.317329***	4.892897*		1.512250	0.619874
P/BV	28.71064***	0.976937	0.384118		6.605068**
DIV/YIELD	0.208622	4.622327*	0.373806	5.102420*	
Joint	47.42663***	10.99744	13.68764*	10.44963	9.509993
IS Index		15.21769***	6.970668	4.591135	12.53963*
P/E	10.137409*		2.765542	10.37880	6.544255
P/OCF	3.402239	29.24183***		8.128354	7.605781
P/BV	36.92807***	7.787716	3.264690		21.81962***
DIV/YIELD	129.1542***	3.384906	1.008486	16.48383**	
Joint	236.3005***	111.6243***	9.717078	21.91735	29.93797
SS Index		1.194915	1.566352	31.00229***	13.04831***
P/E	29.98210***		8.488973	34.55768***	24.28711***
P/OCF	33.13374***	6.856833		28.35284***	19.15457***
P/BV	18.95880***	0.770525	2.487454		13.10094***
DIV/YIELD	11.51602	3.771764	1.070673	10.81433	
Joint	94.18156***	13.77513	16.23717	89.83130***	72.95234***
ASE Index		8.782387	9.325931	7.654670	4.116061
P/E	12.67170**		5.962548	8.678183	5.950353
P/OCF	13.27495**	10.22995		9.594610	37.21302***
P/BV	15.47496**	11.63343	9.182879		3.605893
DIV/YIELD	17.77009**	8.525209	10.63568	12.92536**	
Joint	44.05093**	24.95172	30.98770	27.49215	86.19355***

The Chi-square tests are reported in each cell with their associated p-value. Significant at 10% (*), 5% (**) and 1% (***)

The results are consistent with the following researchers: Kheradyar *et al* (2011); Karami and Talaeei (2013); Emamgholopour *et al* (2013) find that the financial ratios including: (dividend yield, earning yield and book to market ratios) significantly influence stock market indexes performance.

Conclusions

This paper examines the causal relationship of Amman Stock Exchange indexes with the financial ratios. Trace and λ_max. tests indicate that there are four and four cointegrating equations, respectively; at 1% level of significance between ASE Indexes and financial ratios. The results of ETC for ASE suggests that about 15%, 90% and 53% of disequilibrium corrected each month by changes in ASE, P/E and P/OCF. The empirical results of Granger causality test indicate that the financial ratios including: stock price to earnings, stock price to operating cash flow and stock price to book value have Granger causality direction running significantly to the financial sector index and services sector index. The results of Granger causality suggest that there is Granger causality running significantly at 1% from all financial ratios to ASE indexes. The Granger causality results of FSI and ASE suggest that the reverse hypothesis is rejected since the Wald test statistics are insignificant. This implies that there is uni-directional causality between FSI, ASE and the financial ratios.

The following recommendations are drawn from the findings of the study: since the findings of the study indicate strong causal relationships between the main financial ratios and the performance of ASE indexes, investors are recommended to consider these ratios when starting investment. Investors should consider these financial ratios in order to choose financial market and make rational decision. Further research can be conducted on the companies of ASE indexes by employing other financial ratios using different econometrics techniques such as impulse responses and variance decompositions.

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