



IDXCarbon Unleashed: An Event Study Analysis of Its Impact on the Indonesian Capital Market

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Abstract

The launch of the Indonesia Carbon Exchange (IDXCarbon) on September 26th, 2023, is an important milestone for Indonesia's decarbonization commitment towards Net Zero Emissions by 2060 or sooner. This paper aims to analyze the Indonesian capital market reaction to the announcement of the IDXCarbon. Using the event study approach and market model method, this study used 735 companies listed on the Indonesia Stock Exchange (IDX) which were then divided into eleven sectors. The sample period taken for the study was 30 days for the estimation window and 10 days for the event window. We estimate the cumulative abnormal return by summing the abnormal returns of the five days before and after the event. The results of this study showed that the Indonesian capital market reacted in different ways following the various event windows. The study found that basic materials and energy industries have been adversely impacted by the announcement of IDXCarbon. However, financial, healthcare, and properties & real estate industries responded positively to the announcement of IDXCarbon.

Keywords: abnormal return, capital market, carbon emission trading, event study, IDXCarbon.

JEL Classification: C20, G10, G14.

Introduction

In December 2015, President Jokowi participated in the UNFCCC COP21 Paris Climate Change Summit and declared Indonesia's pledge to decrease greenhouse gas (GHG) emissions by 29% by 2030 through internal initiatives, and potentially up to 41% with external aid and collaboration. The COP21 meeting in Paris ratified the Paris Agreement, establishing it as the legal framework for global climate change mitigation. The objective of the agreement is to limit the average temperature increase to a maximum of 2 degrees Celsius over the pre-Industrial Revolution temperature, with an additional aim of limiting the increase to no more than 1.5 degrees Celsius.

The launch of the Indonesia Carbon Exchange (IDXCarbon) is an important milestone for Indonesia's decarbonization commitment towards Net Zero Emissions by 2060 or sooner. Nations and territories like the European Union have

implemented carbon emission trading rights as a cost-effective method to efficiently decrease industrial pollution (Kaushal and Rosendahl, 2021). Carbon trading or carbon exchange is the buying and selling of credits for the emission of carbon dioxide or greenhouse gases. Companies that can reduce emissions can sell carbon credits to companies that exceed emission limits. IDXCarbon strives to provide transparency, reliability, and security in providing the best solution for carbon trading in Indonesia to create orderly, fair, and efficient trading.

On September 26th, 2023, IDXCarbon was officially launched nationwide. On the first day of the launch, 13 transactions were made, totaling 459,914 metric tons of CO₂ equivalent. The unit price for these transactions was approximately USD 4.51. State-owned enterprises dominated these transactions, showing great enthusiasm. However, lessons from other emissions trading systems, like China's, indicate that it typically takes nearly a decade to establish a robust and mature market ecosystem¹. The extensive magnitude of carbon trading offers opportunities for the development of emerging low-carbon technologies and innovative businesses. These emerging companies have the potential to acquire a competitive advantage by leveraging innovative technologies and environmentally friendly products to decrease carbon emissions. Several studies examine the connections between carbon emission trading regimes and companies' performances. Empirical data demonstrates that the adoption of carbon emissions trading regulations has resulted in enhanced profitability and decreased debt burden for firms (Wang et al., 2022). Additional research has demonstrated that the implementation of carbon emission trading policies contributes to the high-quality development of exporting companies (Liu and Li, 2022).

According to Wicaksono et al. (2022), information on the presence of a new policy or regulation is very influential on capital market activity because investors tend to take measures to make investment decisions based on the phenomena that occur. In other words, investment decisions made by investors are a reaction to the information they receive and an event that occurs can affect their investment decisions. The announcement of the launch of IDXCarbon is one of the important information that can trigger market reactions. If information or an event has significant information content, the market could react when the announcement of the information reaches it, which is marked by a change in the price of the security in question (Jogiyanto, 2017). There is a theoretical link between the stock market and the carbon emission trading market (Jiménez-Rodríguez, 2019; Wen et al., 2020). Considerable efforts have been made to examine the correlation between

the two markets (Fan and Todorova, 2017; Ji et al., 2019; Kumar et al., 2012; Oberndorfer, 2009).

Hence, the primary objective of this research is to examine the response of the capital market in the Indonesia Stock Exchange following the introduction of the IDXCarbon. We employed an event study approach to analyze the Cumulative Abnormal Return (CAR) of industries that responded to the introduction of the IDXCarbon. The calculation is conducted collectively, or as a whole, using the entire sample inside the specified event window. After the announcement, the results of these statistical calculations can be used to identify if there is a reaction in the capital market, indicating the presence of information related to the event. This analysis specifically examined the potential for a favorable response in the capital market following the introduction of the IDXCarbon.

The rest of this paper is organized as follows. Section 2 presents the literature review, Section 3 outlines the sample and empirical method, Section 4 discusses the results, and Section 5 concludes the study.

Literature Review

The American scientist Dales presented the notion of carbon emissions trading in 1986, which was subsequently used for environmental regulation in other European countries. The signing of the Kyoto Protocol in 1997 provided greater clarity on the emission reduction obligations for each country, leading to increased attention and implementation of carbon emission trading policies. Indonesia has assumed the proactive global responsibility of mitigating carbon emissions and has pledged to decrease its overall carbon emissions by 29% by 2030 through domestic initiatives. Additionally, with international aid and collaboration, Indonesia aims to achieve a reduction of up to 41%.

The carbon trading policy is a form of tradable emission permit system, wherein each enterprise that releases pollutants is assigned a specific quantity of pollutant emission targets based on a predetermined method. These targets are utilized by the enterprises in accordance with their own pollutant emissions, and can be bought or sold in the market as per their requirements (Yang et al., 2021; Yang et al., 2022).

Carbon emissions trading is an institutional innovation that plays a crucial role in tackling climate change and attaining the objective of "carbon neutrality" (Fang et al., 2021; Li et al., 2022). Carbon emissions trading has received significant scholarly interest in recent years (He and Zhao, 2023; Zhang and Wu, 2022). Carbon emissions trading is widely regarded as an essential policy

instrument for tackling climate change and mitigating greenhouse gas emissions, as established by prior studies (Düerkop, 1994). Prior research has primarily concentrated on the ecological advantages of carbon emissions trading, resulting in a plethora of discoveries (Aihua et al., 2022; Changsong et al., 2020). Wu et al. (2023) employed a comprehensive control approach to identify the impact of carbon emissions trading schemes on CO₂ efficiency in the steel industry. A study revealed a 5% enhancement in the efficiency of CO₂ emissions in the pilot provinces of China's carbon emissions trading program. This finding serves as evidence of the efficacy of carbon emissions trading in curbing emissions and attaining environmental objectives.

The research largely centers on assessing the efficacy of carbon emissions trading policies and the factors that influence them. The focus is on the drivers, trading systems, and trading effects of carbon emissions trading. The economic drivers of developing carbon emissions trading are analyzed in studies that draw on economic externality theory (Hu et al., 2023), economic efficiency theory (Wang et al., 2022; Zhao et al., 2017), and sustainable development theory (Pan et al., 2020; Tsai et al., 2022). These studies also examine the equal importance of environmental protection and economic development as direct drivers of carbon emissions trading during economic transition. Nevertheless, the practice of trading carbon emissions will have an impact on and modify several parts of socio-economic structures (Leimbach and Toth, 2003; Shaheen et al., 2019). The effect mechanism of carbon emissions trading is a complex and non-linear process. Dissanayake et al. (2020) describe it as a growth model that combines different factors to achieve sustainable economic development while considering ecological and environmental aspects. This model involves the introduction of carbon emissions trading pilot policies, which stimulate technological innovation, improve industrial structure, and create synergistic effects with other environmental policies. The primary focus of carbon emissions trading is on elements such as the green total factor productivity of firms (Shao et al., 2023), the attainment of regional "carbon neutrality" objectives (Li and Wang, 2022), and energy efficiency (Hong et al., 2022).

Positive news or information can significantly influence stock trading in a favorable manner, whereas negative news or information can lead to stock market outflows, resulting in a detrimental impact (Hong, 2016). Investors have a somewhat prompt response to negative information in comparison to favorable information (Yasar et al., 2020). The Efficient Market Hypothesis (EMH) posits that investors promptly reassess and adjust their expectations, make judgements,

and take immediate actions in response to newly available information (Fama, 1965). The dissemination of the recently revealed information may elicit an exaggerated response from the general public, leading investors to divest themselves of certain shares and acquire others that they see as more advantageous in order to achieve a more balanced portfolio (Bondt and Thaler, 1985; Brown and Warner, 1985). These reactions have the potential to induce volatility in stock prices. Several empirical studies have been carried out, and their findings indicate a connection between the capital market and occurrences such as warfare, politics, social media content, religious events, and natural disasters (Kaplanski and Levy, 2010; Kollias et al., 2011; Liu and Zhang, 2015; Yousaf et al., 2022). Recent research investigating the pandemic's influence on stock performance has revealed that market volatility, driven by investor apprehension and pessimism on future earnings as a result of the Covid-19 pandemic, has had substantial and adverse economic consequences (He et al., 2020; Liu et al., 2020; Setiawan et al., 2021). Stock prices, according to Mehdian et al. (2008), describe past information, estimate future expectations, and respond instantly to newly received information. Stock prices may therefore be a good way to determine how the market will respond to new information.

The event study method is one approach that has been utilized to determine how the market would respond to information (Henderson, 1990). This approach involves calculating abnormal or excess returns and statistically analyzing them to find out how the capital market will respond to an event or the information it presents. An event study analyzes the response of the market to an event where information is made public through an announcement. This study can be utilized to evaluate an announcement's informational value as well as the market's semi-strong efficiency (Jogiyanto, 2017).

Methodology

Model

In this paper, we employed Event Study methodology to analyze the market response to the launch of IDXCarbon. There are three primary models used to calculate anomalous returns: the average adjusted return rate model, the market index adjusted return rate model, and the market model.

The average adjusted rate of return model exhibits significant variance in the presence of a bull or bear market on the event day (Klein and Rosenfeld, 1987). The market index-adjusted return model assumes a strong link, although this assumption is not valid in most circumstances (Huang and Li, 2018). Market

models are widely utilized and provide strong forecasting capabilities (Brenner, 1979). Abnormal returns can be computed using many models, with the market model being the most frequently employed (Henderson, 1990; Jogiyo, 2017; MacKinlay, 1997; Pacicco et al., 2018). This paper employed the market model, which is delineated as follows. Calculate the abnormal return:

$$AR_{i,t} = R_{i,t} - (\alpha_i + \beta_i R_{m,t}) + e_{i,t}$$

According to the above equation of the market model, the return depends on parameters α_i and β_i (which were estimated in the estimation period), and the market return parameter $R_{m,t}$ (Pacicco et al., 2018).

Calculate the cumulative abnormal rate of return:

$$CAR_{i(t_1,t_2)} = \sum_{t=t_1}^{t_2} AR_{i,t}$$

$CAR_{i(t_1,t_2)}$ is the cumulative abnormal return rate of stock i in the event window period (t_1, t_2) .

Event Window and Sample Selection

The event date for the opening of Indonesia Carbon Exchange (IDXCarbon) was set as September 26th, 2023, with the official inauguration by the President of the Republic of Indonesia, Joko Widodo. The designated time frame for estimation is a 30-day period preceding the event date, in order to prevent any potential interference or complications. Yahoo! Finance offers daily stock price data that has been adjusted for several factors. In order to be eligible for inclusion in the sample, a stock must have been officially listed and actively traded on the Indonesia Stock Exchange, and its trading activity must have been observed for a period of 30 days both before and after the event date. Subsequently, we employ the Indonesia Stock Exchange industry classification to categorize our sample and ascertain the market response of each industry. This classification system encompasses eleven industries: basic materials, consumer cyclical, consumer non-cyclical, energy, financial, healthcare, industrial infrastructure, properties & real estate, technology, and transportation & logistics. The final sample comprises 735 enterprises, with the bulk of listed firms belonging to the consumer cyclical sector, which represents around 15% of the entire sample. To calculate the cumulative abnormal return for each model, we add up the abnormal return for each event window. The event windows we consider are 5 days before and after the event, where 0 represents the event date. According to the null hypothesis, we assumed that the average cumulative anomalous return on the event date is exactly zero. Thus, t statistics are employed to examine whether the estimated cumulative abnormal returns (CARs) at specific time intervals are equivalent to zero.

Results and Discussion

Table 1 shows the impact of the IDXCarbon announcement on the market value of eleven industries in Indonesia. It can be seen from Table 1 that, on the day of the announcement, the cumulative abnormal return (CAR) of the basic materials, consumer non-cyclical, energy, and infrastructure industries all significantly declined. However, there is no significant impact on the seven remaining industries. Also from Table 1, interestingly, basic materials and energy industries are the most severely impacted by the various event windows because we thought that with the launching of IDXCarbon, companies from those industries would benefit more from it. On the other hand, the financial industry responded positively to the announcement of IDXCarbon as we can see from (-5, 0) and (-4, 0) with the average CAR values of 0.79% and 0.68%, respectively as well as after the event date (0, +3) with the highest average CAR values of 1.13%, due to some major financial companies becoming the first buyers in the first day of trading on the IDXCarbon exchange.²

The data shown in Table 2 indicates that the average CARs (Cumulative Abnormal Returns) for the healthcare and properties & real estate sectors remained positive and statistically significant prior to the announcement, with the exception of the industrial, technology, and transportation & logistics industries. We found a negative and significant impact in the infrastructure industry for the event windows (-1, 0) and (0, 0) with the average CAR values of -2.23% and -1.72%, respectively. Moreover, we also found a positive and significant CAR after the announcement (0, +3) and (0, +4) for the properties & real estate industry.

In summary, the Indonesian President's introduction of IDXCarbon has had a substantial economic influence on the capital market, as seen by the data presented in Tables 1 and 2. Basic materials and energy industries had a negative and significant impact on the announcement date while financial, healthcare, and properties & real estate industries responded positively to the announcement of IDXCarbon.

Table 1 reports the cumulative abnormal returns with various event windows. Numbers in parentheses are p-values for the test in which the mean is equal to zero. Continued Table 1 reports the cumulative abnormal returns with various event windows. Numbers in parentheses are p-values for the test in which the mean is equal to zero.

Table 1. Cumulative Abnormal Returns Around the Announcement Date (0,0)

Event Window	Full Sample n=735	Basic Materials n=87	Consumer Cyclical n=112	Consumer non-cyclical n=107	Energy n=69	Financial n=92
(-5,0)	0.00063 (0.261)	-0.00430 (0.402)	0.00494 (0.931)	0.00651** (0.049)	-0.04874*** (0.001)	0.00795*** (0.009)
(-4,0)	-0.00043 (0.697)	-0.00987* (0.073)	0.00953 (0.931)	0.00272 (0.121)	-0.04510*** (0.000)	0.00679** (0.029)
(-3,0)	-0.00139 (0.439)	-0.01142* (0.075)	0.00376 (0.449)	0.00180 (0.231)	-0.03935*** (0.001)	0.00277 (0.861)
(-2,0)	-0.00019 (0.979)	-0.00817 (0.141)	0.00183 (0.423)	0.00376* (0.082)	-0.03076*** (0.002)	0.00730 (0.776)
(-1,0)	-0.00505*** (0.006)	-0.00850* (0.060)	-0.00343 (0.347)	-0.00151 (0.789)	-0.02905*** (0.004)	0.00281 (0.711)
(0,0)	-0.00574*** (0.000)	-0.01113*** (0.003)	0.00107 (0.901)	-0.00657* (0.051)	-0.02724*** (0.000)	0.00031 (0.457)
(0,+1)	-0.00269** (0.018)	-0.00933*** (0.010)	0.00539 (0.259)	-0.00421 (0.267)	-0.01988** (0.023)	-0.00108 (0.836)
(0,+2)	-0.00052 (0.436)	-0.01331*** (0.010)	0.00481 (0.695)	-0.00462 (0.234)	-0.01824 (0.180)	0.00647 (0.124)
(0,+3)	0.00203 (0.553)	-0.02123*** (0.000)	0.00703 (0.774)	-0.00077 (0.872)	-0.02355** (0.021)	0.01133** (0.024)
(0,+4)	0.00037 (0.212)	-0.03145*** (0.000)	0.00770 (0.919)	0.00093 (0.792)	-0.03703*** (0.002)	0.01010* (0.087)
(0,+5)	-0.00735*** (0.000)	-0.03765*** (0.000)	0.00003 (0.156)	-0.00255* (0.061)	-0.05857*** (0.000)	0.00012 (0.898)

Source: Research findings.

Note: p-values are reported in parentheses, and *, **, and *** indicate significance at 1%, 5%, and 10% levels, respectively.

Continued Table 1. Cumulative Abnormal Returns Around the Announcement Date (0,0)

Event Window	Healthcare n=29	Industrial n=52	Infrastructure n=55	Properties & Real Estate n=65	Technology n=36	Transportation & Logistics n=31
(-5,0)	0.02629** (0.019)	0.00524 (0.455)	0.02605 (0.953)	0.00845 (0.148)	-0.01976 (0.626)	-0.00276 (0.873)
(-4,0)	0.02307** (0.041)	0.00567 (0.392)	0.02430 (0.795)	0.00442* (0.053)	-0.01867 (0.649)	-0.00787 (0.613)
(-3,0)	0.02352** (0.031)	0.00337 (0.597)	0.01556 (0.331)	0.00955** (0.040)	-0.00947 (0.514)	-0.00564 (0.678)
(-2,0)	0.01893** (0.012)	0.00840 (0.455)	0.00854 (0.639)	0.00580 (0.116)	-0.00076 (0.937)	-0.01248 (0.249)
(-1,0)	0.01516** (0.035)	0.01082 (0.489)	-0.02227*** (0.000)	-0.00375 (0.868)	-0.00109 (0.926)	-0.00564 (0.566)
(0,0)	0.00377 (0.524)	0.00487 (0.675)	-0.01718*** (0.007)	-0.00335 (0.435)	0.00152 (0.835)	-0.00230 (0.724)
(0,+1)	0.00091 (0.469)	-0.00312 (0.193)	-0.00336* (0.061)	0.00275 (0.635)	0.00953 (0.838)	-0.00149 (0.874)
(0,+2)	0.00464 (0.770)	-0.00269 (0.623)	-0.00051 (0.215)	0.01115 (0.208)	0.01387 (0.480)	0.00652 (0.507)
(0,+3)	0.01930 (0.940)	-0.00212 (0.548)	0.01349 (0.860)	0.01979** (0.046)	0.01077 (0.814)	0.01137 (0.330)
(0,+4)	0.03416 (0.642)	-0.00616 (0.536)	0.01304 (0.933)	0.02444** (0.026)	0.00849 (0.523)	0.01252 (0.117)
(0,+5)	0.03807 (0.347)	-0.01480 (0.330)	-0.00474 (0.157)	0.02842 (0.316)	0.00072 (0.509)	0.00735 (0.347)

Source: Research findings.

Note: ***, **, and * indicate significance at 1%, 5%, and 10% levels, respectively.

Conclusion

The establishment of the Indonesia Carbon Exchange (IDXCarbon) marks a significant achievement in Indonesia's efforts to reduce carbon emissions and achieve Net Zero Emissions by 2060 or before. This study investigates the performance of the Indonesian capital market during the initial phase of the announcement of IDXCarbon. In order to achieve this objective, we utilize Indonesian publicly traded companies and employ a conventional event study methodology to analyze the market response. Furthermore, we also assess whether there are variations in the market response among different industries. The current findings unequivocally demonstrate the contrasting market responses, both negative and positive, across numerous industries in anticipation of a new policy. In addition, basic materials and energy industries have negative reactions, while the finance, healthcare, and properties & real estate businesses demonstrate favorable reactions. Although this interpretation of our data is reasonable, there are two important considerations to keep in mind. Firstly, it is important to acknowledge that our empirical investigation is preliminary in nature and is based on a restricted amount of data. Specifically, due to our reliance on a single methodology for gauging anomalous returns, it is imperative to employ supplementary techniques in order to yield more resilient outcomes. Furthermore, state-owned and non-state-owned enterprises may elicit distinct responses from investors. Hence, it is crucial to determine whether the core attributes of a company can substantially impact the responses of investors, which is a pertinent inquiry for future research.

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