



## Apakah Pasar Indonesia Efisien Pada Peristiwa Pengumuman OJK Tentang Perdagangan Karbon Pada Perusahaan IDX80?

### *Are The Indonesian Markets Efficient in Events OJK Announcement Regarding Trade Carbon On The IDX80 Company?*

Luluk Rohmah<sup>1</sup>, Vivi Ariyani<sup>2</sup>

<sup>1,2</sup> Fakultas Bisnis, Universitas Katolik Widya Mandala Surabaya Kampus Kota Madiun  
Jl. Lenteng Agung Raya No. 56, Jakarta Selatan, 12810, Indonesia

\*Corresponding author: [vivi.ariyani@ukwms.ac.id](mailto:vivi.ariyani@ukwms.ac.id)

#### ABSTRAK

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Penelitian ini bertujuan untuk menganalisis perbedaan reaksi pasar pada pengumuman peraturan OJK tentang perdagangan karbon di Indonesia untuk membuktikan pengujian pasar efisien di pasar Indonesia. Sampel yang digunakan dalam penelitian ini sebanyak 75 perusahaan yang terdaftar dalam IDX80 pada tanggal 23 september 2023 yang dipilih berdasarkan teknik purposive sampling. Data yang digunakan adalah data sekunder berupa harga saham dan volume perdagangan harian lima hari sebelum dan lima hari sesudah peristiwa pengumuman peraturan OJK tentang perdagangan karbon di Indonesia. Hasil penelitian menjelaskan bahwa pasar Indonesia dengan adanya pengumuman perdagangan karbon adalah efisien di hari ke-1 sebelum pengumuman, hari peristiwa pengumuman, hari ke+4 dan ke+5 setelah pengumuman. Dikuatkan dengan pengujian hipotesis uji beda dengan paired sample t-test yang menunjukkan bahwa: (1) terdapat perbedaan signifikan abnormal return pada hari ke-2, ke-4, ke-5 sebelum pengumuman dan hari ke+4, ke+5 sesudah pengumuman. (2) terdapat perbedaan signifikan trading volume activity pada hari ke-1 sebelum pengumuman dan hari ke+1, ke+2, ke+3, ke+5 sesudah pengumuman peraturan OJK tentang perdagangan karbon di Indonesia pada saham yang terdaftar di IDX80.

**Kata Kunci:** Pasar efisien; pengumuman perdagangan karbon

#### ABSTRACT

*This research aims to analyze differences in market reactions to the announcement of OJK regulations regarding carbon trading in Indonesia to prove efficient market testing in the Indonesian market. The sample used in this research was 75 companies registered on IDX80 on September 23 2023 which were selected based on a purposive sampling technique. The data used is secondary data in the form of stock prices and daily trading volume five days before and five days after the announcement of OJK regulations regarding carbon trading in Indonesia. The research results explain that the Indonesian market with the announcement of carbon trading is efficient on the 1st day before the announcement, the day of the announcement, and the 4th and 5th days after the announcement. This is confirmed by testing the different test hypothesis with a paired sample t-test which shows that: (1) there is a significant difference in abnormal returns on the 2nd, 4th, 5th day before the announcement and the 4th, 5th day after the announcement. (2) there is a significant difference*

*in trading volume activity on the 1st day before the announcement and the +1st, +2nd, +3rd, +5th day after the announcement of OJK regulations regarding carbon trading in Indonesia on shares listed on IDX80.*

**Keywords:** *Efficient markets; carbon trading announcements*

## **1. INTRODUCTION**

The Financial Services Authority (OJK) announcement regarding carbon trading, according to Hartono (2017:609), is one of the government-related announcements that can influence the price of securities. The OJK issued a technical regulation under OJK Regulation No. 14 of 2023 concerning carbon trading through the carbon exchange (POJK 14/2023), accompanied by OJK Circular Letter No. 12/SEOJK.04/2023 on the procedures for conducting carbon trading through the carbon exchange (OJK, September 2023). With this regulation, companies are required to reduce greenhouse gas emissions in their operations, serving as information for stakeholders about the company's involvement in mitigating global warming.

Testing for the semi-strong form of market efficiency involves examining the information content to observe the market's reaction to a particular announcement. If the OJK announcement contains information (information content), the market is expected to react at the time the announcement is received, as stated by Jogiyanto (2017:643). The market reaction is indicated by a change in the price of the relevant securities. This reaction can be measured using returns as the value of price changes or by using abnormal returns. When abnormal returns are used, it implies that an announcement containing information will generate abnormal returns for the market. Conversely, announcements without information content will not produce abnormal returns. According to Jogiyanto (2017:609), if the market is efficient in its semi-strong form, no investor or group of investors can use publicly available information to earn abnormal profits over a long period. This indicates that in an efficient market, abnormal returns should not occur. This principle forms the main contribution of this study—that an efficient market is achieved when investors do not obtain abnormal returns. However, when investors do earn abnormal returns following an event, it signifies market inefficiency.

Previous studies by Manurung (2019) and Pratiwi (2020) found significant differences in abnormal returns before and after an event, suggesting that the market is efficient only on certain days, as abnormal returns were still observed before and after the event. In contrast, studies by Sunarga (2020) and Raya (2019) found no differences in abnormal returns before and after the event, indicating that investors still gained abnormal returns, and thus, the market had not yet achieved efficiency.

In this study, the author also employs trading volume activity (TVA) as an indicator providing information about the volume of shares traded. According to Suganda (2018:23), trading volume activity measures the ratio between the number of shares traded during a specific period and the total number of outstanding shares over the same period. In this context, TVA reflects how actively shares are traded in a given time frame following an announcement. High trading volume activity indicates a strong investor interest in purchasing shares, whereas low trading volume activity suggests a lack of investor enthusiasm. The purpose of this study is to analyze whether the Indonesian market is efficient in response to an event and to examine the differences in market reactions before and after the OJK announcement concerning carbon trading in Indonesia.

In the concept of an efficient market, past price movements of a security cannot be used to predict future price changes. Stock price fluctuations in an efficient market follow a random walk pattern, meaning that stock price estimation cannot be conducted solely by observing historical prices but must instead rely on all available and forthcoming information in the market. Information entering the market and related to a particular security may lead to a shift toward a new equilibrium price. If the market reacts quickly and accurately to incoming information and promptly establishes a new equilibrium price, such a market condition is referred to as an efficient market (Jogiyanto, 2017:60).

According to Jogiyanto (2017:667), abnormal return or excess return is the difference between the actual return realized and the expected return anticipated by investors. It can be calculated using the following formula:

$$RTNi,t = Ri,t - E(R)i,t$$

*Explanation :*

$RTNi,t$  : *abnormal return of security i during event period t*

$Ri,t$  : *actual (realized) return of security i during event period t*

$E(R)i,t$  : *expected return of security i during event period t*

Trading Volume Activity Trading is an indicator used to measure a stock's liquidity (Rori, Mangantar, & Maramis, 2021:853). The higher the TVA value, the more liquid the stock is considered to be. The balance between supply and demand for a stock can be observed through the development of its trading volume. An increase in trading volume indicates a rise in buying and selling activity on the exchange, which in turn can affect both stock prices and returns. TVA can be calculated using the following formula:

$$TVA = \frac{\sum \text{Saham } i \text{ yang diperdagangkan pada waktu } t}{\sum \text{Saham } i \text{ beredar waktu } t}$$

According to Hartono (2017:644), if an announcement contains information, the market is expected to react at the time the announcement is received. The market reaction is reflected through changes in the price of securities, which can be measured using abnormal returns. An event that carries information content will generate abnormal returns in the capital market. If the market reacts quickly and accurately to incoming information and immediately establishes a new equilibrium price, such a market condition is considered efficient.

Previous studies by Manurung (2019) and Pratiwi (2020) found significant differences in abnormal returns before and after an event. In contrast, studies by Sunarga (2020) and Raya (2020) found no significant differences in abnormal returns before and after the announced event. This suggests that market efficiency only occurs on certain days surrounding the event.

Similarly, studies by Pratiwi (2020), Haningrum and Sukoco (2021), and Sukoco et al. (2022) revealed significant differences in trading volume activity before and after the event. However, these findings are not consistent with those of Paramita (2019) and Laduny (2020), which reported no differences in trading volume activity before and after the event. This indicates that within event studies, certain days around the event period still exhibit market inefficiency, suggesting the need for further investigation into the causes of such inefficiencies during those specific days.

## 2. RESEARCH METHOD

The data required for this study consist of daily closing stock prices and trading volumes from 75 companies listed in the IDX 80 index that meet the research criteria, covering a period of five days before and five days after the event date of the OJK announcement regarding carbon trading in Indonesia. The data processing and analysis were conducted through the following stages:

- a. Calculating the actual (realized) return using the following formula (Jogiyanto, 2017:668):

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

Explanation :

$R_{i,t}$  : actual (realized) return of security  $i$  during event period  $t$

$P_{i,t}$  : closing price of security  $i$  during event period  $t$

$P_{i,t-1}$  : closing price of security  $i$  during event period  $t-1$

- b. Calculating the expected return using the market-adjusted model:

$$E(R_{i,t}) = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}}$$

Explanation :

$E(R_{i,t})$  : expected return of stock  $i$  on day  $t$

$IHSG_{i,t}$  : Jakarta Composite Index (IHSG) value for stock  $i$  on day  $t$

$IHSG_{i,t-1}$  : Jakarta Composite Index (IHSG) value for stock  $i$  on day  $t-1$

- c. Calculating the abnormal return using the following formula:

$$RTN_{i,t} = R_{i,t} - E(R)_{i,t}$$

Explanation :

$RTN$  : abnormal return of security  $i$  during event period  $t$

$R_{i,t}$  : actual (realized) return of security  $i$  during event period  $t$

$E(R)_{i,t}$  : expected return of security  $i$  during event period  $t$

- d. Calculating Trading Volume Activity (TVA) using the following formula:

$$TVA = \frac{\sum \text{Saham } i \text{ yang diperdagangkan pada waktu } t}{\sum \text{Saham } i \text{ beredar waktu } t}$$

After calculating TVA, the next step is to compute the Average Trading Volume Activity (ATVA) from all research samples for each observation period.

#### e. Testing Procedure

Descriptive statistical analysis is conducted to describe the characteristics of the data under study, as these characteristics influence the subsequent, more in-depth analysis. This is followed by a normality test to determine whether the data are normally distributed, using the Kolmogorov–Smirnov test with a significance level of 5% ( $\alpha = 0.05$ ).

This study employs hypothesis testing using the paired sample t-test if the data are normally distributed. However, if the data are not normally distributed, the Wilcoxon signed-rank test is used instead, with the same 5% significance level ( $\alpha = 0.05$ ). If the significance value is  $< 0.05$ , it indicates a significant difference in the average abnormal return and trading volume activity (TVA). Conversely, if the significance value is  $> 0.05$ , it means there is no significant difference in the average abnormal return and TVA.

### 3. RESULT AND DISCUSSION

#### A. Research findings

The market reaction test in this study was conducted using abnormal returns before and after the announcement. The data used consist of daily closing stock prices for the period of five days before and five days after the event — the announcement of the OJK regulation on carbon trading in Indonesia. The descriptive statistical data of abnormal returns were obtained by subtracting the expected return from the realized return.

**Tabel 1.** Results of Descriptive Statistical Test of Abnormal Return

	N	Minimum	Maximum	Mean	Std. Deviation
AR-5	75	-0,02	0,0912	0,008499	0,0223365
AR-4	75	-0,06	0,0901	0,004935	0,0213413
AR-3	75	-0,06	0,0425	0,000381	0,0197999
AR-2	75	-0,05	0,0771	0,008800	0,0207399
AR-1	75	-0,08	0,0433	-0,002987	0,0222855
ART0	75	-0,07	0,0922	-0,004844	0,0269498
AR+1	75	-0,04	0,1063	0,003929	0,0245781
AR+2	75	-0,06	0,0481	-0,001147	0,0189081
AR+3	75	-0,07	0,0824	0,001173	0,0226178
AR+4	75	-0,06	0,0396	-0,016297	0,0223423
AR+5	75	-0,09	0,0258	-0,018837	0,0254275

In Table 4.1, the results of the descriptive statistical analysis show that during the five days preceding the announcement of the OJK regulation on carbon trading (September 26, 2023), the minimum abnormal return value was -0.02, while the maximum value was 0.0912. The mean value was 0.008499, which is smaller than the standard deviation of 0.0223365, indicating a relatively large data deviation since the standard deviation exceeds the mean value. The smallest deviation occurred three days before the announcement, with a minimum value of -0.06, a maximum of 0.0425, and a mean of 0.000381, which is also smaller than the standard deviation of 0.0197999. Meanwhile, the largest data deviation occurred one day after the announcement of the OJK regulation on carbon trading, with a minimum value of -0.04, a maximum of 0.1063, and a mean of 0.003929, which is smaller than the standard deviation of 0.0245781. The smallest deviation after the event occurred two days following the announcement, where the minimum value was -0.06, the maximum was 0.0481, and the mean value was -0.001147, smaller than the standard deviation of 0.0189081. These findings indicate that there was a relatively large variation in the data, as reflected by the standard deviation values being greater than the mean in all observation periods.

**Table 2.** Results of Descriptive Statistical Test of Trading Volume Activity

	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>
TVA-5	75	0,00	0,0219	0,001981	0,0030213
TVA-4	75	0,01	0,0159	0,002260	0,0029651
TVA-3	75	0,01	0,0128	0,001872	0,0024044
TVA-2	75	0,00	0,0302	0,001939	0,0037589
TVA-1	75	0,01	0,0201	0,001896	0,0033084
TVAT0	75	0,01	0,0130	0,002076	0,0024112
TVA+1	75	0,00	0,0528	0,002229	0,0063710
TVA+2	75	0,01	0,0480	0,002056	0,0056479
TVA+3	75	0,01	0,0299	0,002024	0,0045820
TVA+4	75	0,01	0,0381	0,002336	0,0049393
TVA+5	75	0,01	0,0459	0,002731	0,0055323

In Table 4.2, the descriptive statistical analysis of Trading Volume Activity (TVA) shows that the average TVA decreased from five days before until three days after the announcement of the OJK regulation on carbon trading. It then increased two days before the announcement, decreased again one day before the event, and subsequently increased on the announcement day and continued to rise one day after the announcement. When comparing the mean and standard deviation values from five days before to five days after the announcement, all periods show data deviations, as indicated by the standard deviation values being greater than the mean. Specifically, five days before the announcement (September 26, 2023), the minimum TVA was 0.00, the maximum was 0.0219, and the mean was 0.001981, which is smaller than the standard deviation of 0.0030213. The smallest deviation occurred three days before the announcement, with a minimum of 0.01, a maximum of 0.0128, and a mean of 0.001872, smaller than the standard deviation of 0.0024044. Meanwhile, the largest data deviation occurred one day after the announcement, where the minimum was 0.00, the maximum was 0.0528, and the mean was 0.002229, which is smaller than the standard deviation of 0.0063710. Another large deviation was also observed five days after the announcement, with a minimum value of 0.01, a maximum of 0.0459, and a mean of 0.002731, again smaller than the standard deviation of 0.0055323. These results indicate that there was a relatively high degree of

data variability, as reflected by the standard deviation values being greater than the mean across all observation periods, suggesting inconsistent trading activity surrounding the event.

**Tabel 3.** Results of Normality Test Using Kolmogorov-Smirnov

Variabel	Sig
AAR Sebelum	0,200
AAR Sesudah	0,200
ATVA Sebelum	0,200
ATVA Sesudah	0,200

Based on the results presented in the normality test table, the significance values of the residual data for abnormal returns before and after the announcement of the OJK regulation on carbon trading in Indonesia were 0.200 and 0.200, respectively. Similarly, the significance values of the residual data for Trading Volume Activity (TVA) before and after the event were also 0.200 and 0.200, respectively. Since all significance values are greater than 0.05, it can be concluded that the residual data for both abnormal returns and TVA are normally distributed. Therefore, the hypothesis testing for normally distributed data is conducted using the paired sample t-test (difference test for two paired samples).

**Tabel 4.** Paired T-Test (AR)

		Paired Differences					
		Mean	Std Deviasi	Std. Error Mean	T	df	Sig
Pair 1	ART0, ART-5	-0,01334	0,04046	0,00467	-2,855	74	0,006
Pair 2	ART0, ART-4	-0,00977	0,03301	0,00381	-2,565	74	0,012
Pair 3	ART0, ART-2	-0,01364	0,03474	0,00401	-3,401	74	0,001
Pair 4	ART0, ART+4	0,01145	0,02886	0,00333	3,437	74	0,001
Pair 5	ART0, ART+5	0,01399	0,02914	0,00367	4,158	74	0,000

Based on Table 4, the results of the hypothesis testing using the paired sample t-test for the mean difference in abnormal returns before and after the announcement of the OJK regulation on carbon trading in Indonesia are as follows. In Pair 1 (ART<sub>0</sub>, ART<sub>-1</sub>), there is a significant difference indicated by a significance value of 0.006 < 0.05. In Pair 2 (ART<sub>0</sub>, ART<sub>-4</sub>), a significant difference is observed with a significance value of 0.012 < 0.05. In Pair 3 (ART<sub>0</sub>, ART<sub>-5</sub>), there is also a significant difference with a significance value of 0.006 < 0.05. In Pair 4 (ART<sub>0</sub>, ART<sub>+4</sub>), a significant difference is found with a significance value of 0.001 < 0.05. In Pair 5 (ART<sub>0</sub>, ART<sub>+5</sub>), a significant difference is also indicated with a significance value of 0.000 < 0.05. These results show that the first hypothesis (H<sub>1</sub>) is accepted, meaning that there are significant differences in abnormal returns on days -2, -4, and -5 before the announcement of the OJK regulation on carbon trading in Indonesia, as well as on days +4 and +5 after the announcement for stocks listed in the IDX80 index.

**Tabel 5.** Paired T-Test (TVA)

		Paired Differences					
		Mean	Std Deviasi	Std. Error Mean	T	df	Sig
Pair 1	TVAT0, TVAT-1	0,17226	0,69515	0,08027	2,146	74	0,035
Pair 2	TVAT0, TVAT+1	0,19572	0,65179	0,07577	2,583	73	0,012

Pair 3	TVAT <sub>0</sub> , TVAT+2	0,26283	0,79239	0,09150	2,873	74	0,005
Pair 4	TVAT <sub>0</sub> , TVAT+3	0,29120	0,81982	0,09467	3,076	74	0,003
Pair 5	TVAT <sub>0</sub> , TVAT+5	-0,16615	0,70384	0,08127	-2,044	74	0,044

Table 5 presents the results of the paired sample t-test comparing Trading Volume Activity (TVA) before and after the announcement of the OJK regulation on carbon trading in Indonesia. The results show that there is a significant difference in Pair 1 (TVAT<sub>0</sub>, TVAT<sub>-1</sub>) with a significance value of  $0.035 < 0.05$ , in Pair 2 (TVAT<sub>0</sub>, TVAT<sub>+1</sub>) with a significance value of  $0.012 < 0.05$ , in Pair 3 (TVAT<sub>0</sub>, TVAT<sub>+2</sub>) with a significance value of  $0.005 < 0.05$ , in Pair 4 (TVAT<sub>0</sub>, TVAT<sub>+3</sub>) with a significance value of  $0.003 < 0.05$ , and in Pair 5 (TVAT<sub>0</sub>, TVAT<sub>+5</sub>) with a significance value of  $0.044 < 0.05$ . These results indicate that the second hypothesis (H<sub>2</sub>) is accepted, meaning that there are significant differences in trading volume activity on one day before and on days +1, +2, +3, and +4 after the announcement of the OJK regulation on carbon trading in Indonesia for stocks listed in the IDX80 index.

## B. Discussion

In this study, the author examined the differences in market reactions among IDX80 companies in 2023 surrounding the announcement of the OJK regulation on carbon trading. The analysis was conducted by calculating the average abnormal return over a ten-day event window, covering five days before and five days after the announcement. The results show that the mean abnormal return during the five-day, four-day, three-day, and two-day periods before the announcement was positive, while after the announcement, the positive mean abnormal return occurred on the first and third days. The occurrence of abnormal returns indicates that the market was not efficient, in line with Jogiyanto (2017:667), who states that a market is considered inefficient when some investors can earn abnormal returns over a certain period.

Further analysis using the paired sample t-test revealed that the market reacted differently five, four, and two days before the announcement compared to the announcement day. These differences suggest that during the days leading up to the event, the market was not efficient, whereas on the announcement day, the market became efficient. This finding implies that there may have been information leakage prior to the announcement, allowing certain investors to gain profits from the advance information. However, on the day of the announcement itself, the market efficiently absorbed the information, preventing the occurrence of abnormal returns.

The next test showed that the market also reacted differently four and five days after the announcement compared to the announcement day. These results suggest that during those post-event days, the market remained inefficient, while on the announcement day, it was efficient. This indicates that the market reacted slowly in assimilating the new information, which allowed some investors to continue obtaining abnormal returns even after the announcement. These findings are supported by studies conducted by Fitriary et al. (2023), Rori et al. (2021), and Sukoco et al. (2020), which also reported significant differences in abnormal returns before and after certain announcement events.

In addition, this study analyzed the differences in market reaction based on Trading Volume Activity (TVA) for IDX80 companies in 2023 over the same observation period. The average TVA showed positive mean values from five days before to five days after the announcement of the OJK regulation on carbon trading. This indicates the presence of active trading behavior or abnormal trading volume, which also reflects a condition of market inefficiency, consistent with Jogiyanto (2017:667), who explained that a market is inefficient when investors can earn abnormal returns for an extended period.

The results of the paired sample t-test showed that the market reacted differently one day before the announcement compared to the announcement day, indicating a difference in market behavior between those two periods. Additionally, significant differences were found in market reactions on the first, second, third, and fifth days after the announcement compared to the event day (September 26, 2023). These findings indicate that the market exhibited different reactions during those days, as investors had already absorbed and responded to the information regarding the OJK regulation on carbon trading. In contrast, on the announcement day, investors were still in the process of interpreting and responding to the new information.

This result aligns with the findings of Haningrum et al. (2022), Pratiwi (2020), and Manurung (2019), all of which reported significant differences in trading volume activity before and after major

announcement events, confirming that market reactions tend to vary around informational events that affect investor behavior.

#### **4. CONCLUSION**

Based on the data analysis conducted to examine the differences in abnormal returns and trading volume activity (TVA) before and after the announcement of the OJK regulation on carbon trading in Indonesia for companies listed in the IDX80 during the September 2023 period, the following conclusions can be drawn: (1) There are significant differences in abnormal returns on days -2, -4, and -5 before the announcement of the OJK regulation on carbon trading in Indonesia. This indicates that the market was not efficient, as the presence of abnormal returns before the announcement suggests information leakage that allowed investors to gain profits prior to the official release. Furthermore, significant differences were also found on days +4 and +5 after the announcement for stocks listed in the IDX80. This shows that the market was still inefficient, as it reacted slowly in absorbing the new information, enabling investors to continue obtaining abnormal returns. (2) There are significant differences in trading volume activity on day -1 before the announcement, indicating a change in market reaction as investors began adjusting their trading behavior in anticipation of the event. In addition, significant differences in trading volume activity were also observed on days +1, +2, +3, and +5 after the announcement. This suggests that the market reacted actively following the release, as investors had absorbed and responded to the information contained in the OJK announcement regarding carbon trading in Indonesia.

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