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The effect of Eurozone carbon futures price on stock market price performance

Abstract. the contemporary central role of carbon compliance in business operations on financial markets is garnering impetus with expansions in carbon compliance.

The objective of this paper is to examine the effect of Eurozone Carbon Futures Market (Carbon Emissions Futures [CFI2M5]) price on EU Stock Market (Euro Stoxx 50 - STOXX50E) Price Performance.

Problem statement. research on the interaction between the Carbon Emissions Futures Market and the financial market is growing with diversity of findings among researchers from different economic regions.

Purpose of the article. The goal of this article therefore is to evaluate whether the price of Carbon Futures market affects the price of conventional stock market, the magnitude and the direction of the impact.

Unresolved aspects of the problem. Existing gap in the problem is on the scarcity of focussed research on Carbon Futures price and Stock Market price within the Eurozone, which is the global pace setter of carbon market.

Presentation of the main material. Data for the analysis was collected over a period of 124 days between January and June 2025 for EU Carbon Futures (CFI2M5) and EU stock market (STOXX50E). The data was analysed using the simple regression model.

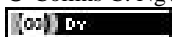
Conclusions. Findings show a P-value of 0.006, which is lower than the test alpha of 0.05 with regression coefficients of 9.977 which thus indicates a significant and positive relationship. This shows that a 1% increase in the EU Emissions Futures is likely to cause a 9.977 increase in the Euro Stoxx 50 price. The paper provides important implication for corporate decision makers, and Carbon Futures and stock market analysis and participants. It provides an agenda for further research to examine intercontinental variations between carbon futures market and stock market.

Keywords: *Stock exchange, Carbon market, Share Price, Eurozone, Emission trading, Carbon price, share price, carbon accounting, carbon finance*

JEL Classification: Q51, Q54, G18, G13, C58, C22

Formulas: 1; fig.: 3; tabl.: 1; bibl.: 19.

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Introduction. Carbon emission futures market is one of the pillars that support corporate motivation to comply with carbon reduction compliance requirements (Colmer, Martin, Muûls & Wagner, 2025). The global campaign and advocacy for environmental sustainability comes with diverse economic, financial, accounting and legal implications. For the corporate who is generally seen as the largest emitter of greenhouse gases Callahan and Mankin (2025), they are entwined within the complex web of both implications, which amongst others – the corporate gives final consideration to the accounting and financial implications of the choice of cutting down on carbon emission or holding onto the status quo. Either way, there are financial cost implications, and a wrong choice may either push the company out of business due to the loss in competitive advantage that comes with proven reduction in environmental responsibility or be cut up with huge regulatory penalties and/or suspensions – which may plummet corporate revenue, shrink profitability, corrode legitimacy and loss of market value stock Gabr and ElBannan (2025); Zhang and Han (2025). Contemporary evidence is ubiquitous which points to the fact that climate change policies are contributing to have a significant impact corporate stock return. For example, research results by Antoniuk and Leirvik (2024) show that the clean energy industries benefitted as a result of the Paris climate Agreement, the Climategate, and the Fukushima climate events because these measures amplified the investors' climate change consciousness and support for corporate policies geared to reducing the influence of climate change. Therefore, modern shareholders are constantly embracing the inevitable threat posed by loss of invested capital that may result from continued neglect to national or international corporate carbon reduction requirements. Hence, the shareholders are growing in support to carbon responsibility compliance. Among other avenues, one of the growing opportunities for the corporate to comply with carbon emission requirements is through the participation in carbon futures market of which the well know EU Emissions Trading System (EU ETS) carbon market (Günther et al., 2025).

Therefore, achieving corporate financial goals in the contemporary carbon compliance business environmental should require a balanced approached between carbon regulatory compliance and targeted financial goals. Hence regulations for protecting the environment are becoming more stringent against the larger backdrop of carbon peaking and carbon neutrality objectives. In the face of numerous environmental lawsuits and high government regulatory risks, corporate environmental compliance becomes essential to a successful business. One essential component of corporate environmental compliance is to ensure that the carbon regulatory requirements are adhered to and integrated into corporate operations and governance. Accordingly, corporate establishment of a diverse environmental governance framework that includes social participation enterprise self-discipline and government regulation is necessary (Zhang & Han, 2025).

Financial agreements known as carbon emissions futures give participants the option to purchase or sell the right to release a specific quantity of carbon dioxide (or its equivalent in other greenhouse gases) at a fixed price and future date. Carbon futures markets are vital parts of the overall carbon trading market, which is a market-based mechanism that assigns monetary value to carbon emission. The overall aim of carbon futures market is to incentivise and encourage carbon emission reductions. Therefore, carbon futures market essentially enable businesses and investors to control the monetary risk related to carbon prices and possibly make profits from their emission reduction efforts.

There is growing evidence from the Asian studies about likely interaction effects between the carbon futures market and the stock market. As an instance, a China study on market interaction between carbon trading market and stock market found that increases in carbon market price affects the stock price especially on the stock price of energy intensive and financial companies (Wen, Zhao & Yang, 2020). But studies the effect of EU ETS market price on stock prices are not very common within current year, therefore, this paper bridges this gap in knowledge and provides a latest evidence of the impact of carbon futures market on the stock market price. This will

contribute to the literature and assist stock market investors in monitoring and guarding their investment risks by taking a constant study and analysis of the carbon futures trend.

Literature review. Some researchers have examined the possibility of predicting the price of carbon futures to enable investors and operators to benefit from hedging and financial risk management. As an instance in a research conducted by Kumar (2024), the price of carbon emission futures is predicted using a variety of techniques such as machine learning algorithms and conventional ARIMA models. They used data spanning from 2005 to 2023 and included factors like GDP per capita carbon emissions crude oil and natural gas futures the Dow Jones Industrial Average and industrial indices. They discover that the prices of carbon futures and economic indicators are significantly correlated.

Using disclosed carbon intensity data Enders et al. (2025) investigate how carbon transition risk affects equity prices in the US and Europe. They discover a negative carbon premium and a negative impact on the cross section of returns for the 2009–2019 timeframe. By looking at fund flows they discover that institutional investors disapproved of carbon-intensive stocks which may help to explain why green stocks performed better. This negative carbon premium vanishes following the Paris Agreement and a positive premium is anticipated going forward. We use an asset-pricing method to calculate an assets exposure to carbon risk.

The effects of the carbon emission trading policy on information transmission were examined by Yuan et al. (2025) from a variety of approaches. They applied the difference-in-differences (DiD) approach to analyze data from A-share listed companies and found that Chinas CETS policy mitigates information asymmetry among listed companies in the pilot regions. Even after conducting numerous robustness tests Yuan et al. (2025) conclusion remains valid. According to their study's mechanism analysis, the CETS policy can: (1) increase the legitimacy of corporate disclosure of carbon information (2) reduce information asymmetry through the trading signals in the carbon market and (3) ensure that the CETS policy operates effectively through active government participation.

Businesses must support sustainable development as required by expanding multilateral and national environmental regulations. At the international level agreements, many countries have committed to limiting their greenhouse gas emissions under the Paris Agreement. Under the agreement, the expected maximum limit for global warming is 2 °C but 1.5 °C is thought to be the more desirable target. For manufacturing industries, large production companies, and factories that use a lot of energy, carbon futures have become an essential resource (Griffin et al., 2016). For these big businesses controlling the rising risk of carbon futures prices is essential. However, current US withdrawal from the Paris climate agreement may affect international and national climate governance with a ripple effect on carbon emissions and their futures markets (Swain et al., 2025). In related research conducted using the EU market, Wei and Lin (2016) examined how the European carbon market interact with oil futures and stock futures. To comprehend how the carbon market interacts with these other financial markets, they investigated the relationship between carbon and other asset classes such as the stock and oil markets. According to their empirical findings, the shock and oil returns does have a positive impact on the returns of carbon futures. In first observation, the stock market benefits from an oil price shock. The BEKK models multivariate generalized autoregressive conditional heteroskedasticity (GARCH) shows that while the oil market influences the volatility of the other two markets it is significantly less influenced by them.

Other researchers such as Ma et al. (2020) applied the DCC-MVGARCH model and built a modelling of Chinese capital, energy and carbon emission trading markets from the standpoint of power consumption. It then analysed the dynamic linkage of the three markets. Their findings demonstrate that the dynamic correlation has notable time-varying and persistent characteristics and the price fluctuation of the yield series of products in each market exhibits clustering characteristics. There is essentially a constant dynamic conditional correlation between the carbon emission trading market and the natural gas market and the oil market. Yet in their analysis, on the interaction

between carbon, stock, and renewable energy markets, [Qiu et al. (2023) found that over time there is virtually no connectivity between the carbon market and the stock market or the market for renewable energy. Second with values of and respectively they conclude that COVID-19 short-term improves the positive connectivity between the stock market and carbon market and the market for renewable energy to carbon market. Finally, the carbon market had a more detrimental effect on the renewable energy market during COVID-19 than it did when the European Green Deal was announced but Brexit permitted the price of renewable energy to rise in tandem with the price of carbon.

One of the important studies on carbon trading market effect on stock price market was conducted by (Wen, Zhao & Yang, 2020). Their findings yield significant insight for understanding the interplay between carbon market and stock market. Accordingly, using the nonlinear autoregressive distributed lag (NARDL) model Wen, Zhao & Yang (2020) [7] examined the asymmetric relationship between the Chinese stock market and carbon emission trading market. Their analysis of the Chinese stock market at both the sector and overall levels produced intriguing and compelling empirical findings that demonstrate the long-term and short-term asymmetric relationships between the carbon emission trading market and the Chinese stock market as a whole are substantially negative. When they traced the effects from the carbon market to the stock market, they found that rising carbon emission trading prices had a bigger impact on stock prices than falling ones. Additionally, the stock market for the financial sector and certain energy-intensive sectors are strongly correlated with the price of carbon emissions at the sector level. Additionally, they discovered no discernible correlation between Chinas stock index and carbon emission trading price either at the sector or overall stock market levels [Wen, Zhao & Yang, 2020 [7]]. Their detailed findings include the following specifics: they observed that carbon trading market exhibit a long-run asymmetric negative effect on the stock market when tested at both the 1% and 5% levels of significance. From their findings, they conclude that a 1% increase in the carbon emission trading price would result to a 0.956% decrease in the general stock market; but a 1% decrease in carbon emission trading price would cause a 0.880% increase in the general stock market. This implies that from the findings there is a negative relationship which exists between Chinese carbon trading market price and the Chinese general stock market price. Therefore, using the EU ETS, this paper hypothesizes as follows:

HI: the EU Carbon Futures price affects the EU stock market price.

Purpose, objectives and research methods. Researchers find multiple evidence of diverse interactions between the carbon emission market and other markets (Wei & Lin, 2016; Wen et al., 2020). This cross-market interactions warrant that policy makers are aware of such and more events around the carbon and other markets and their latent effect on the corporate stock markets. This is because investors would consider potential climate related risks along with some expected market sector growths in making their overall investment decisions. Therefore, the purpose of this article is to provide a focussed insight into the effect of EU carbon futures market price on stock market price. The core objective thus is to examine if the Carbon Market Futures Price has any effect on the stock market price, and the direction of the effect thereof.

Such awareness will not only contribute to existing literature, but it will also in addition assist corporate decision makers, investors, analyst and researchers on the stock market reaction to changes in Carbon Futures price. Hence the findings of the paper will provide additional information for stock market investment decisions, hedging and climate related financial risk management when considering stock related decisions. Overall, the findings from this article aims to enlighten decision-makers and investors on the need to incorporate carbon market price performance variables into conventional corporate portfolio management analysis and decisions.

This paper applied a mix of review and quantitative approach. Firstly, the related literature to carbon futures market was reviewed. The literature was closed with a hypothesis which is tested under the quantitative analysis of data that follows below. The paper focused on the popular EU

Emissions Future Market which is the largest carbon futures market in the world (Rabe, Streimikiene & Bilan, 2019). Therefore, data for the analysis was collected for EU Carbon Emission Futures (Carbon Emissions Futures (CFI2M5) and EU stock market price index (Euro Stoxx 50 (STOXX50E). The two data sets were retrieved from the market price index archives of (Fusion Media, 2025a & 2025b). The Carbon Emission Futures contract, which is coded as CFI2M5 falls under the European Union Emission Trading System (or EU ETS). It is one of the important tools designed by the EU to target the achievement of its climate goals such as the target for net-zero emissions by the year 2050.

The hypothesis is restated below as:

HI: the EU Carbon Futures price affects the EU stock market price.

The hypothesis testing is used to achieve the objective of this paper which is to examine the effect of the EU Carbon Emission Futures on EU stock market.

For both variables, data was collected for 124 days from January to June 2025.

Following the simple model specification by Ross (2021), the analysis was conducted with a simple regression analysis using the following model:

$$y = \beta_0 + \beta X + \epsilon \quad (1)$$

Where:

y = stock market price (dependent variable or predicted variable)

X = EU Emissions Futures Price (independent variable or predictor variable)

B = gradient (or regression coefficient)

β_0 = constant (or intercept)

ϵ = error term

Research results. Analysis was conducted at an alpha of 0.05 using the excel software. Table 1 presents the results of the regression analysis showing the effect of EU Emission Futures price (which is the EU Carbon Emissions Futures CFI2M5 (the independent variable) on the EU stock price, which is the Euro Stoxx 50 (STOXX50E) being the dependent variable in this analysis. The results indicate a P-value of 0.006, which is far lower than the test alpha of 0.05 with regression coefficients of 9.977 which indicates a significant positive relationship. This shows that a 1% increase in the EU Emissions Futures is likely to cause a 9.977 increase in the Euro Stoxx 50 price (all other impacting variables being equal). Figure 1 provides a pictorial view of the relationship in a line chart which shows a corresponding movement of the X and Y variables. Therefore, the hypothesis is accepted which implies that within the short-run (half year of 2025) data used for the EU ETS and Euro Stoxx 50 price, the former affects the later positively and significantly.

Table 1 Regression results of the Effect of EU Emission Futures (X) on EU Stock Price (Y)

ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	285621.0526	285621.1	7.541331	0.006943013			
Residual	122	4620639.329	37874.09					
Total	123	4906260.382						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	4557.237575	260.0824242	17.52228	4.12E-35	4042.37844	5072.097	4042.3784	5072.09671
CarbonFuturesPrice	9.977531253	3.633282014	2.746148	0.006943	2.785086619	17.16998	2.7850866	17.1699759

Source: author's statistical analysis .

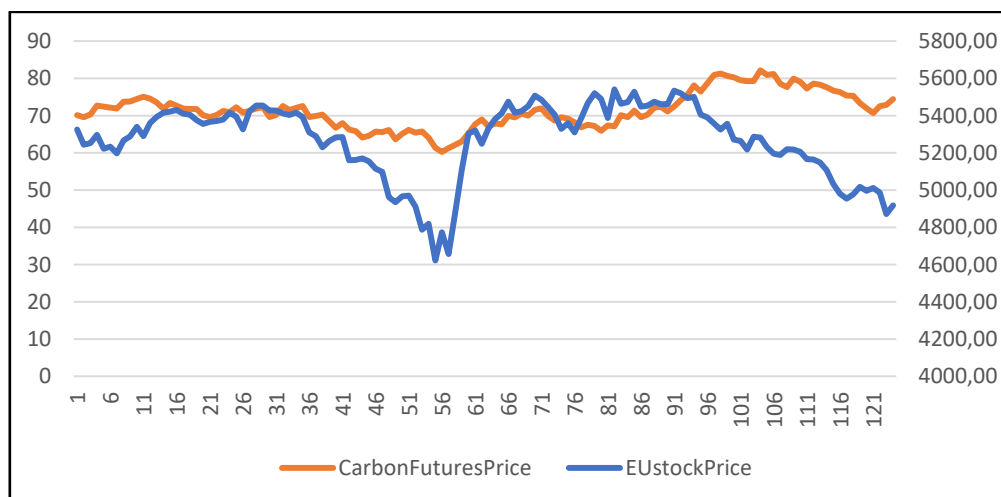


Figure 1 Line graph of the effect of EU Emission Futures (X) on EU Stock Price (Y)

Source: author's development.

Discussion. The above results from the analysis of data present the paper's findings, which reveals an important inter-price interacting movement between the EU Carbon Futures Market (EUCarbon Emissions Futures CFI2M5) and the EU stock market (Euro Stoxx 50 (STOXX50E)). The relationship between these two unrelated markets is both informative and attention directing.

It is informative because the findings contribute to broaden our understanding of how a relationship exists between two unrelated markets (carbon future, which is a market that targets the provision of permission or contract to emit carbon) and (a stock market where equity capital – which corporate ownership shareholding is traded).

Albeit their unrelatedness in the nature, scope and purpose of their existence, but this finding brings to the fore an echo of the efficient market hypothesis, which among other important postulates hints on the power of response stimuli of the stock market to every informative around its environment. In this instance the stock market can and does respond to carbon futures' price fluctuation information at a positive and significant level. The findings also add additional angle of clarity to existing knowledge – especially given that previous researchers have combined up to three different markets in examining the effect of carbon futures market or effect on carbon futures market.

It is worth mentioning insight depicted in Figure 2 and Figure 3, which shows in clustered bar graph that changes in Figure 2 (carbon futures) orchestrates (in most of the trends) an amplified effect on Figure 3, which means that movements in Futures Market causes a more than proportionate positive effect on stock market. This salient and unique effect has not been made conspicuous in earlier research especially within the EU Futures market environment.

This finding is different from the negative findings observed by Wen et al. (2020) when they used the Chinese ETS data. Their findings indicate that the Chinese carbon market affects the Chinese stock market negatively, however, within the bounds of this current paper, the opposite is the case. This finding has important implication for stock market practitioners, investors and scholars. The finding sheds light toward understanding the different dynamics that might be playing out regarding the relationship between emissions futures and stock markets – showing that the interaction between these variables might differ across regions depending on other factors beyond the scope of this paper. Accordingly, further research is encouraged for intercontinental study that might discover other variables that create differences in relationships among different futures markets located in different continents. This result contributes to the literature as it brings another view of the relationship using a current market data.

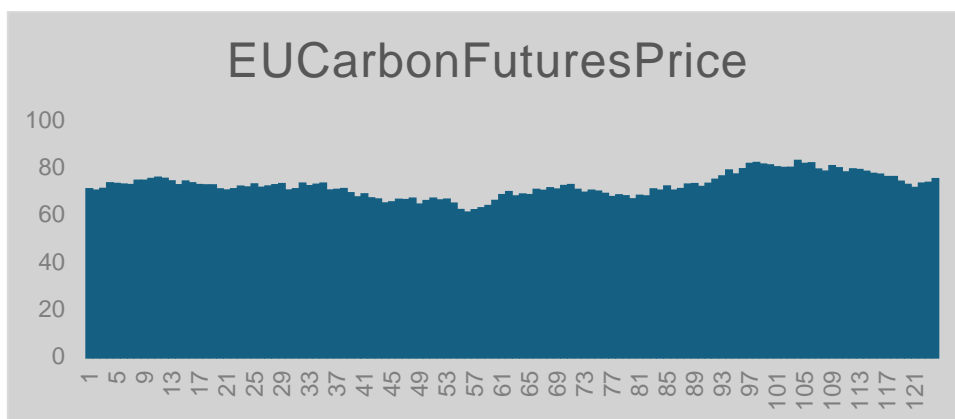


Figure 2 Clustered Colum graph of EU Carbon Futures Price
Source: author's development.

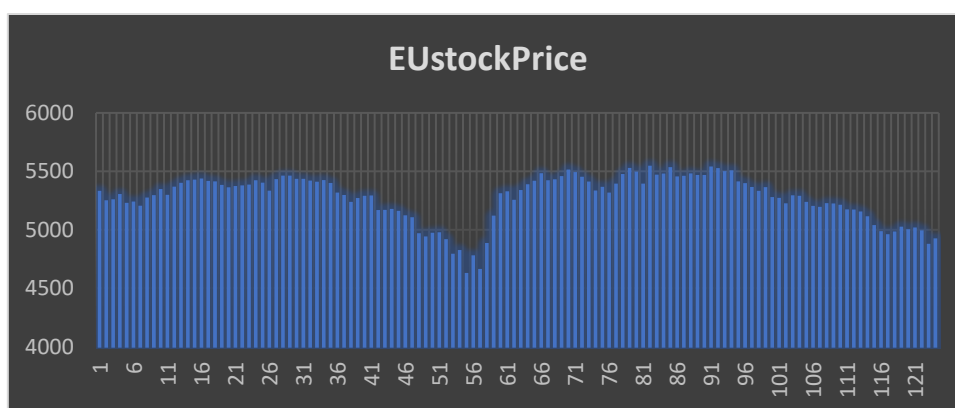


Figure 3 Clustered Colum graph of EU Stock Price
Source: author's development.

Conclusions. Carbon Emission Futures Market is one of the novel tools designed by the European Union to curb carbon emission with a view to achieving future targets of net tolerable emissions in tandem with sustainable development and climate change advocacy.

Given that Carbon Emission Futures affects corporate operations in addition to offering an income creation avenue through the purchase and selling of carbon contracts, it thus has some spill-over interaction with the capital markets such as the stock exchange market. Hence researchers have been researching on diverse aspects of interaction between the Carbon Futures Market and the Stock Market. Therefore, evidence from existing literature suggest various interactions between the carbon emission market the stock markets (Wei & Lin, 2016; Wen et al., 2020). Therefore, the purpose of this paper was to contribute to existing research by focussing the paper on the effect of EU Carbon Futures Markets on EU Stock Market.

The findings reveal a unique interaction based on the timeframe and within the EU Carbon Futures and EU Stock Market Price. Specifically, at an alpha value of 0.05, the findings show a P-value of 0.006, and given that this probability value is way lower than the stated test alpha of 5%(0.05) along with a corresponding regression Beta of 9.977, it thus depicts a significant and positive effect of Carbon Futures on Stock price. This finding therefore led to the acceptance of research hypothesis that Carbon Futures Market may have an effect on the stock market. The line graph also substantiates the statistical analysis by showing how increases and decreases in Carbon Futures result in the same movement in stock price.

This paper contributes to the literature by providing additional information required by corporate decision makers, stock investors, analyst and researchers on the stock market reaction to fluctuations in Carbon Futures price. Therefore, this paper provides insight for stock market investment decisions, hedging and climate related financial risk management. Since this paper was

limited to one independent variable used to assess its impact on stock market, the paper recommends further research of an intercontinental genre to use multiple variables which may uncover the variable/s that create intercontinental differences in the interaction between Carbon Futures Market and Stock market.

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Вплив ціни на вуглецеві ф'ючерси Єврозони на результативність цін фондового ринку

Анотація. Сучасна центральна роль вуглецевої відповідності в бізнес-операціях на фінансових ринках набуває імпульсу з розширенням вуглецевої відповідності.

В статті досліджується вплив ціни на ринку вуглецевих ф'ючерсів Єврозони (Ф'ючерси на викиди вуглецю [CFI2M5]) на результативність цін фондового ринку ЄС (Euro Stoxx 50 - STOXX50E).

Постановка проблеми. Дослідження взаємодії між ринком ф'ючерсів на викиди вуглецю та фінансовим ринком зростає, при цьому результати дослідників з різних економічних регіонів різняться.

Нерозв'язані аспекти. Існуюча прогалина в дослідженні полягає в нестачі цілеспрямованих досліджень щодо цін на вуглецеві ф'ючерси та цін фондового ринку в межах Єврозони, яка є світовим лідером у сфері вуглецевого ринку.

Мета статті. Метою цієї статті є оцінка того, чи впливає ціна ринку вуглецевих ф'ючерсів на ціну традиційного фондового ринку, а також визначення величини та напрямку цього впливу.

Виклад основного матеріалу. Дані для аналізу були зібрані протягом 124 днів з січня по червень 2025 року для вуглецевих ф'ючерсів ЄС (CFI2M5) та фондового ринку ЄС (STOXX50E). Дані аналізувалися за допомогою моделі простої регресії.

Висновки. Результати показують Р-значення 0.006, що є нижчим за тестовий альфа-рівень 0.05, з коефіцієнтами регресії 9.977, що вказує на значущий і позитивний зв'язок. Це свідчить про те, що зростання ціни на ф'ючерси на викиди вуглецю в ЄС на 1% може призвести до зростання ціни Euro Stoxx 50 на 9.977. Стаття має важливі наслідки для корпоративних управлінців, аналітиків вуглецевих ф'ючерсів і фондового ринку та учасників ринку. Вона також визначає напрямки для подальших досліджень щодо міжконтинентальних відмінностей між ринком вуглецевих ф'ючерсів і фондовим ринком.

Ключові слова: фондова біржа, вуглецевий ринок, ціна акцій, Єврозона, торгівля викидами, ціна вуглецю, ціна акцій, вуглецевий облік, вуглецеві фінанси.

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