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Abdulnafi Al Zarari
Philadelphia University, Jordan

EXAMINING OF AMMAN STOCK MARKET BEHAVIOR

1. Introduction

Several papers consolidated the fact that correlations through major stock markets have occurred in the last years. There are many reasons for elucidating that the returns and instability of largest equity markets may be related. The economies of the developed countries are related through trade and investment, so that any news about economic components in one country most likely has involvement for the other one. An international share-pricing model shows correlation between stock returns in different countries. Some suggest that thrive financial market integration will increase the degree of correlation between the stock returns of several countries by making portfolio managers in the home market more harmonious to changes in foreign markets. So from a portfolio management viewpoint, a higher correlation markets makes it uneasy to vary the total risk of a portfolio by simply spreading investment across countries.

A second logical reason for correlation of stock price changes is market contagion [Karolyi, Stulz 1996]. That is, stock prices in one country may be affected by the changes in another country, what is probable because of connections.

For instance the October 1987 collapse in NYSE, as well as Mexico, Russia, Far East countries, Turkey and others, which caused worldwide stock prices declines, is recognized as evidence for international behave market contagion. King and Wadhawani (1990) inquire the October 1987 crash to determine why all the markets moved to gather in spite of different economic circumstances. The authors suppose that a "mistake " in one market can be transmitted to other markets by means of contagion mentioned above, and it was an argument in the discussion on the degree of Amman Stock Market correlation with other markets in Middle East and the world, especially after the step-by-step liberalism for instruction was challenge for its activities.

However, the main objective of the present study is to discuss time-varying correlation of the current stock prices changes of ASM with other markets, hence emerging market are subsequent of developed stock markets.

The study hypotheses are: A – there is a statically essential correlation between the fluctuation of Amman Stock Market price with fluctuation of stock price in selective developed stock markets groups; B – the correlation between Amman Stock Market with some of Middle East stock markets is superior.

2. Methodology of the study

Analysis of published data. A descriptional analysis is based on the survey monthly data collected from monthly reports of ASE, statistical international federation for stock exchange markets, and international stock markets issued by IMF, for the period 1993-2004.

Applied analysis: the model used in the analysis of present study is Pearson correlation coefficient, and regression analysis.

This study is organized as follows: in section 3, an elementary look at correlation (Pearson) figures gives a hint of up-rise and therefore unstable correlations. In section 4 the concept of regression analysis of stock-market return as approach to estimating the regression level of stock markets is introduced.

3. The instability of correlations

The correlation matrix of international assets return plays a special role in the finance literature.

The covariance between region markets could change because of the volatility of region markets progress over time, but also because of the interdependence across markets changes, as mentioned in the introduction. Looking at the market correlation allows one to focus on the interdependence between markets.

First look at the analysis of data gives an indication of the stability of the correlation of region market, but a deep look at correlation (Pearson) (Table 1, matrix of stock market correlation given notice that markets have not been correlated strongly over study).

To get an impression of the correlation across markets, the mean correlation of Jordan with 14 countries conclude the following point:

1. Jordan, Saudi Arabia and Egypt are correlated (0.372, 0.293, 0.221 respectively). In fact these 3 countries are related through trade and investment, that is the reason why the correlation is somehow high.

2. Jordan, Switzerland, Sp 500, Oman, and Malaysia are weakly correlated (0.018, 0.032, 0.033, 0.020 respectively), in fact those countries are weakly related through trade and investment.

3. With respect to Jordan with other countries not mentioned in point 1 and 2 not much variation in correlation is noticed, because trade and investment during time study are not that much high compared to point 1 and not that much low compared to point 2. Login and Solink use similar data set (time period 1960-1990). They apply a test for a constant unconditional correlation matrix.

Table 1. Correlations (Pearson)

	Bahrain	Egypt	Israel	Jordan	Malaysia	Morocco	Oman	Saudi
Egypt	0.425							
Israel	0.153	0.178						
Jordan	0.293	0.221	0.225					
Malaysia	0.157	0.167	0.155	0.02				
Morocco	0.095	0.191	0.044	0.095	–0.064			
Oman	0.281	0.248	0.003	0.033	0.26	0.249		
Saudi	0.202	0.277	0.201	0.372	–0.009	0.087	0.074	
Turkey	0.321	0.285	0.345	0.091	0.129	–0.087	–0.145	0.186
Lebanon	0.023	0.282	0.128	0.076	0.077	0.24	–0.096	0.21
Tunisia	0.198	0.051	–0.07	0.063	0.043	0.053	0.023	–0.037
Composite	0.428	0.31	0.41	0.178	0.634	0.014	–0.007	0.302
Ftse100	0.28	0.151	0.366	0.096	0.271	0.015	–0.071	0.174
Sp 500	0.061	–0.014	0.071	0.032	–0.011	0.129	0.244	0.09
Switzerland	–0.048	0.048	0.066	–0.018	0.185	–0.067	0.007	0.38

They estimate the unconditional correlation matrix for 7 countries of 5 years and test for equality equation of correlation matrix. Jenrich test shows that the null hypothesis of a constant correlation matrix is rejected at the 15% confidence level in 10 out of 15 comparisons. Table 1 (matrix of stock market correlation) shows the correlation coefficient of monthly price index in 14 countries.

4. Regression analysis

The last section used the correlation (Pearson) approach to estimate the extent of markets co-movement. This method is not qualified to studying the change in correlation over time, as a large number of observations are required to estimate just one correlation coefficient. To study time variation in correlation we have to get help from regression equation. Available monthly data on share price index and date for the period 1993-2004 have been substituted in to the following linear formulae:

$$Y = b_0 + b_1 x_1,$$

where:

Y – future price index,

b_1 – preset price index,
b_0 – coefficient,
x_1 – date.

Longin and Solink use monthly equity index return for five countries: (US, UK, France, Germany, and Japan). Return exceedances defined with various predetermined beginning: 1%, 3%, 8%, and 10% away from imperical mean of each country.

The results for the regression analysis of each of the 14 countries in present study found by the author are particularly interesting.

The regression equation for Bahrain is:

$$Y = –1446 + 0.00723x_1,$$

$$R^2 = 10.4\%, \qquad R^2(\text{adj}) = 9.1\%.$$

Table 2. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	106.32	106.32	8.00	0.006
Error	69	916.82	13.29		
Total	70				

The table shows regression analysis of monthly stock market index in Bahrain (1993-2004). From this table we see the regression equation is fit for the data.

The *p* value (0.006) is less than 5%, that means x_1 is significant indicative in expecting *Y*.

The results indicate that the increment in price index in Bahrain parallel to the Jordan price index and this increment confirm the positive relationship between Jordan and Bahrain, relative to their correlation coefficient that is about 30%. *T* (–2.83) is significant, too.

Regression equation for Jordan:

$$Y = –521 + 0.00261x_1,$$

$R^2 = 4.0\%$, $R^2(\text{adj}) = 3.4\%$.

Table 3. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	112.67	112.67	5.89	0.017
Error	140	2678.71	19.13		
Total	141				

Regression analysis of monthly stock market index in Jordan (1993-2004) is shown in Table 3: The *p* value 1.7% is significant, less of 5%. Therefore x_1 is signif-

icant indicative in expecting *Y*. The consequence indicates that the increment in price index of ASE is parallel to Bahrain. This increment confirms the positive relationship between Bahrain and Jordan, relative to their correlation coefficient as mentioned before.

Regression equation for Saudi Arabia:

$$Y = -1771 + 0.00886x_1,$$
$$R^2 = 12.4\%, \qquad R^2(\text{adj}) = 11.4\%.$$

Table 4. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	256.22	256.22	11.52	0.001
Error	81	1802.23	22.25		
Total	82				

The analysis of variance of monthly stock market index of Saudi Arabia for the period 1998-2004 (Table 4) shows the *p* value (0.001) to be significant, *T* also significant (–3.39), so x_1 (date) is significant indicative in expecting *Y*. The results indicate that the increment in price index of Saudi Arabia is parallel to Jordan (ASE). This increment assures the positive relationship between Saudi Arabia and Jordan, relative to their correlation coefficient (37.2%), it is better than between Bahrain and Jordan.

Relating to the data of monthly stock market index in Egypt (1996-2004), the author arrived at the following equation:

$$Y = -510+0.00255x_1,$$
$$R^2 = 0.7\%, \qquad R^2(\text{adj}) = 0.0\%.$$

Table 5. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	45.75	45.75	0.79	0.376
Error	105	6076.02	57.87		
Total	106				

The analysis of variance in Egypt as in Table 5 shows that the *p* value is not significant (37.6%), it is more than 5%, so x_1 (date) are not significant indicative in expecting *Y*. The results indicate that the price index of Egypt is not parallel to Jordan. It should be noticed that there is no linear relationship between the index and the time in Egypt Stock Exchange, this relationship might be curvilinear, in spite of the fact that the correlation coefficient in the matrix between Egypt and Jordan is 0.221 (22.1%).

Regression equation for Oman:

$$Y = -1321 + 0.00660x1,$$
$$R^2 = 3.7\%, \qquad R^2(\text{adj}) = 2.3\%.$$

Table 6. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	88.69	88.69	2.62	0.110
Error	69	2337.49	33.88		
Total	70				

Regression analysis of monthly stock market index of Oman (1996-2004) is shown in Table 6. The *p* value indicates that there is no linear relationship between the index and the date, that mean slope curve is not applicable to the description of the relation between the single dependent variable and the independent ones , this relation might be curvilinear, also R^2 (3.790) indicates that is the slope curve is not applicable to the description of the relation between Y (index) and x_1 (date). The correlation coefficient in the index between Oman and Jordan is feeblish (3.3%). So the change in price index in Oman Stock Exchange is not parallel to price index of Amman Stock Exchange.

Regression equation for Morocco:

$$Y = 449 - 0.00224x_1,$$
$$R^2 = 1.3\%, \qquad R^2(\text{adj}) \; 0.4\%.$$

Table 7. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	33.35	35.35	1.43	0.234
Error	105	2589.69	24.66		
Total	106				

Analysis of variance in Morocco included in Table 7 reveals that *p* value (23%) is more than criterion of significance (5%), that means there is no linear relationship between index and date, so the slope curve is not applicable to description of relation between these two variables. The R^2 (1.3%) is also very low, so the slope curve is not applicable to the description of the relation between variables. If we check the correlation coefficient in the matrix of correlation between Morocco and Jordan, we find it is poor (9.5%), so the change in price is not parallel to price index of ASE.

Regression equation for Lebanon:

$$Y = -1986 + 0.00992x_1,$$

$R^2 = 4.2\%$, $R^2(\text{adj}) = 2.8\%$.

Table 8. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	200.22	200.22	3.04	0.086
Error	69	4543.41	65.85		
Total	70				

Regression analysis of monthly stock market index of Lebanon (1996-2004) as shown in Table 8 reveals that *p* value (8.6%) is more than 5%, it denotes there is no linear relationship between index and time. The R^2 is positive (4.2%) but feeblish, so the slope curve cannot describe the relation between price index and time. When we check correlation coefficient in the matrix of correlation between Lebanon and Jordan we find it is very poor (7.6%) but positive, consequently the change in price index of Lebanon stock market in spite of positive it is not parallel to price index of ASE.

Regression equation for Israel:

$$Y = 78 - 0.00039\, x_1 \text{ (time)},$$
$$R^2 = 0.0\%.$$

Table 9. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	0.73	0.73	0.01	0.909
Erorr	93	5159.54	55.48		
Total	94				

This model is not fit for the data. Regression analysis of Israel (1997-2004) as shown in Table 9 reveals that the *p* value (90.9%) is far more than 5%, no doubt there is no linear relationship between index and time in Israel stock market. R^2 is 0.0%. When we check correlation coefficient in matrix of correlation between Israel and Jordan we find it is naught, which confirms there is no relationship between Jordan stock market and Israel stock market in spite of the relation through investment.

Regression equation for Turkey:

$$Y = 474 - 0.00236\, x_1,$$

$$R^2 = 0.2\%, \qquad R^2(\text{adj}) = 0.0\%.$$

Table 10. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	91.9	91.9	0.27	0.606
Error	140	4809.6	343.5		
Total	141				

Analysis of variance in Turkey (Table 10) shows that the *p* value is not significant (60.6%), so x_1 (time) is not significant indicative in expecting *Y*. The results indicate there is no linear relationship between price index and time , the square of R is weakly (0.2%), so the slope curve is not applicable to the description of the relation between variables. Therefore the change in the price index in Turkey is not spheral to the price index of Jordan. This situation does not confirm relationship between Jordan and Turkey relative to their correlation coefficient that is 0.091(9.1%) we can obtain the same results from analyzation.

The regression equation for Malaysia, correlation between Jordan and Malaysia (2.0%).

Regression equation for Switzerland:

$$Y = 266 - 0.00133\, x_1,$$
$$R^2 = 0.5\%, \qquad R^2(\text{adj}) = 0.0\%.$$

Table 11. ANOVA

Source	DF	SS	Ms	F	*p* value
Regression	1	29.05	29.05	0.66	0.418
Error	140	6161.06	44.01		
Total	141				

Regression analysis of monthly stock market price index for Switzerland (1993-2004) is presented in Table 11, *p* value is 0.418 (41.8%), it is not significant, refers to no linear relationship between index and time in Swiss stock market. R^2 (0.5%) indicates it is not applicable to the description of relation between variables. But when checking up correlation coefficient in the matrix (Table 1) between Switzerland and Jordan, we find there is negative correlation (–1.8%), that denotes the increment in price index of Jordan means the decrease in Switzerland and the other way out.

5. Conclusions

The correlations of stock price index between markets are not constant over time. The approach in section 4 shows that correlation has positive trend for 13 countries of 14, except Switzerland. This finding suggests that stock markets are getting more integrated. We also find that the countries who have positive and significant *p* value create a coherence. Potentially, these findings impose dramatic challenges for shares portfolio managers.

Table 12. Summary of ASM behavior

Countries	Correlation coefficient (%)	Regression coefficient	*p* value
Saudi Arabia	37. 2	0.00886	0.001 (0.1%) *
Bahrain	29.3	0.00723	0.006 (0.6 %) *
Egypt	22.1	0.00255	0.376 (37.6 %)
Israel	22.5	0.00039	0.909 (90.9 %)
Morocco	9.5	0.00224	0.234 (23.4 %)
Turkey	9.1	0.00236	0.606 (60.6 %)
Lebanon	7.6	0.00992	0.086 (8.6 %)
Tunisia	6.3	0.00312	0.115 (11.5 %)
Oman	3.3	0.00660	0.110 (11.0 %)
Malaysia	2.0	0.00036	0.893 (89.3 %)
Switzerland	- 1.8	0.00133	0.418 (41.8 %)

* significant

The continuously changing correlation sample market makes it very difficult to select an *ex ante* optimal investment strategy. Last but not least, since there is positive link between correlation and market instability, investors and risk managers do not get the full utility of risks diversification, especially in disordered financial markets, either regional or international.

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Statistically International Federation of Stock Exchange Markets.

BADANIE ZACHOWANIA RYNKU PAPIERÓW WARTOŚCIOWYCH W AMMANIE

Streszczenie

Celem artykułu jest analiza i dyskusja nad zmieniającą się w czasie korelacją zmian cen papierów wartościowych na rynku w Ammanie z innymi rynkami. Zastosowane zostały model analizy wskaźnika korelacji Pearsona oraz analiza regresji. W opracowaniu wykorzystano podejście Pearsona w celu oszacowania zakresu zależności rynków. Ta metoda nie kwalifikuje się do zastosowania w badaniu zmian korelacji w czasie ze względu na wymaganą dużą ilość obserwacji. Równanie regresji zostało wykorzystane do analizy zmian korelacji w czasie. Dane dotyczące miesięcznych indeksów cen akcji oraz zmienne czasowe za okres 1993-2004 zostały wykorzystane w równaniu linowym. W wyniku przeprowadzonych badań udowodniono, że korelacje pomiędzy indeksami cen akcji na różnych rynkach nie są stałe w czasie; wyniki pokazują, że korelacja jest pozytywna dla 13 z 14 krajów. Wyniki badań sugerują, iż rynki kapitałowe stają się coraz bardziej zintegrowane. Artykuł pokazuje również, że kraje posiadające pozytywną i znaczną wartość wskaźnika P tworzą spójną całość.

Badania wskazują na istotne wyzwania dla menedżerów portfeli akcji. Ciągle zmieniająca się korelacja rynków powoduje trudności w doborze optymalnej strategii inwestycyjnej, ze względu na pozytywny związek pomiędzy korelacją i niestabilnością rynku, inwestorzy oraz zarządzający ryzykiem nie mogą więc w pełni zastosować metod dywersyfikacji ryzyka, dywersyfikując portfele na rynkach finansowych w regionie i na świecie.