Financial Market Efficiency at Low Level - A Standard Study of Jorden Financial Market

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Abstract :

This paper aims to test Jordan's financial market efficiency hypothesis at the weak level, using the general indicator of AMGNRLX for daily data from 01-01-2017 to 29-12-2022, using the natural distribution test and stabilization tests (ADF .PP), self-correlation testing. The study found that the time series does not follow natural distribution and that it does not have the advantage of random walk.

This paper also found that the effect of conditional variation is an indication of the inefficiency of the Jordanian market for financial markets at the weak level. The results showed that the thoughtful financial market is inefficient at the weak level during the study period.

Keywords: Financial Market Efficiency. Efficiency Levels. Random Walk.

JEL classification codes:G01.G14

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I. INTRODUCTION

Financial markets have become at the forefront with most of the economic and financial news has been translated by many researches and studies presented by many researchers in order to understand their behavior and research into their dynamics and integration with each other, especially in developed countries. The random pattern of changes in prices is close to the efficient performance of the financial markets, and the pole goes against this belief in principle, fully convinced that this pattern of change is only an expression of the natural and rational behavior of the financial markets in prices.

The capital market efficiency hypothesis is one of the most important conditions market management seeks to provide, as this is an incentive for investors to increase the investment process and thus achieve market objectives. The discovery of the idea of indiscriminate price movement was credited to the French 'Bachelier.L' in 1900 in a doctoral thesis. (Bachelier, 1900) An efficient market by 'Francis', 'Samilis' and 'Rolex' is a market that achieves an efficient specialization of productive resources, ensuring that those resources are directed to more profitable areas) and "Fama. Lorie Brealey 'that the efficient financial market reflects its prices at any time and in full in all available or efficient financial market information where appropriate pricing information is available, i.e. the presentation of all securities, so that this information is available to all borrowers-savers at the lowest cost. "(Graya, 2015, p. 38)

According to the concept of efficiency, in the stock market it is expected that security prices will respond to changes in the information received, So that the market value of securities is a fair value that reflects its real value And this response happens so quickly that no category of investors can make extraordinary gains at the expense of another category. The efficiency of markets and all the controversy and interest they generate, Impose a reality that hinges on the development trajectory of developing countries and demands that they urgently reform their financial system to ensure the dissemination of information at a level of disclosure and transparency; Delays would result in a justified cost And that's what happened in the 1990s, When global capital flows are moving upward towards efficient financial markets, financial and legislative system ", given its competitive advantages and strict financial disclosure (Thebti & Kouidri, 2021, p. 69).

An efficient financial market is a highly flexible market that allows for a rapid response in securities prices according to changes in the results of the

analysis of data and information flowing into the market (Abdel Kader, 2009, p. 101).

Whether this information consists of financial lists, information broadcast by the media, historical stock price records in past days, weeks and years, analyses or reports on the effects of the overall economic situation on the company's performance or other information affecting the market value of the stock, if so, it can be claimed that under an efficient market, the market value of the share is fair value (Hassan A., 2007, p. 239). In order for the financial market to be efficient, there must be at least two conditions :

-Market prices should fully reflect all information available to customers published and unpublished.

-Reflect that information in an impartial manner. Prices reflect an efficient market premise.

(Francie.J, 1986, pp. 82-85) noted that an efficient market plays two roles, one directly and the other indirectly. Direct role : It states that investors purchase shares of an enterprise, but in fact purchase future returns. That is, if an enterprise gets promising investment opportunities, it can issue more shares and sell them at an appropriate price, which means an increase in the issuance proceeds and a lower cost of funds. Indirect role : The interest of investors in dealing in shares issued by the enterprise as a safety indicator for investors is aimed at the enterprise's access to many financial resources through the conclusion of borrowing contracts with financial institutions, which are often a reasonable interest rate or the issuance of bonds. (Elnnebi, 2009, p. 41) .It is known as the market in which investment prices reflect all information that reaches investors during a certain period of time while. The market is inefficient when investors notice that there is a difference between the real value of investments and their current market price (eugeun, 1970, pp. 383-386)

In the light of the above, the problem of the study is : ***is Jordan's financial market efficient at a low level ?***

-Hypotheses :- Jordan's financial market is efficient at a low level

- Jordan's financial market is incompetent at a low level

-Objectives of the study: This study aims at the movement of the prices of the Jordanian General Index, and to study the efficiency of the market studied at the weak level in the period from 01/01/2017 to 31/12/2022

II. Literature Research

- This research (Victor, 2021) assumes a normal distribution and random flow of the return chain in order to evaluate the "weakly formed effective market hypothesis" of The Nigerian Stock Exchange. Daily and weekly data of the Nigeria Stock Exchange are analyzed from January 2007 to December 2009 for the daily data, and from June 2005 to December 2009 for the weekly data. The five most traded and oldest bank stocks of the NSE are also included in the analysis. The five individual companies that are listed on the market as well as the daily and weekly returns of the market index comprise the majority of the data used in these tests. To gather information using the following method : conventional analysis. The research yielded the following findings : The automatic documentation testing of observed returns yielded empirical results that were categorically reject the null hypothesis of a random walk of the market index and four of the five individual stocks selected. For the market index and four out of five selected individual stocks, even in the case where returns are corrected for slave trading.
- A study (Borges, 2008) presents the results of tests on weak market efficiency applied to stock market indices in France, Germany, the United Kingdom, Greece, Portugal and Spain, from January 1993 to December 2007. We use the serial correlation test, the run test, the Dickey-Fuller enhanced test and the multiple variance ratio test proposed by Lo and MacKinlay (1988) for the hypothesis that the stock market index follows a random walk. Tests are conducted using daily and monthly data for the entire period and for the past five years, i.e. from 2003 to 2007. Overall, we found convincing evidence that monthly prices and returns follow random rounds in all six countries. Daily returns are not usually distributed, as they are negatively perverted and leptokurtic. France, Germany, the United Kingdom and Spain meet most of the criteria for random walking behavior with daily data, but this hypothesis is rejected for Greece and Portugal, due to the positive chain correlation.
- This study (Hamid, Suleman, Shah, & Akash, 2010) used 14 stock markets for Pakistan, India, Sri Lanka, China, Korea, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, Thailand, Taiwan, Japan, and Australia from January 2004 to December 2009 to test the effectiveness of the poorly formed market for stock market returns in the Asia-Pacific region. It claims that the stock market moves in an erratic manner. To gather information using the analytical and deductive methods. One of the study's most important conclusions was that not all Asia-Pacific nations saw monthly prices follow random patterns. The interest that is generated by the profitable

possibilities that are arbitraged across different marketplaces might be advantageous to investors.

III. Indicators to measure efficiency in financial markets and their levels

3.1 Indicators to measure efficiency in the financial market Efficiency

Price Efficiency : The ability of fresh information to reach market players rapidly, without a significant lag in time, is known as external efficiency. When all relevant information is reflected in the share price and where information is accessible without incurring significant fees. Dealing in the market becomes fair when there is an efficient market where all players have access to information and data on securities. The capacity of some to acquire knowledge ahead of others results in extraordinary gains, and in an efficient market, such profits happen. (Page 242, Hasan A., 2007)

Operational efficiency: This is the market's capacity to establish a balance between supply and demand without subjecting brokers to exorbitant fees or providing market makers (specialists and traders) with a method of making a meaningful profit. It is called the "transaction cost" because it comprises the cost of both the brokerage and the transfer of the securities. Slashing this cost as much as feasible is critical to the financial market's success. Financial and Monetary Markets in a Changing World, (Al-Qadir A., 2009, p. 103)

3-2 Financial market efficiency levels

Understanding the nature of the relationship between the information and facts that influence an investor's decision and the market value of the stock, on the one hand, is essential to determining the various formulae for the efficiency of the stock market. Consequently, the following scale represents the grading of the information levels received by the Securities Exchange, which is used to determine the efficiency of the Exchange in practice :

A- Weak Form of Efficiency The content of this version of the hypothesis is that the prices of financial assets today represent all information available to buyers and sellers about the past period (historical data), including asset price rates and transaction volume, and that the data period can be obtained for free (Dagher M., 2005, p. 284). Alternatively known as the "random price movement theory," this formula makes the assumption that historical data about past occurrences (days, months, or years) has no bearing on the current stock price and cannot be utilized to forecast future price changes. This means that attempting to forecast the future stock price by analyzing past price changes is

pointless. (Bouziane, January 1, 2015)

B- According to the mid-level level of market efficiency hypothesis, the prices of securities traded in the market must take into account both publicly available current data and information as well as historical information about the prices of these markets in the past. This information is related to you and is shown in financial reports, results announcements, rumors, internal business conditions, bonus shares, and national and worldwide political and economic events. Stock prices are supposed to react to information accessible to them under the assumption of market efficiency. This response will initially be minimal because it is based on an initial assessment of the information, but if the investor recognizes the true value that the share price should be under with this knowledge, he will outperform his counterparty investors in terms of earnings. (Samard, June 8, 2021, page 79)

C.Strong Efficiency Form : This formula assumes that the market value of shares is based on all public and private information that investors are required to obtain simultaneously and for free. This information can be historical or general, like publications, or it can be private information that is only available to a particular group of people, like the facility's management or senior employees. This hypothesis can be summarized as follows : prices reflect all that is known, and as a result, they cannot be used to generate extraordinary profits. According to this theory, the price of shares for a given time period represents all information that is available, including information that the public (i.e., the public) and interveners who preferred advantages (financial analysts, capital managers,

IV. RESULTS AND DISCUSSION

4.1 Description and Sources :

This study includes a sample of daily series views of the closing prices of the index for the Jordanian financial market represented by AMGNRLX during the period from 01/01/2017 to 31/12/2022, where the number of views reached 1504. Data obtained from the official website of the stock exchanges published on the website : https://www.investing.com

The daily return of the General Index of the Financial Market has been calculated according to the following formula :

$$Rt= (Ln(Pt)-ln (Pt-1)) *100$$

Where : Rt : represents the daily return of the general index for the current period (t)

Pt : represents the daily closing price of the general index for the current period (t)

Pt-1 : represents the daily closing price of the general index for the previous period (t-1)

4.1.1Financial market statistical analysis :

Figure 1 : The Jordanian index's development from January 1, 2017, to December 29, 2022

Source : Prepared by the researcher based on the study data

The previous figure shows that the Jordan Stock Exchange's general index, AMGNRLX, was continuously rising prior to 2020. After that, we observed a continuous decline in index prices as a result of the global health crisis, which also had a record-breaking impact on 2019 and was reflected in the index's free and maximum fall from the start of 2020 to its conclusion. To provide more context, the descriptive statistics of the indicators under investigation are shown in the following table :

The experimental procedure and materials used to carry out experiments.

4.2 *Financial* Market Efficiency Test at Weak Level: We will study the weak level through a range of tests:

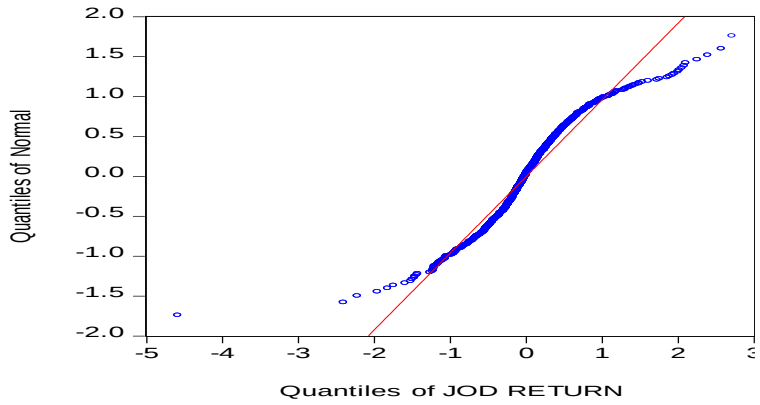
Table 1 : Descriptive statistics of the indicator under study from 01-01-2017 to 31-12-2022

obs	Prob	J-B	kurtosis	skewness	mini	Max	Median	Mean
1455	*0.000000*	17.348	*2.5091*	*0.106*	*1533.350*	*2607.100*	*2067.240*	*2025.633*

Source : *Prepared by the researcher based on the study data*

The results of **Table** 1 show that the mean of the indicator is positive and the value of the standard deviation is very large, which shows that this series has sharp fluctuations and that its dispersion is strong, the value of the torsion coefficient differs from zero and positive (twists towards the left), meaning that the index prices are lower than the average. As for the value of flattening, we note that the values of an indicator less than the value of 3, i.e. its distributions are abnormal and flattened, and this is confirmed by the J-B statistic with its morale at all levels.*(%10 ,%5 ,%1)*

***Figure* 2 :** Quantile-Quantile curve for the evolution of the yield chain of the studied markets during the study period from 01-01-2017 to 30-12-2022



Source : Prepared by the researcher based on the study data

Figure 2 represents. Quantile-Quantile curve for the development of the studied market return chain during the study period from 01-01-2017 to 30-12-2022 It is clear from the previous curve that the series is stable and that the curve takes a stable shape, which shows us that a changé in the return of the index The market under study has the same general trend in terms of time t, and this appears through observation with the naked eye or from stability tests during the study period, and this can be confirmed by performing different unit root tests

Table 2 : Results of the Dickey Fuller and Phillips Perron Daily Returns Tests for the Jordan Index

Results of the Dickey Fuller TEST				
Order of integration	**NONE**	**INTERCEPT**	**TREND AND INTERCEPT**	
I (0)	-30.44753***	-30.44601***	-30.55488***	**Statistic value**
	-2.566554	-3.43462	-3.964373	**Critical value %1**
	-1.941041	-2.863323	-3.412906	**Critical value %5**
	-1.616553	-2.567768	-3.128444	**Critical value %10**
	Reject H0	Reject H0	Reject H0	**Result**

RESULT Phillips Perron TEST				
Order of integration	**NONE**	**INTERCEPT**	**TREND AND INTERCEPT**	
I (0)	-31.14818***	-31.14232***	-31.04845***	**Statistic value**
	-2.566554	-3.43642	-3.964373	**Critical value %1**
	-1.941041	-2.863323	-3.412906	**Critical value %5**
	-1.616553	-2.567768	-3.128444	**Critical value %10**
	Reject H0	Reject H0	Reject H0	**Result**

Source : Prepared by the researcher based on the study data

The results obtained in **Table 2** indicate the results of the unit root tests for the daily returns of the index from the period 01-01-2017 to 31-12-2022, and the ADF and PP tests have been applied respectively, and the results of the above tables indicate that the probability of the estimators of the three models of the ADF and PP test in all cases (categorically, secant and direction, without secant and direction) are significant, meaning that the statistical t-values were much smaller than the tabular t at all values

5%. , $ADF_{sta} > ADF_{cal}$ andThis is what makes us reject $PP_{Sta} > PP_{Cal}$ the nihilistic hypothesis and accept the alternative hypothesis that states that there is no root of the unit, i.e. the stable chain, and from it the return chain RT is stable at its original level, which is one of the characteristics of financial chains.

Table 3 *:* **Random walk test using autocorrelation function**

AC	0.220	0.080	0.054	0.105	0.059	-0.015	-0.016	0.031	0.067	0.017
Q-Stat	70.694	79.947	84.215	100.31	105.40	105.75	106.12	107.57	114.19	114.62
P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source : Prepared by the researcher based on the study data

Table 4 : BDS Test Results for Jordan Index

Dimension	BDS Statistic	Std.er	Z- Statistic	Prob
2	0.043	0.0025	13.51	0.0000
3	0.059	0.0040	14.88	0.0000
4	0.074	0.0047	15.66	0.0000
5	0.082	0.0049	16.53	0.0000
6	0.084	0.0047	17.65	0.0000

Source : Prepared by the researcher based on the study data

Through the **table 4** that gives the results of the test of the independence of observations of the series, we note that the P-Value values are smaller than the level of significance 0.05 and for m = 2,3, 6 The BDS statistic is completely greater than the normal distribution value (tabular value) 1.96 at a significant level of 5%, so we reject the hypothesis of independence H0 (rejection of the hypothesis of correlation between observations), and accept the alternative hypothesis H1, the hypothesis of correlation between observations, that is, there is a correlation between observations or series values, so the series is predictable in the short term. Which indicates the inefficiency of the market at the weak level, i.e. (because the market returns do not go randomly) Appendix No. 01

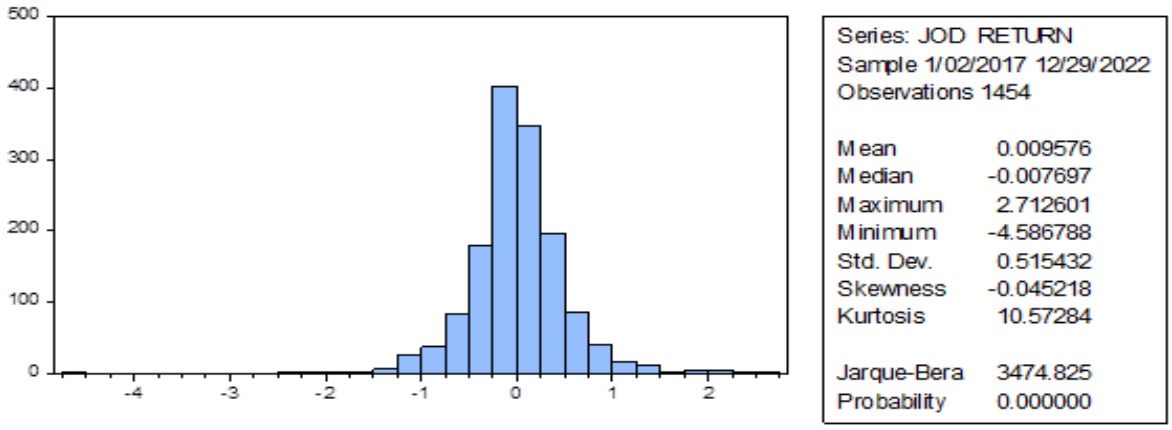
Table 5 : Results of the Variance Ratio Test on the Arden Index Return Series

Joint Tests	Value	df	Probability
Max |z| (at period 2)*	9.681467	1453	0.0000
Individual Tests			
Period	Var. Ratio	Std. Error	z-Statistic	Probability
2	0.590895	0.042256	-9.681467	0.0000
4	0.287979	0.074035	-9.617381	0.0000
8	0.156591	0.108348	-7.784265	0.0000
16	0.082471	0.150538	-6.095015	0.0000

Source : Prepared by the researcher based on the study data

The random walk hypothesis is tested for an index by calculating the variance ratio VR(q) and Z(q) for the periods 2, 4,8,16, the percentage of variance appears in the second column of the table and the statistics of Z(q) in the fourth column, it is clear from the results that the values of the variance ratio are less than the increase of the period of delays for the return series, and based on the statistical probability value Z for each delay period and all periods with some Joint Tests that were less than 0% in all cases (their statistical value did not fall Between ± 1.96, the null hypothesis was rejected and the alternative hypothesis was accepted that the variance ratio during the study period is statistically different from one, i.e. that the index return chain for the stock market does not follow the random course at a significant level of 5% for the stock market under study and for all periods of slowdown, and since the variance ratio was (VR(q))<1In all cases, the returns are negatively self-correlated. This is further evidence of the inefficiency of this market at the weak level.

Figure 3*Normality test for the Jordan index return series for the period from 01-01-2017 to 31-12-2022*



Source : Prepared by the researcher based on the study data

From the **figure 3** shows that the smallest value in the time series was (4.586788) and the largest value was (2712601) and the average time series is equal to L (mean = 0.009576) and with a standard deviation equal to (-0.007697) and the value of the kewness coefficient is also shown to be negative, which is shown by the resulting value Thus, the curve is skewed to the left as for the Kurtosis 10.57284 > 3 fluctuation factor, which indicates that the single distribution of Leptokurtique, through the above shows that the return chain does not follow the normal distribution and this is a general advantage in financial time chains and this is shown by statistical value. (Jarque-bera = 0.00000) If we reject the hypothesis of nowhere and accept the alternative hypothesis that the return chain for an indicator does not follow a normal distribution

V. CONCLUSION

The hypothesis of efficiency is based on the basic pillars of rationality of investors and the lack of correlation between their mistakes in addition to the opportunity of limited arbitration, so that it is sufficient to provide one pillar to achieve the specific presumption of efficiency, pricing efficiency, which knows the speed with which new information reaches all customers in the market - without interval and does not incur high costs. This makes stock prices a mirror that reflects all available information so that dealing in the market becomes fair game. Financial markets are characterized by three efficiency formats and are determined based on available information : weak formula, semi-strong formula and strong formula, In this study, we used the contrast ratio, self-correlation test, autonomy test, natural distribution test, and stability test to evaluate the Jordan

Stock Exchange's efficiency at a low level. The following are the key findings :

- The prices of the Jordan Stock Market Index are not normally distributed, that is, they do not follow a normal distribution.

-The investigation discovered that the series does not support the random walking theory as it is stable at the level of any integrated degree I (0).

-The autonomy and contrast ratio tests demonstrated that the return chain of the index deviates from a normal distribution.

-The general indicator of Jordan's inefficiency at the weak level was validated by the natural distribution test. Based on earlier findings, we accept the second.

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VII. Annex

1. BDS Test

BDS Test for AMGNRLX
Date: 04/12/23 Time: 11:43
Sample: 1/02/2017 12/29/2022
Included observations: 1455

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	0.034016	0.002517	13.51453	0.0000
3	0.059533	0.004001	14.88042	0.0000
4	0.074667	0.004766	15.66719	0.0000
5	0.082195	0.004970	16.53984	0.0000
6	0.084661	0.004795	17.65654	0.0000

Raw epsilon	0.639607		
Pairs within epsilon	1487960.	V-Statistic	0.703821
Triples within epsilon	1.67E+09	V-Statistic	0.543336

Dimension	C(m,n)	c(m,n)	C(1,n-(m-1))	c(1,n-(m-1))	c(1,n-(m-1))^k
2	557941.0	0.528915	742097.0	0.703491	0.494899
3	429294.0	0.407522	740956.0	0.703377	0.347989
4	336283.0	0.319668	740112.0	0.703545	0.245001
5	267173.0	0.254323	738885.0	0.703348	0.172128
6	215595.0	0.205509	737645.0	0.703138	0.120849

2. Autocorelation test

Date: 03/20/23 Time: 17:36
Sample: 1/02/2017 12/29/2022
Included observations: 1454

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.220	0.220	70.694	0.000
		2	0.080	0.033	79.947	0.000
		3	0.054	0.031	84.215	0.000
		4	0.105	0.089	100.31	0.000
		5	0.059	0.016	105.40	0.000
		6	-0.015	-0.044	105.75	0.000
		7	-0.016	-0.014	106.12	0.000
		8	0.031	0.032	107.57	0.000
		9	0.067	0.054	114.19	0.000
		10	0.017	-0.006	114.62	0.000
		11	0.024	0.022	115.49	0.000
		12	0.040	0.025	117.87	0.000
		13	0.016	-0.014	118.25	0.000
		14	0.001	-0.009	118.26	0.000
		15	-0.007	-0.006	118.32	0.000
		16	-0.012	-0.014	118.52	0.000
		17	0.011	0.015	118.72	0.000
		18	0.014	0.012	119.01	0.000
		19	0.019	0.017	119.57	0.000
		20	0.019	0.009	120.09	0.000
		21	0.006	-0.008	120.14	0.000
		22	0.051	0.048	124.00	0.000
		23	0.056	0.034	128.67	0.000
		24	0.004	-0.023	128.70	0.000
		25	-0.023	-0.025	129.50	0.000