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The Impact of New Information Regime on the Jakarta Stock Exchange

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Abstract

Stock market efficiency is an important concept, especially in understanding the working of the stock markets particularly in emerging stock market such as Indonesia. The efficiency of the emerging markets assumes greater importance as the trend of investments is accelerating in these markets as a result of regulatory reforms and removal of other barriers for international equity investments. This study provides empirical evidence on the impact of new information regime on the efficiency of the Jakarta Stock Exchange by using weak-form efficiency test. This study uses data from the returns series of the Composite Index and selected individual companies before regulation changes from 1991 to 1995 and after regulation changes from 1996 to 2004. This paper employs the BDS test, which is widely used to distinguish random independent and identically distributed error terms. Three variants of BDS were performed to evaluate weak-form efficiency namely: (i) the normalized BDS test, (ii) the BDS test under ARMA and (iii) the BDS test under EGARCH.

The findings indicate that in general and with exceptions the null hypothesis of independent and identically distributed (iid) error term is not rejected and insignificant at the 5% level on the Composite Index and individual companies before and after regulation changes and more prominent after the imposition of the new information regime. The results suggest that it is difficult to reject the random walk hypotheses for most of the return series after the regulatory reform. This result confirms that the market is weak-form efficient, except for daily and weekly returns before regulation changes and except for daily return after regulation changes. The results also implied that the new information regime have impacted on the Jakarta Stock Exchange by making it becoming more efficient.

Keywords: Weak-form EMH, the Jakarta Stock Exchanges, BDS Test, information regime.
JELClassifications Codes: G10, G14, and G18.

1. Introduction

Stock market efficiency is an important concept for understanding the working of the capital markets particularly in emerging stock market such as Indonesia. The efficiency of the emerging markets assumes greater importance as the trend of investments is accelerating in these markets as a result of regulatory reforms and removal of other barriers for the international equity investments. There is enough evidence concerning the validity of the weak-form efficient market hypothesis (EMH) with respect to developed and emerging stock markets of the world. The weak-form of the EMH postulates that successive one-period stock returns are independent and identically distributed (*iid*). This paper attempts to investigate the impact of new information regime on the Jakarta Stock Exchange by using the BDS weak-form efficiency test.

This paper used three different models of the BDS test namely the normalized BDS tests, the BDS test under ARMA and the BDS test under EGARCH as proposed by Brock et al. (1987) and Nelson (1991).

This rest of the paper is organized as follows. Section 2 overviews the efficiency evidence on the Indonesia market while section 3 describes the data collection procedure and methodology. Section 4 discusses the findings and section 5 concludes the paper.

2. Review of literature

Relatively few evidences were available evaluating the efficiency of the Jakarta Stock Exchange. Suad (1987) and Rusiti (1990) found that the market is fairly efficient in the weak sense. However, Suad (1990), Balsius (1993) and Agus (1995) found that the sufficient conditions for weak form of efficiency were not satisfied.

Further, Suad (1990) also investigated the semi strong form efficiency using earnings, additional issues, and new issues announcements. The general findings indicate that market is not efficient in semi-strong form. Further studies by Rusiti (1990), Muhammad (1993), Agus (1995), Mutamimah (1995), Untung, and Sidharta (1998) substantiated the findings of Fuad (1990). Endang (2000) found that the share price response to bond announcements produces an average excess return significantly different from zero while Eka (2000) found that the average abnormal return is significantly positive at pre-announcement date of merger and acquisitions.

In summary all the evidence leads to the conclusion that the Indonesian stock market is generally inefficient.

3. Data and Methodology

The data originates from official publications of the Jakarta Stock Exchange.

3.1. The Data set

The data sets used in this paper consists of daily, weekly, and monthly closing prices of the JSX Composite Index and selected individual companies before regulation changes from 1991 to 1995 and after regulation changes from 1996 to 2004. The data for the JSE Composite Index were extracted from the computer service of the JSX while JSX Daily Dairy and Companies' Annual Reports provide relevant data set for selected individual companies. The data set were divided into four categories. They are (a) the Composite Index before regulation changes from 1991 to 1995, (b) the Composite Index after regulation changes from 1996 to 2004, (c) the selected individual companies before regulation changes from 1991 to 1995 and (c) the selected individual companies after regulation

changes from 1996 to 2004. The individual company shares were more or less continuously listed in the JSX during the sample period. Companies were selected based on the following criteria; (i) each company must have 70% of traded prices recorded at the time of study, (ii) the companies were of Indonesian domiciled, (iii) the annual reports were publicly available, (iv) the companies have been listed for at least 5 years, (v) delisted, suspended and recently listed companies were excluded. 50 companies fulfil these criteria.

3.2. Methodology

3.2.1. Normalized BDS Test

The BDS statistic as suggested by Brock et al. (1987) provides a powerful test of long-run nonlinear dependence within times series based correlation dimension. For the sake of expository convenience, following Chappell (1999), the notion and construction of the test statistic is described as follows. Let X_t: t = 1, 2,. T denotes a sequence of scalar observations. Now form a sequence of (T-m+1) m dimensional vectors: $\{X_1^m, X_2^m, ..., X_{T-m+1}^m\}$, where $X_r^m = [X_r, X_{r-1}, .. ., X_{r-m-1}]$ and m is a positive integer such that $1 \leq m \leq T$. These vectors have been defined as m-histories. Let $C_{m,T}(\varepsilon)$ signifies the fraction of all m-histories in the sequence that are within a (Euclidian) distance of each other for some positive real number, $T_m = T - m + 1$. The quantity $C_{m,T}(\varepsilon)$ is defined as the correlation integral. Given these notions, the BDS statistic is constructed as:

$$W_{m,T}(\varepsilon) = \frac{\sqrt{T}[C_{m,T}(\varepsilon) - C_{1,T}(\varepsilon)^m]}{\sigma_{m,T}(\varepsilon)} \quad (1)$$

where $W_{m,T}(\varepsilon)$ is the BDS statistic, and $\sigma_{m,T}(\varepsilon)$ is an estimate of the standard deviation of $[C_{m,T}(\varepsilon) - C_{m,T}(\varepsilon)^m]$. T signifies the number of observations. The distribution of the $W_{m,T}(\varepsilon)$ statistic is asymptotically $N \sim (0, 1)$. Under the null hypothesis, the elements of the sequence of X_t are independently and identically distributed (*iid*).

3.2.2. The BDS Test under ARMA

This research also measures relationships between the days of the week, returns and volatility equations, by examining the day-of-the-week effect (an indirect test of weak form efficiency) on the JSX Composite Index and individual companies before and after regulation changes. To estimate the day of the week effect in the return series we run the following OLS equation:

$$R_t = a_M D_{M_t} + a_T D_{T_t} + a_W D_{W_t} + a_{TH} D_{TH_t} + a_F D_{F_t} + R_{t-1} + \varepsilon_t \quad (2)$$

where $D_{M_t}, D_{T_t}, D_{W_t}, D_{TH_t}, D_{F_t}$ are the dummy variables for Monday, Tuesday, Wednesday, Thursday, and Friday at time t. R_t is log return and R_{t-1} is the lag 1 of log return. Then the residual (ε_t) of the equation is tested again by the BDS test to examine whether they are independently and identically distributed (*iid*).

3.2.3. The BDS Test under EGARCH

The standard GARCH models assume that positive and negative error terms have a symmetric effect on volatility. In the other words, good and bad news have the same effect on the volatility based on this model. In practice this assumption is frequently violated, in particular by stock returns, in that the volatility increases more after bad news than after good news. This so called Leverage Effect appears firstly in Black (1976), who noted that: "a drop in the value of the firm will cause a negative return on its stock, and will usually increase the leverage of the stock. That there are rise in the debt-equity ratio will surely mean a rise in the volatility of the stock".

There has been growing evidence in the finance literature that financial asset returns exhibit nonlinearity, time-varying heteroscedasticity, volatility cluster and non-normality. To account for these conditions, an exponential generalized autoregressive conditional heteroscedasticity in a mean

(EGARCH-M) model as suggested by Nelson (1991) and tested the hypothesis of non linear independence in the standardized residuals using Brock, Dechart and Scheinkman (BDS) statistic proposed by Brock et al. (1987). The EGARCH-M model would capture the asymmetric impact of shocks on the volatility of stock returns and the BDS statistic applied on the standardized residuals would provide a formal test of *iid* (independently and identically distributed) assumptions. The EGARCH-M model to be fitted on the return series would be of the form:

$$\Delta \log P_t = \beta_0 + \sum_{i=1}^{n} \beta_i \Delta \log p_{t-i} + \gamma \sigma_t + \varepsilon_t \tag{3}$$

$$\varepsilon_t | \Omega | \sim (0, \sigma^2),$$

$$\log(\sigma^2) = \delta_0 + \delta_1 \frac{\varepsilon_{t-1}}{\sigma_{t-1}} + \delta_2 \frac{\varepsilon_{t-1}}{\sigma_{t-1}} + \Psi \sigma_{t-1}^2 \tag{4}$$

Equation (3) is the mean equation, which expresses stock return as a stable finite order autoregressive process augmented with a conditional standard deviation term. Equation (4) is the specification of the EGARCH model, which accounts for the asymmetric impact of shocks on the volatility of stock returns. The asymmetric impact is tested by hypothesizing that $\delta_2 \neq 0$, and the leverage effect is tested by the hypothesis that $\delta_2 < 0$.

4. The Findings

4.1. Descriptive Statistics

Table 1 (Panel A) presents the descriptive statistics for the Composite Index before regulation change. The Composite Index has a mean daily return of 0.03%, a mean weekly return of 0.14% and a mean monthly return of 0.51%. The corresponding values of the standard deviation were 0.0183, 0.0445 and 0.0990 respectively. Table 1 (Panel B) shows the descriptive statistics for the Composite Index after regulation changes. In contrast, the Composite Index has a mean return of 0.04% for daily, 0.19% for weekly, and 0.103% for monthly. The values of the standard deviation were 0.0090, 0.0279 and 0.0714 respectively

Panel C of Table 1 shows the daily stock returns of the selected 50 individual companies before regulation change which have mean values ranging from (0.35%) to 0% daily, from (1.66)% to 0.15% weekly, and from (0.728) % to 0.12% monthly. The standard deviations range from 0.0199 to 0.0986 for daily, from 0.0481 to 0.2150 for weekly and from 0.1053 to 0.4492 for monthly returns. Table 1 (Panel D) shows the mean of individual companies after regulation change which range from (0.15) % to 0.09 % daily, from (0.70) % to 0.41% weekly, and from (3.06) % to 1.77% monthly. The standard deviations range from 0.0141 to 0.0979 for daily, 0.0318 to 0.1896 for weekly, and from 0.0708 to 0.3701 for monthly.

Table 1: The Results of Descriptive Statistics

Panel A: the Composite Index before Regulation Change			
	Daily	**Weekly**	**Monthly**
Mean	0.0003	0.0014	0.0051
Median	0.0004	0.0016	0.0063
Maximum	0.1318	0.1880	0.2502
Minimum	-0.1273	-0.1785	-0.3786
Std. Dev.	0.0183	0.0445	0.0990
Panel B: the Composite Index after Regulation Change			
	Daily	**Weekly**	**Monthly**
Mean	0.0004	0.0019	0.0103
Median	0.0001	0.0016	0.0059
Maximum	0.0765	0.0994	0.1569
Minimum	-0.0598	-0.1474	-0.1888
Std. Dev.	0.0090	0.0279	0.0714
Panel C: the Individual Companies before Regulation Changes			
	Daily	**Weekly**	**Monthly**
Mean	-0.0035 to 0	-0.0166 to 0.0015	-0.0728 to 0.0012
Median	0 to 0	0 to 0	-0.0366 to0.0209
Maximum	0 to 1.6094	0 to 1.6094	0.0000 to 1.6094
Minimum	-1.8192 to -0.2549	-1.8192 to -0.2336	-1.8192 to -0.3151
Std. Dev.	0.0199 to 0.0986	0.0481 to 0.2150	0.1053 to 0.4492
Panel D: the Individual Companies after Regulation Changes			
	Daily	**Weekly**	**Monthly**
Mean	-0.0015 to 0.0009	-0.0070 to 0.0041	-0.0306 to 0.0177
Median	0 to 0	0 to 0	0 to 0
Maximum	0.2151 to 2.9957	0.2513 to 2.8622	0.3054 to 2.8258
Minimum	-2.4365 to -0.2412	-2.4617 to -0.2007	-2.4849 to -0.2877
Std. Dev.	0.0141to 0.0979	0.0318 to 0.1896	0.0708 to 0.3701

The descriptive statistics indicate that monthly return is higher than weekly return and that the weekly return is higher than daily return. However, the corresponding risk measured in a monthly interval is higher than weekly interval and that the weekly risk measurement is higher than daily interval consistent with the higher risk and higher return concept.

4.2. Weak-Form Efficiency Test Results

The weak form efficiency test results are based upon three different methods of Brock, Dechart and Scheinkman tests; i) the normalized BDS test, ii) the BDS test under Auto Regressive Moving Average (ARMA) model and (iii) the BDS test under Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH). The results are divided in two sections; the first section examines the volatility of the Composite Index before regulation changes from 1991 to 1995 and after regulation changes from 1996 to 2004. The second section examines the individual companies before regulation changes from 1991 to 1995 and after regulation changes from 1996 to 2004 respectively.

4.2.1. The Normalized Brock, Dechart and Scheinkman (BDS) Test Results

(i) The Results on Composite Index before and after Regulation

Table 2 (Panel A and B) shows the normalized BDS test results on Composite Index both before and after regulation changes. In Table 2 (Panel A) presents the normalized BDS test results on Composite Index before regulation changes. The most of e/σ values and embedding m dimensions for daily and weekly returns rejected the null hypothesis of *iid.* The results indicate that the null hypothesis of *iid* is rejected and significant at the 5% level for values of e/σ and embedding dimensions m is examined for the daily and weekly returns. These findings indicate that the evidence does not support the random walk hypothesis for the daily and weekly returns which the market is the weak-form inefficient. Next, most of values e/σ and embedding m dimensions for monthly are not rejected the null hypothesis of *iid.* The results indicate that the null hypothesis of *iid* is not rejected for most of values e/σ and embedding m dimensions m was examined for the monthly returns.

Table 2: The Normalized BDS Test Results on Composite Index before and after Regulation Changes

Panel A: Before Regulation Changes (from 1991 to 1995)						
Companies	**ε/σ**	**Z Statistics Dimension**				
		2	**4**	**6**	**8**	**10**
Daily	1.5	14.90*	15.36*	15.10*	16.39*	18.17*
	1.0	15.31*	17.30*	19.20*	23.40*	29.60*
	0.75	14.89*	17.90*	22.00*	29.80*	41.84*
	0.5	13.90*	17.55*	23.80*	35.43*	55.61*
Weekly	1.5	0.13	1.02	1.52	1.82	2.46*
	1.0	1.05	2.08*	2.41*	2.30*	3.14*
	0.75	1.77	3.30*	4.10*	4.05*	5.37*
	0.5	2.68*	4.02*	4.18*	3.03*	1.94
Monthly	1.5	2.27*	3.18*	3.53*	2.99*	2.48*
	1.0	-0.42	1.57	1.18	2.33*	3.37*
	0.75	-0.98	-0.32	-1.46	-0.89	-0.51
	0.5	0.23	3.52	-1.68	-0.66	-0.36
Panel B After Regulation Changes (from 1996 to 2004)						
Companies	**ε/σ**	**Z Statistics Dimension**				
		2	**4**	**6**	**8**	**10**
Daily	1.5	14.76*	18.71*	21.16*	23.07*	25.66*
	1.0	13.86*	18.77*	22.33*	26.87*	34.03*
	0.75	13.11*	18.52*	22.99*	29.97*	42.31*
	0.5	12.12*	18.01*	24.17*	34.62*	53.97*
Weekly	1.5	0.97	1.78	2.20*	2.02*	1.98*
	1.0	0.80	1.45	2.14	1.69	0.84
	0.75	0.60	1.22	1.47	3.51*	8.35*
	0.5	1.24	-0.77	-0.54	-0.44	-4.22*
Monthly	1.5	0.79	1.80	2.46*	2.97*	2.91*
	1.0	1.03	1.02	1.41	1.98*	2.26*
	0.75	1.26	0.63	0.69	1.29	0.85
	0.5	-0.03	0.68	1.41	3.13*	-0.85

Note: * Significance at the 5% level

The results corroborate the random walk hypothesis and the market is the weak-form efficient. Table 3 (Panel B) shows the normalized BDS test results on Composite Index after regulation changes. All values of e/σ and embedding m dimensions for daily returns rejected the null hypothesis of *iid.*

The results indicate that the null hypothesis of *iid* is rejected and significant at the 5% level for all values of e/σ and embedding dimensions m is examined for the daily. Next, most values e/σ and embedding m dimensions for weekly and monthly returns do not reject the null hypothesis of *iid*. The results indicate that the null hypothesis of *iid* is not rejected for most of values e/σ and embedding m dimensions m are examined for the weekly and monthly returns. These indicate that the evidence supports the random walk theory and the market is weak-form efficiency for weekly and monthly returns. These results conclude that the Jakarta stock exchange is weak-form efficient on composite index before regulation changes for monthly return. However, that the Jakarta stock exchange is marginally weak-form efficient on composite index after regulation changes for weekly and monthly returns.

(ii) The Results on Individual Companies before and after Regulation Changes

The normalized BDS Tests results are reported for stock returns series on individual companies before and after regulation. Most of values the BDS test results indicate that the null hypothesis of *iid* is rejected and significant at the 5% level for values of e/σ and embedding dimensions m on dual companies before regulation changes for return series, except for monthly returns.

Table 3: The number of Companies which accepted the Null Hypothesis using Normalized BDS Test on Individual Companies after and before Regulation Changes

Panel A: Individual Companies before Regulation Changes N=50		
Accepted H_0: RW	**Quantity**	**%**
Daily	10	20
Weekly	19	38
Monthly	35	70
Panel B: Individual Companies after Regulation Changes N = 50		
Accepted H_0: RW	**Quantity**	**%**
Daily	11	22
Weekly	31	62
Monthly	40	80

Next, most of the BDS test results indicate that the null hypothesis of *iid* are not rejected and insignificant at the 5% level after regulation changes for all return series except for daily returns. The findings support the random walk hypothesis and the market is in general weak-form efficient for all return series, except for daily and weekly returns on individual companies before regulation change and for daily returns after regulation changes. Table 3 (Panel A) shows the number of individual companies before regulation changes where the null hypothesis of *iid* and insignificant at the 5% level are accepted; there are 10 companies (20%) for daily, 19 companies (38%) for weekly and 35 companies (70%) for monthly returns. These results indicate that majority of individual companies do not follow of the random walk hypothesis and the market is the weak-form inefficient for all series except for monthly returns. Table 3 (Panel B) presents the number of individual companies after regulation changes where the null hypothesis of *iid* and significant at the 5% level are accepted; there are 11 companies (22%) for daily, 31 companies (62%) for weekly and 40 companies (80%) for monthly returns. These results indicate that majority of individual companies follow the random walk hypothesis and the market is weak-form efficiency for all series except for daily returns.

It's implies that the Jakarta stock exchange is weak-form efficient before regulation changes for monthly returns. However, that the Jakarta stock exchange is marginally weak-form efficient after regulation changes for weekly and monthly returns

4.2.2. The Brock, Dechart and Scheinkman (BDS) Test Results under Auto Regressive Moving Average (ARMA)

The results of the Brock, Dechart and Scheinkman (BDS) test under Auto Regressive Moving Average (ARMA) are divided in two sections. The first section examines the day of the week effect of return of the Composite Index before and after regulation changes. The second section tests the individual companies before and after regulation changes for daily returns.

(i) The Results on Composite Index before and after Regulation Changes

The BDS tests under ARMA results on the Composite Index before and after regulation changes are reported in Table 4. Table 4 shows that the coefficients in the equations are significant for lag 1 return at the 1% level on Composite Index before regulation changes. Then, the results are significant at the 5% level for Monday, Friday and lag 1 return at the 1% level on Composite Index after regulation changes.

Table 4: The Results of Day of the Week and lag 1 Returns Effect using ARMA Model on Composite Index

Variables	Before Regulation Changes		After Regulation Changes	
	Coefficient	t-Statistic	Coefficient	t-Statistic
D_M	-0.0014	-1.6712	-0.0035	-2.8634***
D_T	0.0000	0.0567	-0.0012	-1.0177
D_W	0.0005	0.5563	-0.0017	-1.3708
D_{Th}	0.0009	1.1357	-0.0010	-0.7890
D_F	0.0003	0.4384	0.0017	1.9792**
$R_{(t-1)}$	0.3297	11.4681***	0.1844	8.7964***
Adj R^2	0.1112		0.0353	
S.E.	0.0085		0.0179	
D.W	2.0595		1.9927	
F-statistic	28.1193***		17.0778***	

Note: * **Significance at the 5% level

The values of *Adj* R^2 and the standard error of equation ARMA are very small, and the F statistics are significant at the 1 % level on Composite Index before and after regulation changes. Next the residual (ε_t) of the equation is tested again by the BDS test to examine if it is independently and identically distributed (*iid*).

Table 5 presents the BDS test results under ARMA where results indicate that the null hypotheses of *iid* and significant at the 5% level are rejected on Composite Index before and after regulation changes for daily returns. These results indicate that there is no *iid* in the series, it does not support the random walk and the market is weak-form inefficient. These finding implies that the Jakarta stock exchange is not weak-form efficient.

Table 5: The BDS Test Results under ARMA on Composite Index before and after Regulation Changes

Panel A Before Regulation Changes (from 1991 to 1995)						
		Z Statistics Dimension				
Companies	ε/σ	2	4	6	8	10
Daily	1.5	10.33*	14.08*	18.00*	24.24*	31.54*
	1.0	10.53*	13.59*	15.63*	19.15*	23.28*
	0.75	10.38*	14.10*	17.62*	23.33*	30.63*
	0.5	9.74*	14.02*	19.04*	26.43*	34.82*
Panel B After Regulation Changes (from 1996 to 2004)						
		Z Statistics Dimension				
Companies	ε/σ	2	4	6	8	10
Daily	1.5	15.92*	20.14*	22.70*	25.03*	27.99*
	1.0	14.82*	19.85*	23.70*	28.86*	36.60*
	0.75	13.70*	19.20*	24.03*	31.81*	44.90*
	0.5	12.43*	18.08*	24.63*	36.59*	56.41*

Note: * Significance at the 5% level

(ii) The Results on individual Companies before and after Regulation Changes

The results relating to the BDS test under ARMA model on individual companies before and after regulation changes. A few values of the BDS test results indicate that the null hypotheses of *iid* and insignificant at the 5% level are not rejected for all of values e/σ and embedding dimensions m on individual companies before and after regulation changes.

Table 6: The Number of Companies which the Null Hypothesis *iid* are accepted using BDS test under ARMA Equation before and after Regulation

Panel A: Individual Companies before Regulation Changes N=50		
Accepted H_0: RW	**Quantity**	**%**
Daily	9	18
Panel B: Individual Companies after Regulation Changes N = 50		
Accepted H_0: RW	**Quantity**	**%**
Daily	10	20

Table 6 (Panel A) shows the number of individual companies before regulation changes where the null hypotheses of *iid* and insignificant at the 5% level are accepted; there are 9 companies (18%). Table 6 (Panel B) presents the number of individual companies which the null hypotheses of *iid* and insignificant at the 5% level are accepted; there are 10 companies (20%) for after regulation changes. These results indicate that they do not follow of random walk theory and the market is the weak-form inefficient for both before and after regulation changes. It's implies that the Jakarta stock exchange is not weak-form efficient.

4.2.3. The Brock, Dechart and Scheinkman (BDS) Test Results under Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH)

The Brock, Dechart and Scheinkman (BDS) test results under Exponential Generalized Autoregressive Conditional Hetoroscedasticity (EGARCH) model are divided in two sections. The first section examines independently and identically distributed (*iid*) of the returns on Composite Index before and after regulation changes. The second section tests the individual companies before and after regulation changes for all return series.

(i) The Results on Composite Index before and after Regulation Changes

The BDS tests under EGARCH results on Composite Index before and after regulation changes are reported in Table 7.

Table 7: The Results of Parameter Estimation EGARCH Model on Composite Index before and after Regulation Changes

Panel A Before Regulation Changes (from 1991 to 1995)								
Times	**Const**	**Variance equation**				**Adj R^2**	**S.E**	**DW**
		C	δ_1	δ_2	Ψ			
Daily	0.00	-5.60 ***	0.60***	0.03	0.46	-0.01	0.01	1.33
Z Statistics	(-1.62)	(-11.03)	(13.77)	(1.00)	(8.95)			
Weekly	0.00	-6.76	-0.03	0.03	0.05	-0.02	0.03	1.66
Z Statistics	(0.82)	(-0.37)	(-0.14)	(0.31)	0.02			
Monthly	0.01	-1.32	0.11	0.05	0.78***	-0.09	0.07	1.51
Z Statistics	(1.50)	(-0.72)	(0.34)	(0.29)	(2.43)			
Panel B After Regulation Changes (from 1996 to 2004)								
Times	**Const**	**Variance equation**				**Adj R^2**	**S.E**	**DW**
		C	δ_1	δ_2	Ψ			
Daily	0.001**	-0.42***	0.25***	-0.04***	0.97***	-0.002	0.02	1.63
Z Statistics	(2.15)	-12.39	(18.52)	(-6.53)	(278.03)			
Weekly	0.003***	-0.32***	0.19***	-0.07***	0.97***	-0.01	0.04	2.07
Z Statistics	2.30	-5.00	5.25	-3.58	117.50			
Monthly	0.005	-0.66	0.03	-0.15	0.86***	-0.04	0.10	1.73
Z Statistics	0.51	-1.31	0.21	-1.24	9.99			

Note: ** Denotes significance at the 5% level and *** denotes significance at the 1% level.

Table 7 (Panel A) shows the BDS test results under EGARCH on Composite Index before regulation changes. The constant terms and the values of the arch parameters (δ_1) are insignificant at the 1% level for all series returns, except for daily returns. This indicates the presence of conditional heteroscedasticity for daily returns. The asymmetry coefficient (δ_2) is insignificant at the 1% level for all series returns. The garch parameter (Ψ) is positive and insignificant at the 1% level for all series returns, except for monthly returns. The sizes of the Garch parameter (Ψ) are 0.46 for daily, 0.05 for weekly and 0.78 for monthly. Table 7 (Panel B) presents the BDS test results under EGARCH on Composite Index after regulation changes.

Table 8: The BDS Test Results under EGARCH on Composite Index before and after Regulation Changes

Panel A Before Regulation Changes (from 1991 to 1995)						
Companies	**ε/σ**	**Z Statistics Dimension**				
		2	**4**	**6**	**8**	**10**
Daily	1.5	5.97*	6.39*	6.52*	7.74*	8.91*
	1.0	6.50*	7.32*	8.17*	9.98*	11.85*
	0.75	6.49*	7.40*	8.73*	11.35*	13.35*
	0.5	6.25*	7.30*	8.54*	10.93*	10.23*
Weekly	1.5	0.22	1.03	1.56	1.85	2.53*
	1.0	1.14	2.12*	2.45*	2.34*	3.14*
	0.75	1.81	3.35*	3.88*	3.08*	3.21*
	0.5	2.67*	4.02*	4.12*	3.07*	1.97*
Monthly	1.5	-0.40	0.58	0.71	0.22	-0.73
	1.0	-1.86	-0.27	-0.18	1.42	-0.84
	0.75	-0.50	0.66	-1.70	-1.20	-0.78
	0.5	-2.20*	2.34*	-2.43*	-1.02	-0.65
Panel B After Regulation Changes (from 1996 to 2004)						
Companies	**ε/σ**	**Z Statistics Dimension**				
		2	**4**	**6**	**8**	**10**
Daily	1.5	5.75*	5.18*	4.17*	3.18*	2.61*
	1.0	5.06*	4.55*	3.42*	2.36*	1.88
	0.75	4.48*	3.92*	2.77*	1.83	1.22
	0.5	3.98*	3.33*	2.29*	2.80*	2.58*
Weekly	1.5	1.63	1.29	1.19	0.81	0.52
	1.0	0.98	0.78	0.71	0.42	-0.46
	0.75	0.68	0.53	0.53	-0.46	-1.35
	0.5	0.63	0.65	1.42	-1.33	-2.82*
Monthly	1.5	0.02	-0.23	0.38	1.01	0.97
	1.0	0.20	-0.20	-0.37	0.06	0.40
	0.75	0.54	-0.22	0.11	1.74	1.42
	0.5	-0.64	-1.16	-0.59	-1.79	-1.15

Note: * Significance at the 5% level

The constant terms, the values of the arch parameters (δ_1) and the asymmetry coefficient (δ_2) are significant at the 1% level for all series returns, except for monthly returns. This indicates the presence of conditional heteroscedasticity for daily and weekly returns. The garch parameter (Ψ) is positive and significant at the 1% level for all returns series. The sizes of the garch parameter (Ψ) are 0.97 for daily, 0.97 for weekly and 0.86 for monthly.

Then, the drawback residual of the equation is tested again by the BDS test to examine independently and identically distributed (*iid*) on Composite Index before and after regulation changes are shown in Table 8. Table 8 (Panel A) shows the BDS test results on Composite Index before regulation. The results show that the null hypotheses of independently and identically distributed changes (*iid*) and significant at the 5 % level are rejected for all the series except for monthly returns. This evidence indicates that these series do not follow the random walk hypothesis and the market is weak-form inefficient except for monthly returns.

Next, the BDS test results on Composite Index after regulation changes can be shown in Table 8 (Panel B). Table 8 (Panel B) shows that the null hypotheses of independently and identically distributed changes (*iid*) and insignificant at the 5 % level are not rejected for all the series except for

daily returns. This result indicates that these series can follow the random walk hypothesis and the market is weak-form efficiency for all series except for daily returns. These results conclude that the Jakarta stock exchange is weak-form efficient on Composite Index before regulation changes for daily returns. However, that the Jakarta stock exchanges is marginally weak-form efficient after regulation changes for weekly and monthly returns

(ii) The Results on individual Companies before and after Regulation Changes

The results relating to the BDS test under EGARCH model on individual companies before and after regulation changes. The most of the BDS test results on individual companies before regulation are rejected the null hypothesis. The results show that the null hypothesis of *iid* and significant at the 5% level are rejected for all return series except for monthly returns. The most of the BDS test results on individual companies after regulation changes show that the null hypothesis of *iid* and insignificant at the 5% level are not rejected for all return series except for daily returns. Table 9 shows the number of individual companies before and after regulation changes that the null hypothesis *iid* and insignificant at the 5% level are not rejected.

Table 9: The number of Companies which accepted the Null Hypothesis of *iid* for the BDS Test under EGARCH

Panel A: Individual Companies before Regulation Changes N=50		
Accepted H_0: RW	**Quantity**	**%**
Daily	11	22
Weekly	17	34
Monthly	36	72
Panel B: Individual Companies after Regulation Changes N = 50		
Accepted H_0: RW	**Quantity**	**%**
Daily	13	26
Weekly	29	58
Monthly	41	82

Table 9 (Panel A) shows the number of individual companies before regulation changes that the null hypothesis *iid* and insignificant at 5% level are accepted; there are 11 companies (22%) for daily returns, 17 companies (34%) for weekly returns and 36 companies (72%) for monthly returns. In Table 10 (Panel B) shows dual listed companies after regulation changes that the null hypothesis *iid* and results are insignificant at 5% level are accepted; there are 13 companies (26%) for daily returns, 29 companies (58%) for weekly returns and 41 companies (82%) for monthly returns respectively.

These results indicate that the majority of individual before regulation changes do not follow of the random walk and the market is weak-form inefficiency for all series except for those on monthly returns. However, these results indicate that the majority of individual companies after regulation changes follow the random walk hypotheses for all series except for daily returns and the market is the weak-form efficient. It's implies that the Jakarta stock exchange is weak-form efficient before regulation changes for monthly returns. However, that the Jakarta stock exchange is marginally weak-form efficient after regulation changes for weekly and monthly returns

5. Conclusion

This section summarised the conclusions and implications of the study. The main objective of this study is to investigate the behaviour of stock prices in the Jakarta stock market before and after the imposition of the new information regime. The issue is analysed from the perspective of the weak-form efficiency. This study covers a four-year period from 1991 to 1995 which involved the Composite Index and 50 selected individual companies before regulation changes and a nine-year period from 1996 to 2004 for the Composite Index and individual companies after regulation changes for three different returns series namely daily, weekly and monthly returns.

Three different test procedures are employed to test the weak-from efficiency namely: i) the normalized BDS test ii) the BDS test under ARMA and iii) the BDS test under EGARCH,

The findings on the weak-form efficiency suggest that the BDS test results on the Composite Index and individual companies before regulation changes from 1991 to 1995 rejected the random walk hypothesis except for monthly returns. However, the results of the BDS test on Composite Index and individual companies after regulation changes from1996 to 2004 do not reject the random walk hypothesis except for daily returns. Based upon the evidence, the results suggest that the Indonesian stock market is weak-form efficient after the imposition of the new information regime.

The findings of the study have a number of implications. For, the researchers, the study has shown that over an extended and comprehensive period of study and with a information regime that promotes transparency, in general, the behaviour of the Indonesian stock market more or less mirrors the general behaviour of the developed securities markets. More deregulation and more disclosures might make the market prices reflect real values of companies listed on the Indonesian stock market.

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