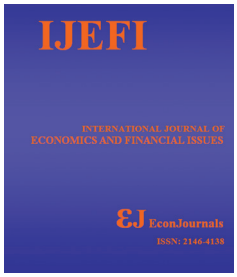

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Is Amman Stock Exchange an Indicator of Jordan's Economic Performance?

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ABSTRACT

There have been great debate in the literature on the impact of stock market on the economic performance, as some believe that higher stock prices increase the wealth of people and stimulate further investment leading to higher consumption and investment, consequently higher GDP. Others cast doubts on the robustness of that view. In Jordan, an emerging market, the Amman Stock Exchange plays a crucial role in the economy as the share of market capitalization to GDP was more than 200% until 2008 but dropped drastically during the economic turbulences after the Arab Spring to reach only 57% in 2018. This study aims to test whether the stock prices in Jordan are to be used as a leading economic indicator. The Correlation between the former and the latter is measured through the statistical method used by Granger (1969). We used quarterly data for real GDP for the period 2000-Q1 till 2018-Q1 as a proxy for economic growth and the weighted average of Amman Stock exchange index as a proxy for stock prices. We found that the optimum time lag to be used was 4 lags and further the null hypothesis of no Granger-causality between lagged stock prices and GDP was rejected at 5%. This means that lagged stock prices in Jordan can cause economic performance. Such findings offer indication on the plausible use of Jordan lagged stock prices as causal factors to economic performance. As such, in an effort to revive the economy, Jordanian government should incentivize investment and stimulus policies targeting Amman's Stock Exchange.

Keywords: Amman Stock Exchange, Granger-causality, Economic Performance
JEL Classifications: O16, G00, N1

1. INTRODUCTION

The stock market has been traditionally viewed as a determinant of the economy, since as the stock prices are increasing, there are two effects: The wealth effect and the valuation effect. The wealth effect means as the stock prices increase, people believe the value of their financial assets go up, hence their wealth increases, which then reflects in more consumption on goods and services. As we know from the economic theory, consumption comprises the major component of the national income, therefore, when wealth increases the national income will improve. Moreover, when stock prices boom, investors and businesses become more optimistic about the value and the profitability of their businesses (valuation effect), leading them to expand in their businesses and recruit more people, which in turn improves the real sector, Hall (2018). However, there are others who are skeptics and question the validity of that view and believe that the stock prices are not determinant of the real economy. This view was supported by the strong economic growth that followed the 1987 stock market crash. Moreover, in a question at Quora (2017) as to "why Indian people are pumping in huge amount of liquidity into the markets which keeps the market alive and kicking, nobody questioned when the GDP went Up. Why." An answer by Saravanan (2017) to that question was "I find this to be a short term disruption that is going on with our economy. A good estimate is to compare how they are going to grow in the future quarters." This dispute of the causality or prediction of stock market to the real sector calls for further research in that topic.

Jordan, an emerging economy, has witnessed drastic changes in its economy since the ascension of King Abdullah II to the throne in the

year 2000. The era could be divided into two periods 2000-2010 and 2010-2018. The first one was characterized by high rates of growth of 8% annually, huge influx of foreign investments, particularly from Iraqis Businesses, and foreign aid to stabilize the country. However, following the Arab Spring in 2011, Jordan suffered from chronic economic crisis represented by high rates of unemployment reaching 18.5% in 2018, moderate economic growth of around 2%, poverty, huge debt of about $40 billion in 2018 and a debt to GDP ratio of about 95%, The World Bank (2018). This economic slow down can be attributed to the influx of more than a million of refugees, rising public debt resulting in a removal of subsidies on major food items, regional instability causing massive reduction in tourist activity, decreased foreign investment, increased military spending and the collapse of trade with major trading neighbors Syria and Iraq.

The stock market in Jordan is considered a backbone to the economy as can be seen from Table 1. It followed the same path as that of the economy since the number of listed companies in the Amman Stock Exchange registered a record high of 277 company 2010. The value traded increased from JD16, 871 million in 2005 to JD20, 318 in 2008 when there was a boom in the stock market, but reduced drastically by more than 110% in 2009 to JD9, 665.3 million due to the market crash and continued deteriorating thereafter to reach only JD2319.3 by 2018. Moreover, the market capitalization to GDP ratio went down from 326.6% in 2005 to 56.7 in 2018.

Therefore, the objective of this research is to investigate whether Jordan stock market prices cause changes in the economy. Furthermore, we need to test for that causality using the Granger-causality test (1969). In other words, will changes in stock prices today in Jordan cause changes on the future economy, or conversely would the economic performance today cause changes in the future value of stocks. In order to do that, we use quarterly data for Real Gross Domestic Product and Weighted average Stock Prices Index for the period of 2000Q1-2018Q1 with 72 total value of observations. The importance of this study stems from the fact that this is the first paper of its kind to tackle that issue in Jordan as businesses fear from government policies and are reluctant to inject money in the market, leading to a further deterioration of the economy.

The paper is organized in five sections as follows: Section 1 is the introduction. In section 2, we review the literature that tackled the relationship between stock prices and economic growth. Section 3 presents the methodology and the model that will be tested using quarterly data. Section 4 presents analysis of the Granger – causality test and discussion, whereas section 5 concludes the paper.

2. LITERATURE REVIEW

The subject of the impact of the stock market on the real economy has been controversial. Many believe that stock prices are a good determinant of the economy through its impact on the wealth and valuation of future values, others question that claim.

Wild and Lebdaoi (2014) studied the relationship between Morocco stock market development and economic growth using quarterly data from 2003 to 2014. They tested for cointegration and the dynamics of GDP growth and stock market development using vector error correction model and Granger-causality tests. They found that there is a long run relation between stock market development and economic growth. Also they found that there is evidence of the demand following hypothesis and there is a threshold level before a positive interaction between real and financial market takes place. Chavda et al. (2018) investigated the growth rate in GDP and performance of Indian stock market BSE-SENSEX Index for the period 2008-2017. Their study shows that SENSEX index is significantly affect GDP growth rate and the correlation between both variables is significant and positive. They concluded that GDP is a predictable variable for Indian stock market returns. Another similar study was conducted by Comincioli (1996) who used quarterly data for the US economy from 1970 to 1999. He found a "causal" relationship between the US stock market and the economy and that stock prices Granger-caused economic activity, but not the reverse. Further, he found that there is a lag length in the stock market turbulences and the changes in the real economy. The lag length impact is very crucial in such instances and the longest significant lag length was three quarters. However, the skeptics argue that there was a strong economic growth after the 1987 market crash, which contradicts the previous findings by doubting the stock market's predictive ability. Also Peek and Rosenberg (1988) found out that between 1955 and 1986 out of eleven cases in which the Standard and Poor's Composite Index of 500 stocks (S&P 500) that were declined by more than 7% only six cases followed by recession.

Table 1: Amman stock exchange: Major indicators

Year	# of listed companies	MKT capitalization (JD million)	Value traded (JD million)	MKT capitalization/GDP (%)
2005	201	#	16871.0	326.6
2006	227	#	14209.9	233.9
2007	245	#	12348.1	289.0
2008	262	#	20318.0	216.7
2009	272	#	9665.3	149.6
2010	277	#	6690.0	122.7
2011	247	#	2850.2	102.7
2012	243	19141.5	1978.8	93.5
2013	240	18233.5	3027.3	83.0
2014	236	18082.6	2263.4	75.8
2015	228	17984.7	3417.1	70.7
2016	224	17339.4	2329.5	65.0
2017	194	16962.6	2926.2	61.8
2018	195	16122.7	2319.3	56.7

Source: Key statistics of the ASE, 2018

3. METHODOLOGY

In order to test whether the Amman Stock Exchange Market (ASE) can cause the economic performance in Jordan or the economic performance causes changes in stock prices, the quarterly data from the period of 2000-Q1 till the year 2018-Q1 was used making the total number of observations 72. We use the weighted average of ASE price index as a proxy for the stock market performance and the real GDP as a proxy for economic performance. The data was obtained from the yearly official published reports of the Central Bank of Jordan and the Amman Stock Exchange, (CBJ different issues and ASE).

In order to reveal the relationship between stock prices and GDP in Jordan and whether stock prices cause GDP or the other way around, we will use the "Granger-causality" test. A variable X "Granger-causes Y" if Y can be better predicted using the histories of both variables (X and Y) rather than using the historical values of only Y.

The following pair of models will be used in this study:

$$DGPt=a0+\sum_{i=1}^{k} ai(GDP)t\text{-}i+\sum_{i=1}^{k} bi(SP)t\text{-}i+Ut \quad (1)$$

$$SPt=c0+\sum_{i=1}^{k} ci(SP)t\text{-}i+\sum_{i=1}^{k} di(GDP)t\text{-}i+Vt \quad (2)$$

Where:
GDPt: Real Gross Domestic Product at time t.
SPt: Weighted Average Stock Price Index at time t.
bi, di: Are AR Coefficients.
k: Number of lags.
Ut, Vt: Are white noise.

Equation (1) above regresses current gross domestic product on the two independent variables: previous values of GDP and the previous values of the stock prices. Whereas, equation (2) tests whether lagged values of GDP cause the stock market prices.

The hypothesis that will be tested is the following:
Null hypothesis H0: bi =0.
Alternative H1: bi ≠0.
Where i = 1,2,3,…k.

If the null hypothesis is accepted that means stock prices can not cause the real economy. On the contrary, if the null hypothesis is rejected then the stock market is a good cause (determinant) of the future economic performance.

4. STATISTICAL TEST FOR GRANGER CAUSALITY ANALYSIS

In order to test whether the Amman Stock prices Granger cause the real economy (equation 1), the first step in testing is to check whether the variables (GDP and SP) are stationary (mean and variance have to be constant) to be able to do forecasting of time series. As can be seen from Figure 1, the variance of the two variables is not constant, indicating that they are not stationary and need to be converted into stationary by "first differencing." After conversion to first difference, Figure 2 appears to be stationary. Hence, the stationary data/variables can be used to run various time series models such as regression, VAR and Granger causality. We also used the Augmented Dickey Fuller Test (ADF) (unit root test) for stationary. The results of the ADF are shown in Table 2. As can be seen from the results in Table 2, both variables GDP and SP are stationary once we take the first difference and the t-test results are significant at 5% level.

Therefore, the model that will be tested is as follows:

$$\Delta GDPt = a0+\sum_{i=1}^{k} ai(\Delta GDP)t\text{-}i+\sum_{i=1}^{k} bi(\Delta SP)t\text{-}i+Ut \quad (3)$$

$$\Delta SPt = c0\sum_{i=1}^{k} c1(\Delta SP)t\text{-}i+\sum_{i=1}^{k} di(\Delta GDP)t\text{-}i+Vt \quad (4)$$

Where ΔGDP and ΔSP are the first differences of GDP and SP simultaneously.

The second step of conducting the Granger causality test is to determine the optimum number of lags to be used in the model, as too many lags lead to loss of degrees of freedom and can cause multicollinearity, serial correlation in the error terms and misspecification errors.

There are few ways to determine the optimal number of lags of the model such as Akaike Information Criterion (AIC), Schwarz

Figure 1: Non-stationary variables

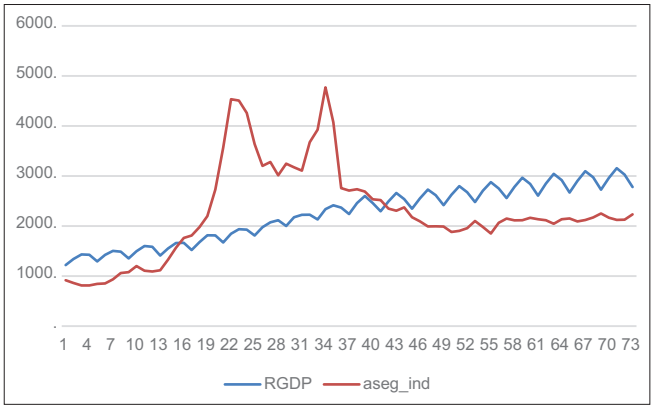
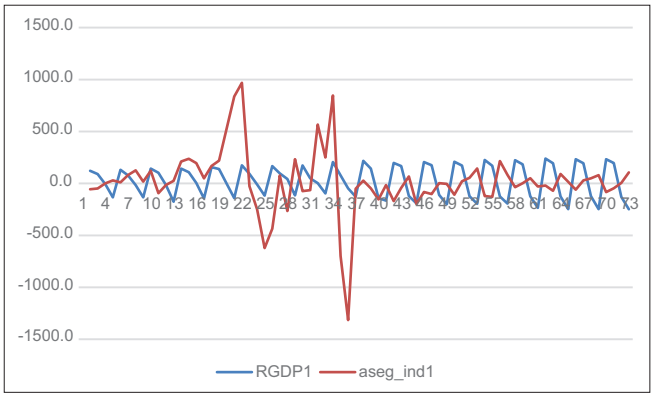


Figure 2: Stationary variables



Information Criterion (SIC) and Hannan-Quinn Information Criterion (HQIC). The lower the value of AIC, or HQIC or SIC the better the model.

After estimating the vector autoregressive (VAR), the results are shown in Table 3.

As can be seen from Table 3, the results show that in all the different criterion of lags (AIC, HQIC and SIC), lag 4 seems to be the optimum lag to be taken in the model as it has the lowest value. This means any changes in the stock prices today will be reflected in the real economy (GDP) four quarters later. In other words, if stock prices today increase, then through the wealth and the valuation effect the economy improves four quarters after.

The third step in our test for Granger causality is to check if the variables, i.e., ΔGDP and ΔSP are correlated, as if they are correlated then one can check for the causality. However, if it turns out that the variables are not correlated, then there is no use to check for causality. Therefore, I run multiple linear regression for different models with different lags (1,2,3 and 4) as can be seen from Table 4.

The ANOVA test results show that the best F-value is 4.694 (significant at 5%) when four lags are taken. The equation for the best model with four lags is as follows:

Table 2: Stationary test: ADF test

ΔGDP	T score	P-value (%)	C.V	Stationary at 5%
Const only	−2.4	17.9	−3.0	False
Const+trend	−2.8	0.3	−1.6	True
Const+trend+trend^2	−2.9	0.2	−1.6	True
ΔSP				
Const only	−4.1	0.5	−3.0	True
Const+trend	−4.2	0.0	−1.6	True
Const+trend+trend^2	−4.5	0.0	−1.6	True

$$\Delta GDPt=2000+0.139\ \Delta SPt-4.$$

As the objective of this research paper was to check whether GDP Granger-causes SP or SP Granger-cause GDP, it is time to run the fourth and last step for Granger-causality test.

After running a regression for the above equations (3) and (4) in which the null hypothesis are H0: bi=0, di=0.

Versus the alternative H1: bi≠0,di≠0.

The value of F-statistics is appointed. If the P-value is more than 5%, we cannot reject the null hypothesis. On the other hand, if the P-value is <5%, we reject the null hypothesis and accept the alternative. This means the stock prices in Jordan Granger cause the GDP (financial market do affect real economy).

After we run the for Granger-causality test for the above two equations (3) and (4), the results are shown in Table 5.

Grangercausality waldtests			
Equation excluded	**χ^2**	**df**	**Prob. >χ^2**
D_aseg_indDrgdp	1.9158	4	0.751
D_aseg_indALL	1.9158	4	0.751
DrgdpD_aseg_ind	14.818	4	0.005
Drgdp ALL	14.818	4	0.005

One can see that in the second model where we regress stock prices on its lagged values and lagged GDP values, the P-values are not significant at 5% level, indicating that the null hypothesis (di=0) is accepted and GDP does not Granger-cause or predict stock prices. However, the first model in which Gross Domestic product GDP is the dependent variable and the lagged values of SP and GDP are the independent variables, the P-value is <5%, which means we can reject the null hypothesis that bi=0 and accept the alternative. Therefore, the stock prices when we take 4 lags Granger-cause the real economy.

Table 3: VAR test for equation 3

Lag	LL	LR	Df	P	AIC	HQIC	SIC
0	−927.14				27.3279	27.3538	27.3932
1	−921.17	11.948	4	0.018	27.2698	27.3474	27.4657
2	−875.48	91.378	4	0.000	26.0437	26.173	26.3701
3	−826.63	97.697	4	0.000	24.7246	24.9057	25.1816
4	−780.75	91.759*	4	0.000	23.4929*	23.7257*	24.0804*

Table 4: ANOVA[e]

Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	1588417.783	4	397104.446	1.604	0.185[a]
	Residual	1.535E7	62	247559.546		
	Total	1.694E7	66			
2	Regression	1527067.999	3	509022.666	2.081	0.112[b]
	Residual	1.541E7	63	244603.835		
	Total	1.694E7	66			
3	Regression	1476778.454	2	738389.227	3.057	0.054[c]
	Residual	1.546E7	64	241567.675		
	Total	1.694E7	66			
4	Regression	1140720.948	1	1140720.948	4.694	0.034[d]
	Residual	1.580E7	65	243021.364		
	Total	1.694E7	66			

[a]Predictors: (Constant), xt4, xt1, xt2, xt3. [b]Predictors: (Constant), xt4, xt1, xt3. [c]Predictors: (Constant), xt4, xt1. [d]Predictors: (Constant), xt4. [e]Dependent Variable: RGDP

Table 5: Granger-causality test

Variable	Coef.	Std. err	z	P>|z|	(95% Conf. interval)	
D_aseg_ind D_aseg_ind L1	0.4426788	0.119881	3.69	0.000	0.2077164	0.6776
L2	−.173476	0.1321405	−1.31	0.189	−0.4324666	0.0855
L3	−.0096142	0.1308895	−0.07	0.941	−0.266153	0.2469
L4	−0.1497256	0.1201565	−1.25	0.213	−0.3852279	0.0857
Drgdp L1	−0.6150656	0.8342855	−0.74	0.461	−2.250235	1.020
L2	−0.0861524	0.8301496	−0.10	0.917	−1.713216	1.540
L3	−0.5229836	0.8442969	−0.62	0.536	−2.177775	1.131
L4	−0.2533928	0.849088	−0.30	0.765	−1.917575	1.410
_cons	53.1045	83.29886	0.64	0.524	−110.1583	216.3
Drgdp D_aseg_ind L1	0.0236518	0.0090722	2.61	0.009	0.0058707	0.041
L2	−0.0075701	0.0099999	−0.76	0.449	−0.0271697	0.0120
L3	−0.0214051	0.0099053	−2.16	0.031	−0.0408191	−0.0019
L4	0.0192772	0.009093	2.12	0.034	0.0014552	0.0370
Drgdp L1	−0.1156866	0.0631359	−1.83	0.067	−0.2394308	0.0080
L2	−0.1590576	0.062823	−2.53	0.011	−0.2821883	−0.0359
L3	−0.1344018	0.0638936	−2.10	0.035	−0.2596309	−0.0091
L4	0.8705071	0.0642561	13.55	0.000	0.7445673	0.9964
_cons	12.25474	6.30378	1.94	0.052	−0.1004373	24.60

5. CONCLUSION

The stock market in Jordan is considered a backbone to the economy. It followed the same path as that of the economy since the number of listed companies in the Amman Stock Exchange registered a record high of 277 company 2010. The value traded increased from JD16, 871 million in 2005 to JD20, 318 in 2008 when there was a boom in the stock market, but reduced drastically by more than 110% in 2009 to JD9, 665.3 million due to the market crash and continued deteriorating thereafter to reach only JD2319.3 by 2018. Moreover, the market capitalization to GDP ratio reached a record high of 326.6% in 2005 but dropped drastically to 56.7 in 2018 due to the regional turbulences and the influx of thousands of Syrian refugees to Jordan.

The objective of this study was to test the effectiveness of stock market as a leading economic indicator for the Jordanian economy and explore the causal relationship between Amman Stock Market and the real sector using quarterly data for the period of 2000-Q1-2018Q1. We tested for the Granger-causality test. We used the values of real GDP as a proxy for the economic performance and the weighted average of Amman stock price index as a proxy for the stock market performance. The results show that the optimum lag time to be used in our model was 4 lags. This was supported by AIC, SIC and HQIC. Furthermore, we found out that Amman stock prices "Granger-cause" the economy but not the other way around. The coefficient of lag 4 of stock prices was positive and significant in causing or predicting the economy at 5% significant level. This finding was supported by the effect of wealth and the forward looking nature of the stock market.

The policy implication of such result is very important for policy makers in Jordan since the stock market plays a crucial role in boosting the economic growth of the country. Therefore, by fostering and facilitating the flow of foreign investments into the market, that will be reflected in a positive and significant impact on the economy, given the fact that more than 50% of the investments in the stock market belongs to non-Jordanians.

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