

Stock Price and Index Co-Movements: Evidence from Oman

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Abstract: This research focuses on the interaction between Oman Capital Market Index (MSM 30) and share price of companies listed and traded on the exchange, using daily closing prices of 15 individual companies for a period of 8 years from 2008 until 2015. It estimates the systematic risk levels of stocks by performing a simple linear regression using the 'market model'. It further employs traditional granger causality test to study lead lag relationships among the stock prices of individual stocks and Index. The overall results indicate that only few stocks out of the selected sample show price movements over time, where, rest either show no movement or relatively very small movement over the years. The results indicate low activity on the stock exchanges in case of companies of food industry of Oman. The results point out a need to reform process so as to increase the market depth and breadth for securities. Further, measures can be adopted to increase the participation of foreign investors which may boost liquidity and fresh capital in the sector.

I. Introduction

Share prices in general are governed by certain internal and external factors. Internal factors are the micro level factors including operating profit, sales, managerial expertise, ownership structure etc. and external factors are the macro economic factors which are common for all the companies operating in an economy and therefore, it is expected that stock prices of different companies will have a certain degree of co-variation or co-movement. Changes in the macro economic factors, which have an impact on securities markets, are treated as systematic risk.

In the paper we present new evidence on the interaction between the Oman Capital Market Index and share price of individual companies of Oman food sector listed and traded on the exchange.

We first start with studying the co-variation or co-movement among the market and share prices of individual companies. We also calculate the systematic risk levels of stocks listed on the Oman Stock Exchange by calculating the beta for a period of 8 years. The market return was taken as return of the Index. The systematic risk or beta of a stock is estimated by performing a simple linear regression of the following form (known as the 'market model'):

$$\tilde{R}_{it} = \alpha_i + \beta_i \tilde{R}_{mt} + \tilde{\varepsilon}_{it} \quad (1)$$

where \tilde{R}_{it} is the (raw) return from a share i at time t , \tilde{R}_{mt} the return to the market index at time t , α_i is the intercept, and $\tilde{\varepsilon}_{it}$ is a zero mean random disturbance term. This regression is run for each share for the complete time period security. This method of beta estimation through the market model is in line with the tradition in finance and accounting research.

In the next stage we employ traditional granger causality test to study the lead lag relationships among the stock prices of individual stocks and Index. To analyze the lead lag relation in Oman scenario we choose a sample of 15 main companies from the food sector which contribute a significant chunk of the total volume traded at Oman Stock Exchange.

II. Econometric methods

Before testing for causality, each individual price series should be examined to determine whether they are I (1). Augmented Dickey-Fuller (ADF) test and non-parametric Phillips-Perron (PP) approaches were employed to examine the stationarity of all the futures and spot price series. The ADF and PP unit root tests were used to examine the stationarity of spot and futures prices. These two methods have been adopted to assess the unit root test using parametric and non-parametric approaches. Both ADF and PP tests suggested that the null of a unit autoregressive root, i.e. integration of order I (1), could not be rejected for all the shares.

In the second step we test for the presence of causality among share price and index values series for all 15 shares. The Granger-causality test is a Wald test with the null hypothesis that Market Return does not Granger-cause Stock return. The Granger 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 of the lagged Xs are statistically significant.

Table 1 presents the descriptive statistics of the 15 sample companies and MSM 30 Index, the names of the companies are given in annexure 1. The mean share prices appear to be between 0.12 and 5.48 for our sample. National Mineral Water has minimum share price of 0.12 and Oman Refreshment has a share price of 5.48. The values of standard deviation are not very high indicating less volatility in the prices of these stocks. Further, the null hypothesis of normal distribution is rejected indicating distribution to be non normal. The same is reflected by values of Skewness and Kurtosis.

Figure I, representing the stock index, MSM 30 showcases the movement of prices of stocks from 2008 onwards; the time series plot clearly explains a steep fall in 2009 and then has been stable over the last four years. Figure II represents the price trends of the 15 stocks. It can clearly seen from the graphs that only few stocks out of the selected sample namely Asaffa foods, Gulf Mushroom Products and National Mineral Water show price movements over time. The remaining stock prices either show no movement or relatively very small movement over the years.

In the next step, we examined the time series properties by examining the stationarity of the data. To draw inference from the time series analysis, stationarity tests become essential. A stationary test which has been widely popular over the past several years is unit root test. In this study Augmented Dickey Fuller (ADF) test and Philip Perron (PP) tests are applied to estimate the unit root. ADF test to check the stationarity series is based on the equation of the below given form:

$$\Delta y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \alpha_i \sum_{i=1}^m \Delta y_{t-i} + \varepsilon_t \quad (2)$$

Where ε_t is a pure white noise error term and

$$\Delta y_{t-1} = (y_{t-1} - y_{t-2}), \Delta y_{t-2} = (y_{t-2} - y_{t-3})$$

These tests determine whether the estimates of δ are equal to zero. Fuller (1979) provided cumulative distribution of the ADF statistics, if the calculate-ratio (value) of the coefficient δ is less than τ critical value from Fuller table, then y is said to be stationary.

III. Results

In this paper, we studied the the interaction between the Oman Capital Market Index (MSM30) and share price of companies listed and traded on the exchange. It estimates the systematic risk levels of stocks by performing a simple linear regression using the ‘market model’. It further employs traditional granger causality test to study the lead lag relationships among the stock prices of individual stocks and Index. The results of ADF and PP tests are shown in Table 2. The results are similar to the findings of above section which indicate series to be stationary at levels for Dhofar Fisheries and Food Ind., Oman Foods International, Oman Fisheries, Sweets of Oman, Dhofar Beverages Food Stuff, Areej Vegetable Oils. For the rest of the companies the time series were non stationary at level and stationary after first difference. The stationary nature of the stock prices is very uncommon in case of developed stock markets. This may be due to less activity in these stocks or specifically companies in food sector.

After testing the stationarity of the data we proceed with estimating beta of the selected 15 stocks. The beta of the stock represents the responsiveness of the stock price with the change in prices of the market in general. In other words it represents the systematic risk of stocks. The market return is taken as the return of the index i.e. MSM 30. The index of Muscat Securities Market has been established in 1992. A number of companies included in the index sample has changed overtime to reach currently 30 companies, the most liquid in the market. It was launched on full market capitalization weightage methodology. Since July 1, 2009 MSM30 is being calculated on a free-float market capitalization methodology. A 10% capping (CAP) is set to ensure wider representation of smaller companies in the index. Muscat Securities Market has other three sectorial indices; Financial Sector Index, Industry Sector Index and Services Sector Index. Those indices consist of the top 15 companies. All of them use value-weighting methodology which is applied to MSM 30 index. Itsworthy mentioning that the base value of MSM30 index has been changed from 100 to 1000 points since 1st of June 2004.

The beta values are depicted in Table 3; In case of sample 15 companies, the beta values are close to zero reflecting no movement of companies in food sector with the overall economy. The results are quite surprising given the fact that shares are being traded on the exchange for more than a decade. The results point out for further investigation especially the lead lag relationship of these stock prices with the market index and vice versa. Finally, we study the cause and effect relationship between the sample shares and index prices to reveal the lead lag relationship which might exist and have been ignored while estimating beta values. The standard methodology followed by Granger (1969) was adopted. The Granger 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 of the lagged Xs are statistically significant.

$$Stock\ return_t = r_o + \sum \alpha_j Stock\ return_{t-j} + \sum b_i Market\ Return_{t-i} + e_t$$

Stock return_t is said to be Granger-caused by Market Return_t if the coefficients on the lagged of Stock return_t are statistically significant. The same is true for the other way around.

On the other hand, a bilateral causality is said to exist when both coefficients are statistically significant, and there is independence when both are statistically insignificant (Granger: 1981). The Granger-causality test is a Wald test with the null hypothesis that Stock return does not Granger-cause Market Return. The bivariate regressions that are run by the Eviews program for this particular study are in these forms:

$$S_t = r_o + \sum \alpha_j M_{t-j} + \sum b_i S_{t-i} + e_t \tag{3}$$

$$M_t = g_o + \sum \gamma_i S_{t-i} + \sum \delta_j M_{t-j} + u_t \tag{4}$$

where: M_t and S_t are two stationary series representing Market return and Stock Return, respectively and i and j stand for lag lengths.

Table 4 shows the results of Granger causality, the hypothesis Market return does not does not Granger-cause stock return is rejected for four companies namely Gulf Mushroom Products, Oman Foods International, National Biscuit Industries, Areej Vegetable Oils but the hypothesis that stock return does not Granger-cause market return. Therefore, it appears that Granger causality runs one-way only from Market to Stock Return for these four companies. Further, we also observe unidirectional causality from Stock Return to Market return in case of Dhofar Fisheries and Food Industries and Oman Fisheries. Furthermore, bidirectional causality is also observed for Oman Flour Mills and Sohar Poultry. Finally, no causality was found in case of Asaffa Foods, Omani Euro Foods Industries, Dhofar Poultry, Sweets Of Oman, Oman Refreshment, National Mineral Water and Dhofar Beverages Food Stuff where we accept the null hypothesis that Market return does not does not Granger-cause stock return and vice versa.

IV. Conclusion and Discussion

The research paper aimed at studying the interaction between the Oman Capital Market Index (MSM30) and share price of companies listed and traded on the exchange. We estimated the systematic risk levels of stocks by performing a simple linear regression using the ‘market model’. We also employed traditional granger causality test to study the lead lag relationships among the stock prices of individual stocks and Index. The Granger causality test confirms the results of our previous section as majority of the stocks do not show any cause and effect relationship. The results indicate low activity on the stock exchanges in case of companies of food industry of Oman. The results point out for a need for a reform process so as to increase the market depth and breadth especially for companies in food industry. A set of measures should be followed to increase the investor’s participation in the food sector. As food sector is an important sector of the economy and has linkages with many other sectors and balanced growth in such sector will have favourable outcome in the long run. Further, measures can be adopted to increase the participation of foreign investors which may boost liquidity and fresh capital in the sector. In case the country develops a more active and liquid food sector, the benefits will be seen in years to come with more investments in the food sector thereby helping the domestic companies to compete with the international companies/ hypermarkets thereby improving the level of competition and passing on the subsequent benefits to the general public at large. The results can also merit the investors in Oman who can invest in food sector and take benefits arising of diversification as with the increase in purchasing power of the Oman’s young population the food sector especially the fast food sector will grow at a rapid pace thereby higher returns in the long run.



Figure 1 MSM 30 Historical Values from 2008

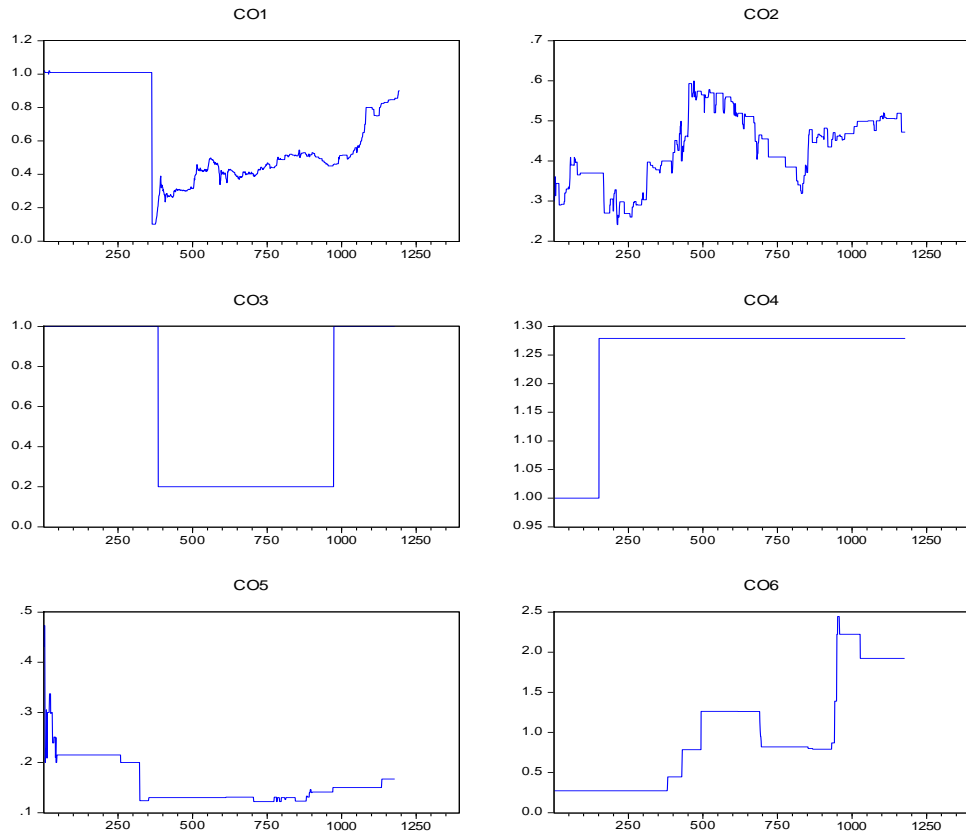
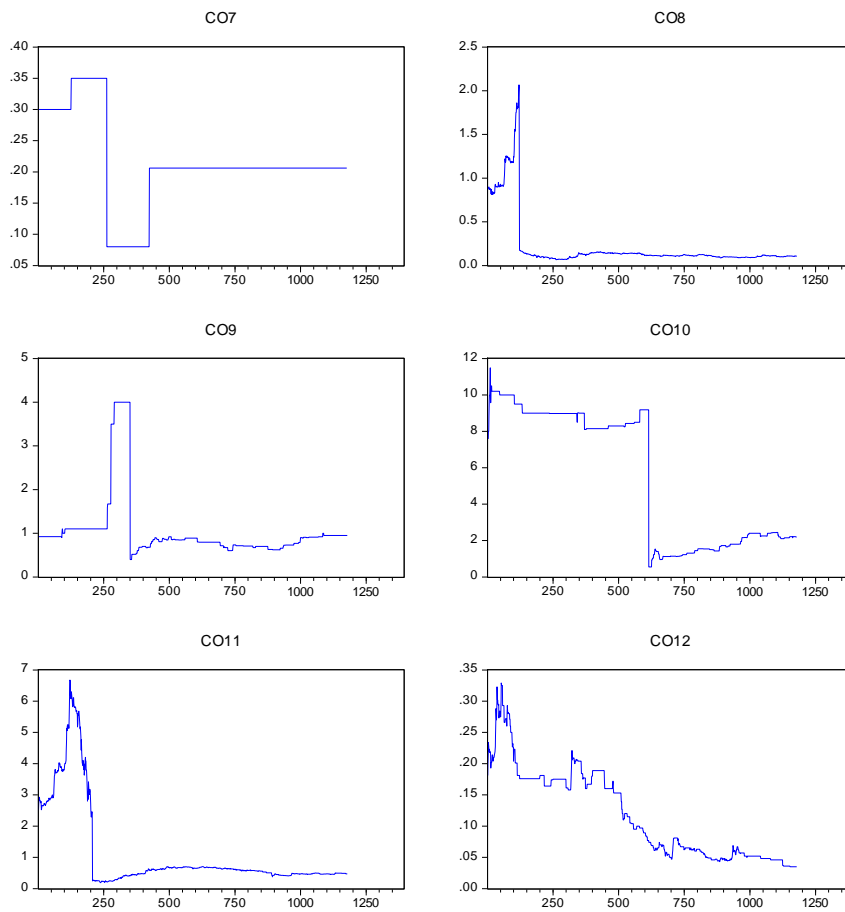


Figure 2 Graphical Representation of Stock Movement



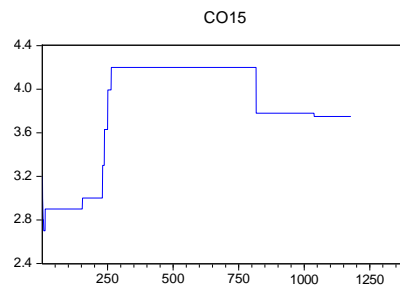
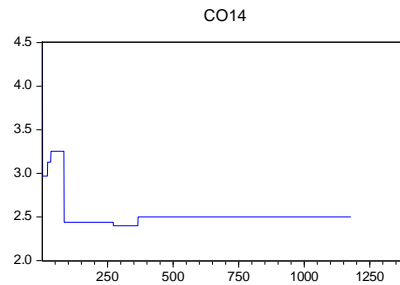
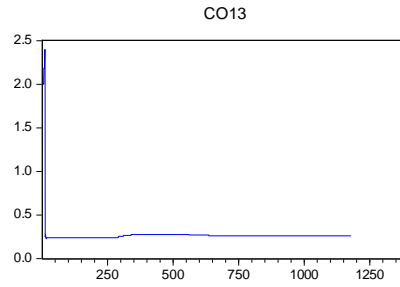


Table 1 Descriptive Statistics

Company	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Index
Mean	0.64	0.43	0.60	1.24	0.16	0.94	0.22	0.22	1.05	5.48	1.12	0.12	0.28	2.53	3.81	6692.764
Median	0.52	0.45	0.60	1.28	0.14	0.82	0.21	0.11	0.89	8.15	0.58	0.10	0.26	2.50	3.78	6171.565
Max	1.02	0.60	1.00	1.28	0.47	2.45	0.35	2.07	4.00	11.49	6.68	0.33	2.40	4.45	4.20	12109.1
Min	0.10	0.24	0.20	1.00	0.12	0.27	0.08	0.07	0.40	0.55	0.19	0.04	0.23	2.40	2.70	4223.63
Std. Dev.	0.28	0.09	0.40	0.09	0.04	0.64	0.07	0.32	0.76	3.65	1.40	0.07	0.18	0.19	0.48	1748.479
Skewness	0.25	-0.19	0.00	-2.22	2.12	0.66	0.01	3.18	3.35	-0.06	2.19	0.61	10.23	3.78	-0.98	1.738072
Kurtosis	1.54	2.13	1.00	5.95	11.12	2.24	3.03	12.78	12.99	1.11	6.69	2.34	106.90	19.83	2.54	4.940771
J-Bera P.	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 2 Results of ADF and PP Tests

Company	T-stat	p-val	T-stat	p-val	T-stat	p-val	T-stat	p-val
1	-1.842	0.360	-34.010	0.000	-1.880	0.342	-34.012	0.000
2	-2.231	0.195	-30.766	0.000	-2.124	0.235	-30.761	0.000
3	-1.414	0.577	-34.264	0.000	-1.417	0.575	-34.264	0.000
4	-2.613	0.091	-34.293	0.000	-2.613	0.091	-34.293	0.000
5	-5.036	0.000	-8.653	0.000	-6.390	0.000	-39.172	0.000
6	-1.011	0.751	-10.079	0.000	-0.800	0.818	-33.267	0.000
7	-2.209	0.203	-34.237	0.000	-2.219	0.200	-34.237	0.000
8	-3.284	0.016	-33.270	0.000	-3.320	0.014	-33.284	0.000
9	-2.714	0.072	-34.140	0.000	-2.728	0.070	-34.140	0.000
10	-1.168	0.690	-34.540	0.000	-1.163	0.692	-34.543	0.000
11	-1.414	0.577	-31.134	0.000	-1.433	0.567	-31.339	0.000
12	-1.095	0.720	-29.638	0.000	-0.937	0.777	-29.567	0.000
13	-11.189	0.000	-34.822	0.000	-14.689	0.000	-35.347	0.000
14	-10.742	0.000	-69.287	0.000	-10.611	0.000	-69.287	0.000
15	-2.214	0.202	-6.407	0.000	-1.347	0.609	-33.823	0.000

Table 3 Beta Values

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Co1	0.00	0.00	-0.04	0.97
C	0.00	0.00	-0.13	0.90
Co2	0.00	0.00	-0.55	0.58
C	0.00	0.00	0.51	0.61
Co3	0.00	0.00	-0.13	0.89
C	0.00	0.00	0.00	1.00
Co4	0.00	0.00	1.29	0.20
C	0.00	0.00	1.04	0.30
Co5	0.00	0.00	2.26	0.02
C	0.00	0.00	-0.69	0.49
Co6	0.00	0.00	0.14	0.89
C	0.00	0.00	1.34	0.18
Co7	0.00	0.00	-1.41	0.16
C	0.00	0.00	-0.36	0.72
Co8	0.00	0.00	1.78	0.07
C	0.00	0.00	-0.34	0.73
Co9	0.00	0.00	0.94	0.35
C	0.00	0.00	0.04	0.97
Co10	0.00	0.00	-0.15	0.88
C	0.00	0.01	-0.59	0.56
Co11	0.00	0.00	0.92	0.36
C	0.00	0.00	-0.64	0.52
Co12	0.00	0.00	2.66	0.01
C	0.00	0.00	-1.01	0.31
Co12	0.00	0.00	-0.07	0.94
C	0.00	0.00	-0.89	0.37
Co13	0.00	0.00	-1.49	0.14
C	0.00	0.00	-1.19	0.23
Co14	0.00	0.00	-1.88	0.06
C	0.00	0.00	0.61	0.54
Co15	0.00	0.00	0.94	0.35

Explanatory Notes : Co represents Company, C is the constant in the beta Equation

Table 4 Granger Causality Results

Null Hypothesis:	Obs	F-Statistic	Prob.
CO1 does not Granger Cause INDEX	1193	0.38	0.68
INDEX does not Granger Cause CO1		0.65	0.52
INDEX does not Granger Cause CO2	1176	4.00	0.02
CO2 does not Granger Cause INDEX		0.85	0.43
INDEX does not Granger Cause CO3	1176	0.18	0.83
CO3 does not Granger Cause INDEX		0.57	0.57
CO4 does not Granger Cause INDEX	1176	17.89	0.00
INDEX does not Granger Cause CO4		0.18	0.83
CO5 does not Granger Cause INDEX	1176	0.11	0.90
INDEX does not Granger Cause CO5		8.38	0.00
CO6 does not Granger Cause INDEX	1174	0.04	0.96
INDEX does not Granger Cause CO6		0.74	0.48
CO7 does not Granger Cause INDEX	1174	7.52	0.00
INDEX does not Granger Cause CO7		9.81	0.00
CO8 does not Granger Cause INDEX	1176	11.72	0.00
INDEX does not Granger Cause CO8		2.69	0.07
CO9 does not Granger Cause INDEX	1176	0.00	1.00
INDEX does not Granger Cause CO9		0.23	0.79
CO10 does not Granger Cause INDEX	1176	2.77	0.06
INDEX does not Granger Cause CO10		0.59	0.55
CO11 does not Granger Cause INDEX	1176	9.41	0.00
INDEX does not Granger Cause CO11		15.23	0.00
CO12 does not Granger Cause INDEX	1176	1.06	0.35
INDEX does not Granger Cause CO12		1.40	0.25
CO13 does not Granger Cause INDEX	1176	1.25	0.29
INDEX does not Granger Cause CO13		1.45	0.23
CO14 does not Granger Cause INDEX	1176	9.87	0.00
INDEX does not Granger Cause CO14		0.69	0.50
INDEX does not Granger Cause CO15	1176	4.05	0.02
CO15 does not Granger Cause INDEX		0.41	0.66

Annexure-I

Variable Name	Company Name
1	Asaffa Foods
2	Gulf mushroom products Cp
3	Omani Euro Foods Industries Cp
4	Dhofar Fisheries And Food Ind. Cp
5	Oman Foods International Cp
6	Dhofar Poultry Cp
7	Sohar Poultry Cp
8	Oman Fisheries Cp
9	Sweets Of Oman Cp
10	Oman Refreshment Cp
11	Oman Flour Mills Cp
12	National Mineral Water Cp
13	Dhofar Beverages Food Stuff Cp
14	Areej Vegetable Oils And Deriv Cp
15	National Biscuit Industries Cp