

An Empirical Analysis of the Informational Efficiency of Jordanian Equity Market

Mohamed Ibrahim Mugableh ¹

¹ Associate Professor, Head Department of Finance & Banking Science, Faculty of Administrative & Financial Sciences, Irbid National University, P.O Box: 2600–Zip Code: 21110, Jordan

Received: 14 March 2020 Revised and Accepted: 17 June 2020

ABSTRACT: This study takes the initiative to make a link among Amman stock exchange price index, financial liberalization, and economic growth. In addition, it tests the efficient market hypotheses in the context of the Jordanian equity market. Using Ng and Perron test, the results show that the Jordanian equity market is informationally efficient in the weak – form and operating as a random walk. However, the results of Johansen and Juselius multivariate test find three co-integrating relationship among variables. These results have important policy implications for the development of equity market in Jordan and stock markets around the world.

KEYWORDS: Stock market efficiency; financial liberalization; economic growth; VECM.

I. INTRODUCTION

The literature of the efficient market hypotheses was basically established in the mid of 1960s with the work of Fama (1965). However, the efficient market hypothesis was traced back to the work of Bachelier (1900). The efficient market hypothesis is defined as the efficient use of information in setting market prices, and it is not possible to make abnormal return in the stock market. Fama (1970) classified three types of market efficiency that reflect the different information as leading to prices changes. In the weak-form information is restricted to historical market prices. The semi-strong form incorporates publicly available information, while the strong form combines all available information (historical, public, and private).

In the late of 1980s, developing countries began to liberalize their economies and financial markets. The aim of liberalization is to transfer technology, and consequently increases saving rates and promotes economic growth. The liberalization process is effective through removing different restrictions such as taxes, ownership limits, and capital controls. However, a considerable attention has been given to examine the relationship between financial liberalization and stock market efficiency (Cajueiro et al., 2009; Hung, 2009; Rejeb and Boughrara, 2013; Alhaj-Yaseen et al., 2017). A few studies have been conducted to investigate the impact of financial liberalization on stock market efficiency in Jordan (Maghyereh and Omet, 2002; Elbarghouthi et al. 2012; Alrafayia, 2018).

This paper provides three main contributions to the extent literature, especially in Jordan. Firstly, there is a salient shortage of research on the causal relationships between financial liberalization and informational efficiency of stock market. Secondly, the present paper combines two sources of information (i.e., financial liberalization and economic growth). These two variables are important in a liberalized open financial market like Jordan. Finally, the current paper tests the efficient market hypothesis in the context of the Jordanian stock market.

The paper proceeds as follows: Section 2 provides literature review; Section 3 presents an overview about Amman stock exchange. The data is provided in Section 4, while methodology and results analysis are given in Section 5. Section 6 concludes the paper and provides recommendations.

II. Literature review

Kawakatsu and Morey (1999) examined the impact of financial liberalization on the stock market efficiency of nine countries. The results showed that financial liberalization did not improve the efficiency of emerging stock markets. Laopodis (2004) examined the impact of financial market liberalization on the efficiency of the Athens stock exchange. The results indicated that the Athens stock exchange was weak-form efficient and operating as a

random walk. Jaleel and Samarakoon (2009) examined the impact of liberalization of the Sri Lankan stock market on return volatility using GARCH and TGARCH models. The results showed that liberalization significantly increased the return volatility in the Colombo stock exchange.

Naghavi and Lau (2016) examined the long-run and short-run relationships between financial liberalization and stock market efficiency for 27 emerging markets over the period, 1996 – 2011. The results showed that financial liberalization granger caused stock market efficiency. Wu et al. (2017) investigated the impact of financial liberalization on the market efficiency of Taiwanese capital market. The results indicated that capital inflows from foreign investments positively affected the Taiwanese stock market and domestic currency appreciated. Naghavi et al. (2018) investigated the effects of financial openness on stock market efficiency in emerging markets. The results showed that the impact of financial liberalization on informational efficiency of the stock market was positive and significant.

III. Overview about Amman Stock Exchange

On the 1st of January, 1978 the Amman financial market was established (1) to mobilize savings by encouraging investment in securities; thus channeling savings to assist the interests of the domestic economy; (2) to regulate issuance of securities in a manner that would ensure the speed of transactions to safeguard domestic financial interests and to protect small savers; (3) to provide the necessary data and statistics to achieve Amman financial market objectives (Amman Stock Exchange, 2020).

Since then and up to the founding of Amman Stock Exchange in 1999, a lot has been achieved. Trading on the secondary market rose from JD9.7 million in 1978 to JD1.767 billion in 2019, the market capitalization of subscribed shares is currently around JD14.9 billion, as compared to around JD286 million by the end of 1978, and the number of listed companies went up from 66 in 1978 to 191 by the end of 2019 (Amman Stock Exchange, 2020).

Figure 1 shows that the Amman stock exchange (ASE) price index started from 585.60 points in 1978 till 3513.76 points in 2019. Figure 2 reported that the trade openness and GDP registered JD3.872 billion and JD28.970 billion in 2019, respectively.

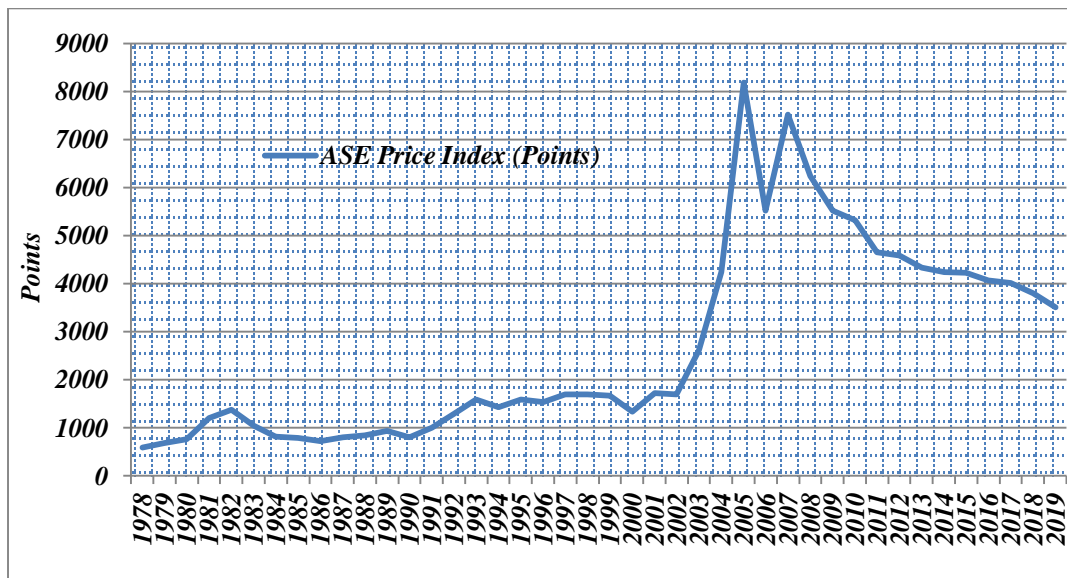


figure 1: ASE Price Index over the 1978 – 2019 period.

Source: Amman Stock Exchange (2020).

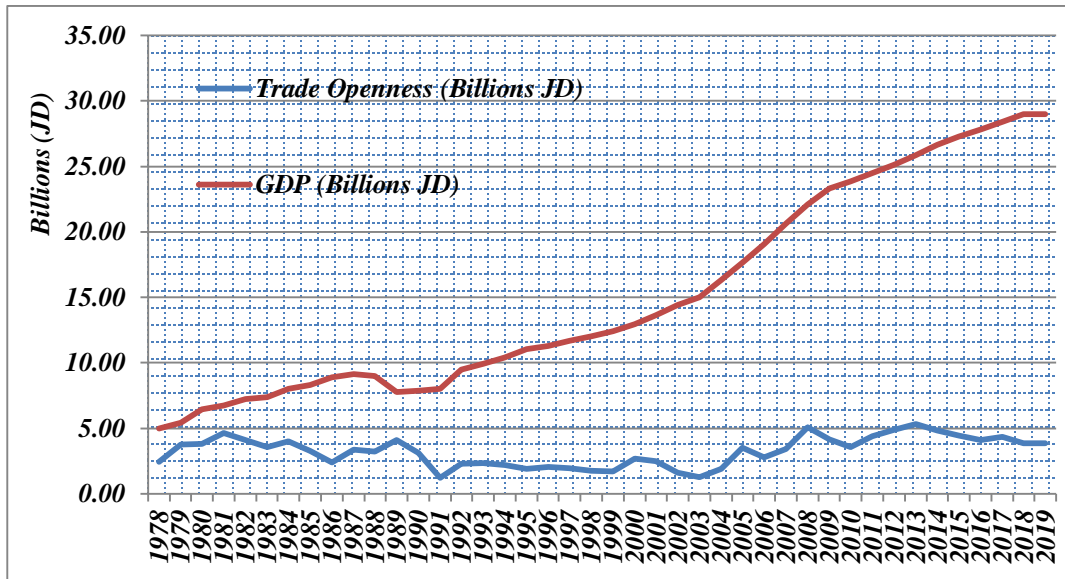


Figure 2: Trade Openness and GDP over the 1978 – 2019 period.

Source: World Bank (2020).

IV. Data

The data used in this study consists of yearly observations for three variables over the period, 1978 – 2019. The Amman Stock Exchange (ASE) price index, weighted by market capitalization (points) is used to measure the performance of the ASE. The price stock index made up of the most liquid and largest 100 listed companies at the ASE from the first and second markets. Financial liberalization (FL) refers to the deregulation of domestic financial market to foreign investors, measured by trade openness (the sum of exports and imports, Billions JD). Economic growth (EG) refers to an increase in the production of goods and services over a specified period of time, measured by gross domestic product (GDP, Billions JD). The data for the ASE price index was obtained from the ASE database (https://www.exchange.jo/en/history?history_category=61). The data for the FL and GDP were obtained from the World Bank, World Development Indicators Database (<https://data.worldbank.org/country/jordan>).

The following model aims to study the determinants of ASE in Jordan for the period, 1978 – 2019:

$$ASE_t = f(FL_t, EG_t) \tag{1}$$

All the variables in Eq. (1) are converted into natural logarithms specification to present the following multiple regressions:

$$\text{Log}ASE_t = \alpha_0 + \alpha_1\text{Log}FL_t + \alpha_2\text{Log}EG_t + \varepsilon_t \tag{2}$$

V. Methodology and results analysis

The main purpose of the current study is to test the efficient market hypotheses in the context of Jordan’s stock market. The primary test of market efficiency is a unit root which is the standard test for weak – form. In this study, Ng and Perron (2001) unit root test is employed to overcome the problem of the presence of structural breaks. The presence of a unit root indicates that the stock price index follows a random walk and the stock market is informationally efficient in the weak – form. Table 1 show that each variable contains a unit root and all the variables are integrated at level one ($I(1)$). Thus, the Jordan’s stock market is informationally efficient in the weak – form. These findings are similar to the findings obtained by Laopodis (2004) for Greece.

Table 1. Results of tests for unit roots using the Ng and Perron test

Ng and Perron (MZa) test computed values		
Variables	Constant	Constant and trend
At level I(0)		
Log ASE _t	-4.143	-11.21
Log FL _t	-5.563	-14.22
Log EG _t	-5.221	-13.31
At level one I(1)		
ΔLog ASE _t	-8.231*	-18.23*
ΔLog FL _t	-11.46**	-21.45**
ΔLog EG _t	-15.34**	-27.13***
Ng and Perron (MZa) test critical values		
	Constant	Constant and trend
1%	-15.90	-24.90
5%	-10.20	-20.60
10%	-6.900	-16.31

Notes: (1) ***, **, and * denote the significance at 1%, 5%, and 10% levels respectively. (2) Source: author’s calculation by using the software Eviews 10.

Engle and Granger (1987) argued that a co-integration can only exist when the variables are integrated at the same order. The results of Ng and Perron (2001) showed that the three variables used in this study are integrated at the same order. Therefore, Johansen and Juselius (1990) test is used to test whether there is a co-integrating relationship among variables. The Johansen and Juselius multivariate co-integration test is based on the following vector autoregression matrix (See Bekhet and Mugableh, 2016; Mugableh and Oudat, 2018; Mugableh, 2018).

$$\begin{bmatrix} \Delta \text{Log}(\text{ASE}_t) \\ \Delta \text{Log}(\text{FL}_t) \\ \Delta \text{Log}(\text{EG}_t) \end{bmatrix} = \begin{bmatrix} \alpha_{1t} \\ \alpha_{2t} \\ \alpha_{3t} \end{bmatrix} + \sum_{i=1}^{h-1} \begin{bmatrix} \lambda_{11t} & \lambda_{12t} & \lambda_{13t} \\ \lambda_{21t} & \lambda_{22t} & \lambda_{23t} \\ \lambda_{31t} & \lambda_{32t} & \lambda_{33t} \end{bmatrix} [1-L] \begin{bmatrix} \text{Log}(\text{ASE}_{t-1}) \\ \text{Log}(\text{FL}_{t-1}) \\ \text{Log}(\text{EG}_{t-1}) \end{bmatrix} + \begin{bmatrix} \beta_{1t} \\ \beta_{2t} \\ \beta_{3t} \end{bmatrix} [\text{ECT}]_{t-1} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \end{bmatrix} \quad (3)$$

where 1-L is the first difference operator; α_it (i = 1,..... 3) represent the intercept terms; λ_{ij} (i,j = 1,....., 3) signify the coefficients to test the H₀ of no Granger causality in the short-run; β_it (i = 1,..... 3) denote the coefficients of error correction terms (ECT_{t-1})s, that are used to test the H₀ of no causality in long-run; ε_it (i = 1,..... 3) represent the error terms that are expected to be normally distributed with zero mean and constant variance.

The results of Johansen and Juselius multivariate co-integration test are reported in Table 2. The trace statistics and maximal eigenvalue tests find three co-integrating relationship among variables. These results are similar to the results obtained by Naghavi et al. (2018) in emerging markets.

Table 2. Johansen and Juselius test results for co-integration among variables.

Null hypothesis	Trace statistics	5% critical value	P-value	Maximal eigenvalue	5% critical value	P-value
$r = 0$	133.40*	122.10	0.05	47.10*	41.10	0.05
$r \leq 1$	126.11*	118.19	0.03	43.21*	39.18	0.04
$r \leq 2$	125.12*	111.21	0.02	42.11*	37.12	0.03
$r \leq 3$	118.34*	109.45	0.02	40.15*	36.14	0.02

Notes: (1) r denotes the number of co-integrating relationships among variables. (2) *Significance at the 5% level. (3) Two lags were included in the vector autoregression determined by the likelihood ratio. (4) Source: author’s calculation by using the software Eviews 10.

As we found co-integrating relationships among variables, the estimation of error correction models is proceeded. The results of long run and short run causality are shown in Table 3.

Table 3. Results of long run and short run causality tests.

Causality		Short run	Long run	Nature of Causality	Direction of Causality
From	To				
ΔLogASE_t	ΔLogFL_t	7.45*	-2.94	Long run and Short run	Feedback
ΔLogFL_t	ΔLogASE_t	6.31**	-2.94	Long run and Short run	Feedback
ΔLogASE_t	ΔLogEG_t	6.22**	-2.94	Long run and Short run	Feedback
ΔLogEG_t	ΔLogASE_t	7.21*	-2.94	Long run and Short run	Feedback
ΔLogFL_t	ΔLogEG_t	6.11**	-2.94	Long run and Short run	Feedback
ΔLogEG_t	ΔLogFL_t	6.09**	-2.94	Long run and Short run	Feedback

Notes: (1) *, ** denote the significance at 1% and 5% levels, respectively. (2) Source: author’s calculation by using the software Eviews 10.

According to the results in Table 3, feedback relationships exist among variables in Jordan. The above results indicate that the Jordan’s stock market is not efficient in the semi-strong form of the efficient market hypotheses.

VI. Conclusions and recommendations

Battery of econometric tests has been applied in this paper to examine the causal relationships among Amman stock exchange price index, financial liberalization, and economic growth, and to test whether the Jordanian stock market became efficient in the semi and strong – forms. It’s clear from the results that following liberalization process and opening market and economy to foreign investors do not make the Jordanian stock market efficient in the semi and strong – forms. The reason for inefficiency in the Jordanian stock market at semi and strong levels is due to different micro market factors. These include the low trading volume, low domestic market capitalization of subscribed shares, restricted number of listed companies, and limited transparency of information.

The findings of this paper have important implications for investors and policy makers. If the subject of the market inefficiency at the semi and strong levels is not fully addressed, then the allocation of funds from stock market to Jordanian economy would be limited. In addition, this could limit the plans of government to privatize its industries. At the same time, there is a clearly need for more deregulation and accurate disclosures that may help the Jordanian stock market to become efficient at the semi and strong levels.

VII. References

- [1] Alhaj-Yaseen, Y.S., Rao, X., and Jin, Y., “Market liberalization and the extent of informed trading: evidence from China’s equity markets”, *Journal of Multinational Financial Management*, vol. 39, (2017), pp. 78-99.
- [2] Alrafayia, A.A., “Effect of liberalization of Amman stock market on the prices fluctuations for the period (1994 – 2015)”, *Asian Journal of Finance & Accounting*, vol. 10, no. 1, (2018), pp. 274-294.
- [3] Amman Stock Exchange (2020), capital market profile, available on line at: <https://www.ase.com.jo/en/Corporate-Profile/Corporate-Governance/Capital-Market-Profile#History>
- [4] Bachelier, L., “Theory of Speculation, Gauthier-Villars”, Paris, (1900).
- [5] Bekhet, H.A., and Mugableh, M.I., "Blueprinting the equilibrium relationships between inward FDI and employment in the Malaysian economic sectors: time series models approach", *Global Business and Economics Review*, vol. 18, no. 2, (2016), pp. 136-150.
- [6] Cajueiro, D.O., Gogas, P., and Tabak, B.M., “Does financial market liberalization increase the degree of market efficiency? The case of the Athens stock exchange”, *International Review of Financial Analysis*, vol. 18, no. (1-2), (2009), pp. 50-57.
- [7] Elbarghouthi, S., Yassin, A., and Qasim, A., “Is Amman stock exchange an efficient market?”, *International Business Research*, vol. 5, no. 1, (2012), pp. 140-156.
- [8] Engle, R.F., and Granger, C.W.J., “Cointegration and error correction representation, estimation and testing”, *Econometrica*, vol. 55, no. 1, (1987), pp. 251-276.
- [9] Fama, E.F., “Efficient capital markets: a review of theory and empirical work”, *The Journal of Finance*, vol. 25, no. 2, (1970), pp. 383-417.
- [10] Fama, E.F., “The behavior of stock-market prices”, *The Journal of Business*, vol. 38, no. 1, (1965), pp. 34-105.
- [11] Hung, J.C., “Deregulation and liberalization of the Chinese stock market and the improvement of market efficiency”, *The Quarterly Review of Economics and Finance*, vol. 49, no. 3, (2009), pp. 843-857.
- [12] Jaleel, F.M., and Samarakoon, L.P., “Stock market liberalization and return volatility: evidence from the emerging market of Sri Lanka”, *Journal of Multinational Financial Management*, vol. 19, (2009), pp. 409-423.
- [13] Johansen, S., and Juselius, K., “Maximum likelihood estimation and inference on cointegration with applications to the demand for money”, *Oxford Bulletin of Economics and Statistics*, vol. 52, no. 2, (1990), pp. 169-210.
- [14] Kawakatsu, H., and Morey, M.R., “Financial liberalization and stock market efficiency: an empirical examination of nine emerging market countries”, *Journal of Multinational Financial Management*, vol. 9, (1999), pp. 353-371.
- [15] Laopodis, N.T., “Financial market liberalization and stock market efficiency: evidence from the Athens stock exchange”, *Global Finance Journal*, vol. 15, (2004), pp. 103-123.
- [16] Maghyereh, A., and Omet, G., “Financial liberalization and stock market efficiency: empirical evidence from an emerging market”, *African Finance Journal*, vol. 4, no. 2, (2002), pp. 24-35.
- [17] Mugableh, M.I., "A homoscedastic co-integration analysis of Malaysian financial market", *American Journal of Finance and Accounting*, vol. 5, no. 4, (2018), pp. 360-370.
- [18] Mugableh, M.I., and Oudat, M.S., “Modelling the determinants of foreign portfolio investments: a bounds testing and causality analysis for Jordan”, *Academy of Accounting and Financial Studies Journal*, vol. 22, no. 4, (2018), pp. 1-8.
- [19] Naghavi, N., and Lau, W.Y., “Financial liberalization and stock market efficiency: causality analysis of emerging markets”, *Global Economic Review*, vol. 45, no. 4, (2016), pp. 359-379.
- [20] Naghavi, N., Mubarik, M.S., and Kuar, D., “Financial liberalization and stock market efficiency: measuring the threshold effects of governance”, *Annals of Financial Economics*, vol. 13, no. 4, (2018), pp. 1 – 24.

- [21] Ng, S., and Perron, N., “Lag length selection and the construction of unit root tests with good size and power”, *Econometrica*, vol. 69, no. 6, (2001), pp. 1519-1554.
- [22] Rejeb, A.B., and Boughrara, A., “Financial liberalization and stock markets efficiency: new evidence from emerging economies”, *Emerging Markets Review*, vol. 17, (2013), pp. 186-208.
- [23] Wu, M., Huang, P., and Ni, Y., “Capital liberalization and various financial markets: evidence from Taiwan”, *The Quarterly Review of Economics and Finance*, vol. 66, (2017), pp. 265-274.