

The Market Efficiency in the Significant Events/Global Events: A Review of Empirical Research

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Abstract: The efficient market hypothesis is a significant theory widely applied in modern economic and financial research about the impact of sudden global emergencies on various markets. Investigating the influence of the Efficient Market Hypothesis on public contingencies can augment the understanding of market behavior and investors' decision-making processes. This could enable anticipating market trends and risks, facilitating prudent investment activities. This study examines the empirical research through the methodology chosen, application, and comparison of conclusions to summarize the effects of the crisis on financial market efficiency within a theoretical analysis framework. This study explores the different methodologies and results of research that test market efficiency in response to events impacting economic performance. As market theory evolves, increasingly refined models are being used, leading to more precise measurements of event effects on markets and better forecasting of market impact for effective decision-making.

Keywords: efficient market hypothesis, pubic contingencies, methodology

1. Introduction

The Efficient Market Hypothesis (EMH), put out in the 1970s, is a widely studied theory in modern finance that posits that financial markets are efficient and that asset prices reflect all available information [1]. The theory has three forms: weak, semi-strong, and strong, depending on the extent of information believed to be reflected in asset prices. Whether markets are perfectly efficient has been a debate that has been going on since the theory was put into practice. With the development of behavioral finance research, which differs from the traditional financial approach, behavioral finance believes that people are not entirely rational in making decisions and are easily misled by their judgment and external guidance. Due to behavioral biases, some researchers argue that markets are not always efficient.

Knowing the efficiency of the market is significant for decision-makers, and many methods test EMH in empirical research, which has grown into many stages. Most of the thesis is composed under the analysis of the events, in which the selection of data periods and methods are varied and progressive. The consequences of global events' impact on financial markets are quantified, tested, and changed into more precise ones. In recent years, the world has been hit with unexpected public emergencies that have significantly impacted investors and institutions. Studies have demonstrated the clustering of stock market volatility in different countries during various events, such as natural disasters, the COVID-19 pandemic, political events, and the Russian-Ukraine conflict. Testing

market efficiency has become a pressing issue, with results varying depending on the periods of market performance examined and the methodologies employed.

This study aims to demonstrate the different results of the studies on market efficiency for various international events. It focuses on sorting out the changes in other research contents and empirical methods in a specific time sequence. Summarizing the results and the general methods based on the different characteristics of the public events leads to a profound understanding of EMH theory, which can augment our understanding of the market structure and intricacies of market mechanisms, culminating in efficacious financial regulation and policy formulation.

2. Literature Review

2.1. Efficient Market Hypothesis

EMH was put out in the 1960s by Farma and Samuelson, and it was categorized into three forms: weak form, semi-strong form, and strong form [1]. The random walk theory started to be tested at the same time. Farma published his work on random walk theory based on empirical studies with runs test [2].

To examine the EMH, there are several tests used in faraway research. Khan and Vieito examined the EMH using the serial correlation test [3]. The unit root test, multiple variance ratio test, and non-parametric variance ratio test using ranks and signs are also used in the research [4].

2.2. Global Events Study

Studies on the impact of the global event on market efficiency can be grouped by the region covered, the level of economic development chosen, the periods of sample data selected, and the results compared. The entropy approach measures the global collective dynamic of financial market efficiency. Patra and Hiremath looked at data from 1994 to 2017 and found that stock market efficiency changes over time, and factors that affect it include the location and development of the market, global events, economic policy, etc. [5]. In the last three years, many studies have focused on the impact of the COVID-19 pandemic, a public health emergency. Frezza et al. used the multifunctional Brownian motion as a model. They found that Asian markets, including the Hang Seng, Nikkei 225, and Kospi, have fully recovered their efficiency. In contrast, despite an initial rebound, European and US markets have not yet returned to their pre-crisis levels of efficiency [6].

3. Influencing Factors

3.1. Political and Natural Events

In these years, there have also been some studies on the impact of political events on market efficiency. The uncertainty about the economy, including the outcome of the national election, especially in highly developed countries, can influence the volatility of financial market returns. Bowes's results illustrated that Iowa Electronic Market presidential election futures market asset prices presented more significant uncertainty [7]. On the background of facing Brexit, some studies related to empirical research on the EMH test are presented. Giudice analyzed the case of Boris Johnson's tweets and the FTSE100 returns and found that investors overreacted to uninformative information, which suggests that markets were not fully efficient in this context [8]. Another test of market efficiency is based on the Brexit announcement [9]. A recent natural disaster affected the stock, debt, FX, and gold market efficiency in the short term more than the long term by testing the C-GARCH-t model [10].

3.2. Covid-19

Many studies focus on the impact of COVID-19 on the financial market, which influenced global economies and financial markets. Aktan analyzed the weak-form efficiency of the Turkish market and its evaluation during the 2008 financial crisis and the COVID-19 pandemic [11]. Liu et al. proved that COVID-19 significantly negatively affects all affected countries' stock market returns, and investors' fear sentiment is a complete mediator and transmission channel for the pandemic [12]. Dias and Santos demonstrated that the random walk hypothesis is not supported by the African financial markets analyzed during this retro of the global pandemic [13]. Vasileiou's study examined the fact that the U.S. stock market was not always efficient by juxtaposing the released news with the respective market performance [14]. Frezza and Bianchi found that US and European markets, after an initial rebound, have not yet returned to the pre-crisis efficiency level, differing from Asian markets [6].

4. Methods Comparison

This section is significantly influenced by the methodological review conducted by Degutis and Novickytė, which examines the proposition, evolution, and contemporary conceptualization of the market efficiency hypothesis [15].

Many studies have challenged the EMH and concluded that markets are not fully efficient. This view is supported by evidence that the EMH fails to provide sufficient explanations for phenomena such as excessive volatility of stock prices, investor overreaction, seasonality of returns, and asset bubbles. Additionally, while some stock returns are found to be unpredictable, investors are frequently able to earn excess returns.

In light of such evidence, a methodological review of market efficiency tests suggests that a more robust approach is necessary to explain weak-form efficiency in the market. The authors propose that liquidity and market size should be top priorities when analyzing developing markets. Tests for randomness in stock returns should be sorted into four groups: serial correlation, runs test, variance ratio, and unit root. Furthermore, they argue that Ljung-Box statistics and variance ratios are widely used, runs test require sufficiently large sample sizes compared to critical values of a normal distribution, and unit root tests include the Augmented Dicky-Fuller (ADF) and Phillips-Perron tests.

The table shows that in the research on the impact of events over several years. The research contents have different emphases, but all the empirical studies follow a particular research pattern.

Table 1: In the research on the impact of events over several years.

Research content		Methods taken	Result
Political event	Presidential election	Event study (regression of AR) [16]	Efficient in both U.S. and Egypt markets
	Brexit	Event study on regression of AR, AAR, CAAR, and CAR [8-9]	Incompatible with the EMH/support semi-strong form efficiency
Natural disaster	Earthquake and tsunami	C-GARCH-t variant of the bound variance test [10]	Partly efficient market

Table 1: (continued).

Global public health emergency	Regional	ADF/LNV/KSS/Sollis/Omay/Yildirim/OEH test [11]	The Turkish Stock Market was determined not to be weak or inefficient by the LNV test.
		unit root/variance ratio/graph the residues' stability [13]	African markets do not follow the random walk hypothesis.
		Runs-test/Statistics description [14]	The US stock market was not always efficient.
	Global	Event study (AR and CAR) [12]	Unmentioned, but information released due to an adverse effect
	Level of economic development	Wild bootstrap automatic variance ratio test [17]	The US and UK stock markets exhibit larger market efficiency deviations.
	Cryptocurrency market	An asymmetric multifractal analysis approach [18]	There are differences in the efficiency attribute of price behavior between short- and long-term perspectives.
Conflict	Russian-Ukraine conflict	Multifractal Detrended Fluctuation Analysis [19]	Reject the EMH

4.1. Event Study

Event study has been mainly used in many cases, and the statistic model selections differ from the studies' proposals.

In the research on the influence of tweets about Brexit, the author summarized the steps into three parts by using an event study to quantify the effect of the content of the tweets. The first step to conducting an event study is to specify the event of interest and its timeline. Once this is established, the next step involves determining a model for the normal stock return and calculating abnormal returns. Finally, the study should build a hypothesis testing the aggregated abnormal returns to assess statistically significant differences from normal stock returns. It is worth noting that this study, under the constant mean return model, employs the return of a market index to capture market-wide price movements. The result was examined by establishing the econometric regression model. It is considered that hypothesis tests on ARs were not as powerful as those with CAARs, which is only confirmed in the 20-day estimation windows [8].

For comparison, the article chose the Brexit announcement, which focused on the ten firms' stock performance and used the market model, claiming that the study's results support the semi-strong form of market efficiency by using a risk-adjusted method from the data from the S&P 500 [9]. Liu et al. also used the event study with the market model to estimate the impact of the COVID-19 pandemic and set up five constant 6-day event windows after the event day. They found that the Asian markets' abnormal returns are more negative than those in other regions [12]. This study delves into the individual effects of the epidemic on stock market indices of various countries, utilizing meticulous control of news release timing and nuanced segmentation of periods.

4.2. Statistical Model

The GARCH model was applied to measure the impact of election uncertainty on the market by analyzing two types of futures contracts traded on the Iowa Electronic Market (IEM) [7]. The model analyzed the absolute difference between the contract prices of the Democratic and Republican candidates in Vote Share or Winner-Take-All markets and found that election uncertainty increases market volatility. An investigation of the impact of the Tohoku earthquake on the efficiency of the Japanese financial market employed an asymmetrical component GARCH model (C-GARCH model) to analyze the effects of long and short runs on the EMH test statistic [10]. The C-GARCH model captured more complex volatility patterns and produced more robust insights into underlying market dynamics, including asymmetrical and leverage effects in the test statistic index.

4.3. Modern Approach

Using the Multifractal-Detrended Fluctuation Analysis (MF-DFA) method to test the efficient market hypothesis during the COVID-19 pandemic and the Russia-Ukraine conflict can help advance theoretical development in the field [19]. The results reveal that both the COVID-19 outbreak and the Russia-Ukraine conflict period exhibit significant levels of multifractality. The analysis further reveals that the COVID-19 series shows long-term persistence, whereas the series during the Russia-Ukraine conflict period demonstrate anti-persistence. These outcomes indicate that the impact and timing of various global economic crises on the worldwide economy differ significantly. The paper proposes that characteristics such as a fat-tailed distribution of financial series and irrational investor herd behavior may contribute to this impact. Still, additional testing and measurement are necessary to validate these findings and guide future research.

According to Kakinaka et al.'s study on the effectiveness of cryptocurrencies during the COVID-19 pandemic, fat-tailed distribution is the primary cause of multifractality in the short run, and correlations of big and tiny fluctuations are not a crucial issue [18]. In Ozkan's study, the Wild Bootstrap Automatic Variance Ratio test (WBAVR) is used to assess how the COVID-19 pandemic has affected stock market performance [17]. The hypothesis of no-return predictability was certified to be rejected for all the markets at the specific moment. According to Charles et al., the WBAVR test performed better than other VR tests in terms of return predictability and had strong small-sample features [20]. The researchers employed these two distinct empirical methodologies across varying rolling windows (short, medium, and long-term) to better understand the dynamics governing the market's efficiency levels. Under weak-form efficient markets, different indices show different efficiency and the degree of returning to pre-crisis efficiency, validating short-term behavioral patterns.

5. Conclusion

Based on the growing EMH theory, this study compared the diverse methodologies and results of the studies that were addicted to testing market efficiency and the effects of some events that could affect economic performance. To measure the impact of the crisis or significant events on the financial market returns, defining the type of market efficiency is essential, which could directly affect the results. Moreover, the estimated window length should be considered precisely, whatever the terms of the periods or the event breakout point chosen. However, as market theory continues to evolve and integrate with approaches from other disciplines, increasingly refined and tailored models are being applied. This has led to more precise measurements of the effects of significant events on the market, which will aid in forecasting market impact and making effective decisions. This article has several shortcomings. The first is that the effects of various events vary significantly in terms of magnitude, timeframes, and geographical areas, making it difficult to draw generalizable conclusions from the

findings. Additionally, the theoretical models used in the analysis yield results that diverge from actual observations, thereby reducing the practical value of the study in informing policy-making.

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