News about COVID-19: Unraveling the Market Reactions and Investor Sentiment across Different Stock Exchanges[1]

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Abstract

This paper examines the impact of news regarding the spread of the coronavirus on stock market returns. We investigate this impact across different geographical regions and behavioral aspects through regression analysis. Specifically, we explore the relationship between stock returns and factors such as investors' attention, the number of new positive COVID-19 cases and deaths, and government measures implemented during the pandemic. Our findings reveal that news concerning new deaths associated with the virus and attention towards the vaccine significantly affected stock markets in Europe, the United States, and globally. Notably, these effects were observed prior to the approval of the first vaccine. However, our analysis does not confirm these results for the Japanese and Chinese stock markets. As a result, we argue that the Japanese stock market presents an opportunity for diversification during similar shocks. These findings contribute to a deeper understanding of the dynamics between public health crises and financial markets.

Keywords: *COVID-19, sentiment, attention, stock markets*

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Introduction

The outbreak of the coronavirus pandemic and the subsequent government-imposed restrictions have had a profound impact on global economic activity. This shock primarily affected the supply side and had significant implications for inflation. Notably, the stock market experienced unprecedented levels of volatility in the first half of 2020. It exceeded even the volatility of the Great Financial Crisis and the Great Depression (Baker et al., 2020) as the market crash was one of the biggest known but also one of the shortest (Dai et al., 2021).

Recent studies have shed light on the influence of behavioral factors, such as sentiment (Haaron and Rizvi, 2020; Sun et al., 2021) and investors' attention (Albulescu, 2021; Chundakkadan et al., 2021) on stock markets during the pandemic. While these studies have provided valuable insights, certain gaps remain in the current research. Specifically, there is a need to examine in greater detail the impact of news regarding the virus's spread, including aspects such as deaths and new cases, on stock markets. While some studies have investigated the impact of the first positive case (Bash, 2020) or the first virus-related death (Heyden and Heyden, 2021), an extended analysis encompassing the period up to vaccine approval is lacking.

Additionally, the effects of restrictions imposed in different regions and the variations observed before and after vaccine approval have not been thoroughly examined. This study aims to address these gaps by providing a comprehensive analysis of the impacts of news about the virus's spread on stock markets. It investigates the extended period including vaccine approval and explores the differential effects of restrictions across various regions.

Our study aims to make several contributions to the existing literature. Firstly, we seek to identify the impact of news regarding the spread of the virus on stock indices representing different global stock markets. While previous studies have examined the impact of news on stock market volatility during the early stages of the pandemic (Albulescu, 2021; Heyden and Heyden, 2021; Nepp et al., 2022), we focus on the relationship between news and investor attention toward vaccine-related developments. Secondly, we aim to discern the relationship between different types of news. Specifically, we differentiate between news reporting the spread of positive cases and news reporting new deaths. Additionally, we explore the impact of government restrictions, which have been previously linked to market volatility and only within the initial phase of the pandemic (Heyden and Heyden, 2021; Zaremba et al., 2020).

Our findings indicate that the impact of news about new deaths is statistically significant only before the vaccine approval. Previous studies did not differentiate the periods with emphasis on vaccination (Nepp et al., 2022; Salisu and Vo, 2020).

We examine the relationship between variables in the Chinese, Japanese, European, US, and global stock markets. To conduct our regression analysis, we adopt the Fama-French Model, which has been validated as an appropriate framework for determining stock market returns (Nguyen et al., 2019).

As a result, our study provides evidence of the impact of news about new deaths and investor attention on the European and US stock markets. By delving into these specific relationships, we contribute to understanding the complex dynamics between news during public health crises, investor behavior, and stock market performance.

The paper is structured as follows. We provide a literature review in section 1. Section 2 describes the data and methods that we used in the study. Results and their interpretation are in section 3, while section 4 tests the robustness of the findings. Section 5 discusses the results compared with other findings. The last section concludes.

1. Literature Review

As the efficient market hypothesis states, investors cannot achieve excessive profits in the long term because the markets reflect all the available information (Fama, 1970). However, markets get into situations in specific periods when the pricing is not perfect, and the individuals might decide irrationally in the short term (Malkiel and Ellis, 2009). Behavioral finance not only concerns the impact of news on asset prices but its sub-categories, such as attention or sentiment are essential to consider.

Empirical findings show that identifying sentiment could help investors choose investments more precisely (Kolasani and Assaf, 2020). Sentiment tends to show spikes in behavior changes, mainly when market uncertainty prevails (Haroon and Rizvi, 2020). As the behavior of investors changes, stock prices are also affected (Maneenop et al., 2020). The impact of the news mainly increases significantly during economic-policy shocks such as the COVID-19 pandemic (Bash, 2020; Maneenop et al., 2020). This was confirmed by Haroon and Rizvi (2020), who identified the relationship between sentiment regarding the news about the COVID-19 virus and the volatility of stock markets.

Another behavioral aspect is the investor's attention (Kapounek et al., 2022). In some studies, attention was confirmed as a more significant factor than the information itself. According to Huberman and Regev (2001), prices are influenced by information only when investors pay attention. Attention has an impact on future volatility as well (Audrina et al., 2019). Frequently used phrases in the news can have negative contexts, e.g., crisis, collapse, or unemployment. From this perspective, combining the attention of investors and the market sentiment makes sense. Smales (2021) analyses global stock markets during the pandemic period. The author used the word ‘coronavirus’ to measure attention in Google Trends to find that the stock markets were on local support at the same time as the number of new cases during the first wave peaked. Then the frequency declined, followed by the uptrend in stock markets. This was confirmed by studies using similar phrases (Albulescu, 2021; Chundakkadan et al., 2021).

Chundakkadan et al. (2021) examined the impact of COVID-19 on investment sentiment and attention and then on stock market returns. They used the Google Search volume index to indicate investor attention. The results showed that increased attention to the current news increased negative sentiment among market participants and transmitted to stock market declines. The results also highlight the fact that sentiment increased volatility.

1.1. Economic Policy Uncertainty and Stock Markets

Shocks like natural disasters, wars, political disturbances, pandemics, or terrorist attacks can launch panic behavior in financial markets and increase economic-policy uncertainty. This can increase market volatility and pressure that weakens stock market prices (Brounen and Derwall, 2010; Papakyriakou et al., 2019; Tavor and Regev, 2019). Chen et al. (2007) emphasize that investors tend to predict bear markets for stocks when catastrophic events occur. Driven by fear, investors tend to sell their stocks and rebalance their portfolios, which multiplies the downtrend of stock prices. However, these economic and political uncertainties significantly affect markets only in the short term (Albrecht et al., 2022).

Among others, studies identify virus pandemics as the uncertainty-increasing factor. Angel et al. (2021) examined the 1918 Spanish Flu epidemic. They confirmed a negative impact on nine stock indices. Chen et al. (2007) analyzed the impact of the SARS epidemic on the Taiwanese hotel industry by employing the event study method. The virus triggered a shock that caused losses for the tourism and hotel sectors.

More recent studies bring evidence that the COVID-19 pandemic mainly having an impact on stock market sectors associated with traveling (Maneenop and Kotcharin, 2020; Wang et al., 2021) but also on other sectors such as food production, communication, and wholesale (Canton et al., 2021). The changes in behavior transmitted to declines in Chinese, European, and US stock markets (Heyden and Heyden, 2021; Chopry and Mehty, 2022) and an increase in stock market volatility (Albulescu, 2021). Further, the studies found that the pandemic-associated news affected the stock markets more than the pandemic itself (Salisu and Vo, 2020; Sun et al., 2021; Nepp et al., 2022).

These events are consistent in increasing uncertainty in the market because participants are concerned about the impact of economic-policy measures (Beckmann and Czudaj, 2017). In this manner, policymakers might affect companies' financial conditions (Fidrmuc et al., 2016). However, the impact of news should be observed in more detail. For example, the studies examined the impact of the first death and first positive case (Bash, 2020; Ftiti et al., 2021; Heyden and Heyden, 2021), but we find it necessary to study an extended period, including the sub-period after the vaccine approval. Further, some studies covered the influence of attention, including numerous phrases about health (Salisu and Vo, 2020) or the virus itself (Dey et al., 2022). However, to the best of our knowledge, none of them examined the impact of attention to vaccine approval.

2. Data and Methods

In this paper, we use regression analysis to identify the impact of the news about the coronavirus on selected stock markets – the US, Europe, Asia, Japan, and global.

2.1. Data

The MSCI World Index was chosen as a representative index for the global stock markets. The S&P 500 Index represents the US stock market. The DAX 40 represents the European stock markets, the Hang Seng Index is chosen to represent the Asian markets, and the Nikkei 225 Index represents Japan. The data are downloaded from the Bloomberg database and analyzed using adjusted daily close prices. We use the Fama-French Model as the basis for the data taken from the websites of Kenneth R. French. We use country-specific Fama-French factors from January 21, 2020, until August 31, 2021.

The relationship between attention and stock prices was analyzed based on the Google Trends database, which provides information about the frequency of searched phrases in the Google Search engine. The global and regional frequencies were downloaded from the database; we downloaded daily data for the frequencies of the *'Coronavirus disease*' and '*COVID-19 vaccine'*. The phrases were chosen because most of the phrases covering the COVID-19 virus were identified (Dey et al., 2022). However, we intend to distinguish the impact between attention to the virus and attention to the vaccine.

Other variables used to identify the impact of the coronavirus on the stock markets are the number of new positive cases and the number of deaths due to the COVID-19 virus. Both variables were used on a daily frequency and downloaded from the WHO database. The last variable used for this empirical research is the Stringency Index downloaded from the Oxford database on a daily frequency. The index measures the strictness of the restrictions for the selected region. All the data are transformed by logarithmic difference.

Further, we split the time series into two subsamples for robustness check. The subsamples are divided on December 21, 2020, which is the date for the vaccine approval (European Commission, 2020). Descriptive statistics for the data are provided in Tables A1 to A5 for each country separately.

2.2. Methods

The paper examines the relationship between news about the spread of the COVID-19 virus and the returns of selected stock indices. We employ the three-factor Fama-French model, defined as follows:

$$r_{it} = \alpha_i + r_{ft} + \beta_1.\left(r_{mt} - r_{ft}\right) + \beta_2.SMB_t + \beta_3.HML_t + \varepsilon_{it} \quad (1)$$

where *r* is the expected return, r_f is the risk-free yield rate, $r_m - r_f$ is a premium for the risk calculated as a difference between market return (index return) and risk-free return, *SMB* is a difference between the returns of small-cap companies and big-cap companies and *HML* is a difference between companies with small book-to-market value ratios and high book-to-market value ratios. β coefficients represent sensitivity to those factors.

Concerning the aim of this paper, the explained variable is interpreted as a risk premium because it includes the profitability of the stock index. Then, we removed the risk-free yield from the formula because it is already included on the left side of the formula. Following these steps, the model used is as follows:

$$r_{mt} - r_{ft} = \alpha_i + \beta_2.SMB_t + \beta_3.HML_t + \varepsilon_{mt} \quad (2)$$

Fama and French (2015) extended their model by another two factors (a five-factor Fama-French Model). The basic model extended by two factors is as follows:

$$r_{mt} - r_{ft} = \alpha_i + \beta_2.SMB_t + \beta_3.HML_t + \beta_4.RMW_t + \beta_5.CMA_t + \varepsilon_{mt} \quad (3)$$

where *RMW* is similar to the previous factors, as it is the difference between the operating profits of companies with small-cap and big-cap companies, and *CMA* is the difference between the profitability of companies investing aggressively and conservatively.

Then we add into the model additional variables regarding the information about the coronavirus spread. The model including all the variables is explained as follows:

$$r_{mt} - r_{ft} = \alpha_i + \beta_2.SMB_t + \beta_3.HML_t + \beta_4.RMW_t + \beta_5.CMA_t + \sum_{n=1}^{N} \gamma_n.Covid\_spec_{nt} + \varepsilon_{mt} \tag{4}$$

where the dataset of the variable named *Covid_spec* represents chosen variables with information about the spread of coronavirus *n* in the time *t*.

After concluding and interpreting the results of the regression analysis, we perform the robustness analysis. The time series of the model is divided into two periods representing the period before the COVID-19 vaccine approval and after the vaccine approval.

3. Empirical Results

The time series is divided into two distinct periods: the period before the vaccine approval and the period after. In Figure 1, we observe the development of stock indices from 2020 to 2021. In March 2020 a significant decline from peak values occurred, coinciding with global concerns about the spread of the coronavirus, which was officially identified as a global pandemic by the World Health Organization (Cucinotta and Vanelli, 2020).
Examining the MSCI World Index, we note a remarkable increase in index values, similarly observed in the S&P 500 and the DAX 40. This surge can be attributed to heightened investor demand driven by increased savings (ECB, 2021). While the US, global, and German indices rebounded after the initial shock, the Japanese Nikkei 225 and the Hang Seng, representing the Hong Kong stock market, experienced a downtrend starting from the beginning of 2021 (Figure 1). The negative growth in Asian markets can be linked to the challenges faced by the Chinese company Evergrande, which encountered financial difficulties and struggled to meet its obligations. The uncertainty surrounding the potential collapse of the company heightened market volatility and contributed to stock price declines. Additionally, the correction in the Chinese stock market can be attributed to regulatory actions targeting technological companies implemented by the Chinese government (Congressional Research Service, 2021).

Figure 2 (in appendix) provides a more detailed view of the volatility of the the four regional indices. Notably, the volatility in March 2020 surpassed the overall volatility during the analyzed period.

F i g u r e 1

Development of Stock Indices for the Period 2020 – 2021
(calculated to the base period = 21.01.2020)

Source: Bloomberg (2022).

3.1. Effects of COVID-19 Pandemic

Here, we extend the basic Fama-French model with additional variables that include information about the spread of the coronavirus. *Covid_disease* and *Covid_vaccine* represent the frequency of the searched key phrases using the Google Search engine. *Stringency_Index* measures the strictness of the government restrictions. *New_cases* represents the number of new infections, and *New_deaths* is the number of deaths connected with COVID-19.

Table 1 shows the regression analysis results in the context of the world stock markets. Various regression models bring evidence that the variables *Covid_disease*, *Stringency_Index*, *New_cases,* and *New_deaths* had significant negative impacts on the stock markets. That means that as the attention paid to the virus increased, the markets correspondingly declined. Similar results are shown for the number of new cases and deaths when both variables negatively affected the value of the indices (Table 1). The worldwide scale brings results that the increased strictness of the restrictions also negatively affected stock markets.

Including all the additional variables in one regression, the model brings evidence for the negative impact of *Covid_disease*, *Stringency_Index*, and *New_deaths* on the stock market (Table 1). The number of new cases concerning another factor affecting stocks' value is insignificant. On the other hand, the number of new deaths still has a negative impact on the investment sentiment and the profitability of the stocks. Table 1 shows results concerning the US market. Analysis of the models for the US market shows *New_deaths* as the only significant variable. In this case, the regression points out the positive impact on the stock market returns, which disagrees with the theory. We do not consider the results valid because other models give information about the negative relationship for the variable *New_deaths*.

T a b l e 1

Stock Indices' Returns in Regression with Indicators of Attention, Sentiment, and Five-Factor Fama-French Coefficients (period from January 2020 until August 2021)

	Asia	Japan	Europe	US	World
SMB	−0.994*** (0.082)	−0.038 (0.110)	−1.269*** (112)	0.650*** (0.121)	−1.176*** (0.103)
HML	−0.020 (0.125)	0.848*** (0.134)	1.569*** (0.123)	0.331*** (0.123)	1.108*** (0.121)
RMW	0.390*** (0.118)	0.981*** (0.243)	0.702*** (0.240)	0.988*** (0.197)	−0.306 (0.198)
CMA	−0.955*** (0.144)	−0.762*** (0.242)	−2.207*** (0.229)	−1.047*** (0.243)	−1.737*** (0.234)
Google Trends ('Covid disease')	−0.025 (0.079)	−0.008 (0.212)	−0.381 (0.297)	−1.039** (0.479)	−0.628* (0.358)
Google Trends ('Covid vaccine')	−0.006 (0.010)	0.001 (0.175)	−0.583*** (0.173)	0.090 (0.357)	–0.188 (0.291)
Stringency_Index	−0.319 (0.547)	−0.209 (0.796)	−0.033 (0.103)	0.020 (0.160)	−2.586** (1.232)
New_cases	0.032 (0.048)	0.001 (0.040)	−0.004 (0.030)	0.038 (0.059)	–0.157 (0.230)
New_deaths	−0.012 (0.011)	−0.005 (0.025)	−0.046* (0.028)	0.432*** (0.096)	–0.258** (0.120)
Constant	0.028 (0.047)	0.036 (0.062)	0.043 (0.057)	0.067 (0.082)	0.128** (0.057)
Observations	397	393	408	407	420
R2 adj.	0.473	0.085	0.427	0.154	0.367

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Own estimations.

A model including all additional variables shows the negative impact of *Covid_disease*, which is interpreted as the attention of investors to the news about the COVID-19 disease. We chose only this phrase as the study of Dey et al. (2022) covered most of the phrases regarding the virus, and they found homogeneity in the impacts of similar phrases. The relative stability of the US stock markets turned to increased volatility during 2020, when the pandemic peaked. Table 1 provides information about regressions of the Asian stock markets. None of the estimated coefficients was confirmed to be statistically significant. Because of that, we can state that our model did not prove that Asian markets were affected by COVID-19-related variables for the longer term. Based on these results, the Asian stock market could be appropriate for the risk diversification associated with such a shock as the virus pandemic. On the other hand, the results may be distorted by the fact that the Hang Seng Index was affected by many different factors during the period, and the index was more volatile than other selected indices.

Table 1 shows the results for the Japanese stock market. From the various regressions, it can be noted that none of the additional variables is estimated as statistically significant. Therefore, we can say that COVID-19 did not affect the Japanese market as much as it did the Asian stock market for the whole period. Based on these results, it seems that the Japanese stock market might be appropriate for diversification of the risk connected with the coronavirus spread.

However, the investor should be careful in this case because the volatility of the Nikkei 225 was also high (Figure 2) but not as high as in the Asian market. Moreover, in the context of these results, the Japanese stock market makes sense as a suitable tool for diversification due to the fact that investors in Japan are less risk-averse and less overreactive to global economic and political shocks (Yuichiro et al., 2017).

4. Robustness Analysis

In this robustness analysis, we selected the model incorporating all additional variables related to the spread of the virus for each of the chosen markets. We categorize the returns of the stock markets into two distinct periods. The first period encompasses the time before the approval of the COVID-19 vaccine. In contrast, the second period represents the time following the vaccine approval. This division aims to assess whether the empirical findings hold true across different time periods or if they are specific to a certain timeframe.

For this analysis, we consider the date of vaccine approval as December 21, 2020. On this date, the European Commission approved the first vaccine developed by BioNTech and Pfizer (European Commission, 2020).

Table 2 reflects the results of the analysis for the sub-period before the WHO officially approved the vaccine. For this period, we confirm the results of the previous parts of the paper.

Therefore, the results are valid for the period before the vaccine approval. The variables that show significant negative impacts are either associated with attention to the news by investors measured by Google Trends or by the number of new deaths connected with the disease. *New_cases* and *Stringency_Index* are not estimated as significant. The robustness analysis shows that the relationships are valid for the European, American, and World stock markets – but not for the Asian and Japanese markets.

T a b l e 2

Stock Indices' Returns in Regression with Indicators of Attention, Sentiment, and Five-Factor Fama-French Coefficients
(period from January 01, 2020, until December 21, 2020)

	(1) World	(2) US	(3) Europe	(4) Asia	(5) Japan
SMB	–1.406*** (0.126)	0.554*** (0.199)	–1.403*** (0.140)	–1.064*** (0.110)	0.250* (0.145)
HML	1.542*** (0.159)	0.490** (0.203)	1.827*** (0.159)	0.589*** (0.224)	0.983*** (0.166)
RMW	0.366 (0.331)	1.472*** (0.326)	1.685*** (0.369)	0.818*** (0.214)	1.125*** (0.313)
CMA	–2.270*** (0.327)	–1.123*** (0.402)	–1.904*** (0.323)	–1.618*** (0.215)	–0.668** (0.299)
Google Trends ('Covid disease')	–0.916* (0.470)	–1.105* (0.636)	–0.429 (0.360)	0.044 (0.117)	0.034 (0.286)
Google Trends ('Covid vaccine')	–0.376 (0.415)	–0.012 (0.494)	–0.722*** (0.233)	0.001 (0.013)	–0.098 (0.222)
Stringency_Index	–2.277 (1.464)	0.039 (0.201)	–0.053 (0.116)	–0.055 (0.651)	–0.412 (0.899)
New_cases	–0.126 (0.305)	0.044 (0.074)	–0.009 (0.043)	0.004 (0.058)	0.011 (0.045)
New_deaths	–0.261* (0.140)	0.453*** (0.126)	–0.056 (0.036)	–0.031* (0.017)	0.003 (0.028)
Constant	0.196** (0.086)	0.076 (0.139)	0.116 (0.086)	–0.018 (0.071)	0.083 (0.092)
Observations	238	232	234	226	223
R^2 adj.	0.495	0.172	0.518	0.543	0.117

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Own estimations.

Table 3 provides information for the period after the vaccine approval. We do not prove the validity of the results for this period. This indicates that COVID-19 had a transitory impact on the stock markets; the pandemic began with increased market uncertainty that tended to decline over time. Therefore, vaccine approval could be linked as a fundament for declining of uncertainty levels. This could be confirmed by the fact that the second period does not show the significant impact of the variables.

Figures 1 and 2 illustrate the heightened volatility and initial decline in stock prices at the onset of the pandemic. However, the figures also show that the markets experienced a relatively swift recovery. The regression analysis results reveal that stock markets were negatively influenced by investor attention toward news related to the spread of the virus in the US and for the world stock index. Further, European stock markets were affected by the attention to vaccine development. Notably, a significant impact was observed for news regarding new deaths. Conversely, the number of new cases and the Stringency Index, which measures the strictness of restrictions, did not exhibit statistically significant effects. In the case of Asian stock markets, no statistical evidence supports the notion that news concerning the COVID-19 virus had an impact.

T a b l e 3

Stock Indices' Returns In Regression With Indicators Of Attention, Sentiment, And Five-Factor Fama-French Coefficients

(period from December 22, 2020, until August 31, 2021)

	(1) World	**(2) US**	**(3) Europe**	**(4) Asia**	**(5) Japan**
SMB	0.001 (0.164)	0.486*** (0.100)	–0.573*** (0.171)	–0.738*** (0.113)	–0.751*** (0.172)
HML	0.074 (0.153)	–0.025 (0.100)	0.744*** (0.172)	–0.546*** (0.119)	0.554** (0.265)
RMW	–0.438** (0.197)	0.254 (0.164)	–0.413* (0.246)	0.013 (0.119)	0.770* (0.399)
CMA	–0.399 (0.271)	–0.461** (0.204)	–1.863*** (0.260)	–0.141 (0.153)	–0.639 (0.486)
Google Trends ('Covid disease')	–0.096 (0.484)	–0.907 (0.732)	0.617 (0.538)	–0.064 (0.087)	–0.152 (0.315)
Google Trends ('Covid vaccine')	0.151 (0.324)	0.146 (0.492)	–0.288 (0.201)	–0.008 (0.011)	0.078 (0.313)
Stringency_Index	–5.337 (4.672)	3.359* (1.991)	–1.264 (4.103)	–1.980 (1.254)	4.493 (5.247)
New_cases	0.053 (0.290)	0.252 (0.367)	–0.028 (0.050)	0.027 (0.104)	–0.509 (0.346)
New_deaths	–0.121 (0.258)	–0.021 (0.261)	–0.029 (0.054)	0.004 (0.010)	–0.262* (0.155)
Constant	0.103** (0.051)	0.131** (0.058)	0.048 (0.056)	0.104** (0.049)	0.016 (0.076)
Observations	181	174	173	170	169
R^2 adj.	0.077	0.187	0.271	0.362	0.127

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Own estimations.

The analysis results provide evidence that the impact of the pandemic was limited to the period preceding the vaccine approval. Consequently, the effects of the pandemic were relatively short-term, aligning with existing literature.

5. Discussion

Several studies in the field examined the coronavirus's impact as a shock on the markets. The studies examined the relationships in the contexts of sentiment (Chundakkadan et al., 2021), uncertainty (Haroon and Rizvi, 2020), and others. For example, Albulescu (2021) observed the influence of announcements about new cases and deaths on financial market volatility. The study identified that both announcements increased the volatility of the financial markets. Bash (2020) identified the impact of the first confirmed positive case on 30 stock indices worldwide. The author concluded that the announcement had a significant negative effect on the stock markets. The effect of the virus on the markets was also confirmed by event studies (Maneenop et al., 2020; Verma et al., 2021).

In the empirical analysis, we investigated the relationship between news about the spread of COVID-19 and the global stock market, as well as the stock markets of Asia, the US, Europe, and Japan. The variables used in the analysis included attention (measured by Google Trends), the strictness of restrictions (using the Stringency Index), and the daily changes in newly infected cases and new deaths. The results indicated a significant impact on the stock markets of Google Trends' attention and new deaths. However, no significant impact was observed for information about new positive cases, which aligns with the findings of Heyden and Heyden (2021). They examined the returns of European and American stock markets during the early stages of the pandemic and concluded that the markets reacted differently to the first infected case compared to the first death. The reaction to the first death was significantly negative. In contrast, the reaction to the first positive case had no significant impact. In this study, we extended the analysis to include two additional countries and an aggregated sample. Moreover, we covered a more extended period to explore the impact of positive cases and deaths over the long term, distinguishing between the pre-vaccine and post-vaccine periods.

Negative investment sentiment about the spread of the virus was confirmed to be the main driver of the stock market decline at the beginning of the pandemic. The results of our paper agree with the paper by Sun et al. (2021). The study claims that the volatility during the period of the pandemic was significantly affected by the sentiment, not by the pandemic itself. We further contribute to these findings by extending the number of countries observed, as the authors only examined the Chinese stock market.

Salisu and Vo (2020) used Google Trends data to confirm the influence of attention. However, the authors aimed the study to identify the relationship between health news. Nepp et al. (2022) studied the role of attention, measured by Google Trends, on the global stock indices and identified that the news concerning the virus had a more significant effect than the pandemic itself. We complement these studies by distinguishing between attention to the virus and attention to a vaccine, and we further divided the dataset into the period before and after vaccine approval. The assumption of an effect of attention on vaccine development was confirmed in the period before vaccine approval for the European market. Surprisingly, we find an inverse relationship. This relationship may indicate that investors evaluated vaccine news negatively in the first period, as the development was uncertain for several months. The results indicate that investors may have sold European stocks on this basis.

Our results also did not confirm the hypothesis that the news about the virus affected Asian or Japanese markets. This complements Chopry and Mehty (2022), who compared the shock associated with the pandemic with the Asian financial crisis, the Great Financial Crisis, and the European debt crisis. The authors concluded that the pandemic did not affect Asian markets significantly compared to other crises. Part of this paper analyzed the impact of the index measuring the strictness of the restrictions. The Stringency Index was confirmed to have a negative impact on the global stock markets. However, we found no evidence of the relationship between regional markets.

This could be linked to the nature of the data. The data are daily, but the restrictions were modified less often. Because of this, it could be interesting to examine the impact of the restrictions by the event study method. That was studied by Ftiti et al. (2021), who empirically confirmed that the lockdown announcement in China had a significantly negative effect on the financial markets. We extend those findings by identifying the relationship between the US, Europe, and Japan and using the Stringency Index as the index has yet been used mainly in health-related studies (e.g., Dzator et al., 2021; Kishore et al., 2023).

Conclusion

We employed regression analysis to investigate the influence of coronavirus news on the world's stock markets, the US, Japan, Europe, and China. The models utilized the five-factor Fama-French Model as a foundation. Subsequently, we incorporated additional variables, including an investor attention index (Google Trends), a Stringency Index measuring the severity of government restrictions during the pandemic, and the daily fluctuations in new cases and deaths attributed to the virus.

The paper confirms, based on Google Trends, the significant negative impact of the attention of investors on the stock markets. Specifically, we distinguished between attention to the virus and the vaccine to find that attention to the virus affected global and US stock markets and attention to the vaccine affected European stock markets in the period prior to vaccine approval. The paper also identifies the influence of the news about new deaths. On the other hand, the impacts of news about newly infected persons and the government restrictions were not confirmed. The influences of those variables are significant only for the World Index and the US and European stock indices. According to the estimations, Asian markets were not affected by the news about the virus. This indicates that the news had different impacts based on the world's regions.

While the results confirm the impact of the variables for the period before the vaccine approval, the news about the virus spread did not affect the markets after the approval. The robustness analysis highlights the transitory impact of the coronavirus. We confirm that the main factor behind the stock market decline at the beginning of the pandemic was negative investment sentiment represented by news about new deaths linked to the virus. Further, we show that the emphasis should be put on the differentiation of the impacts by region. We identified different reactions of the Asian and Japanese stock markets compared to the US and European markets. In this context, we argue that it might be appropriate to include Japanese markets in the portfolio in order to improve diversification.

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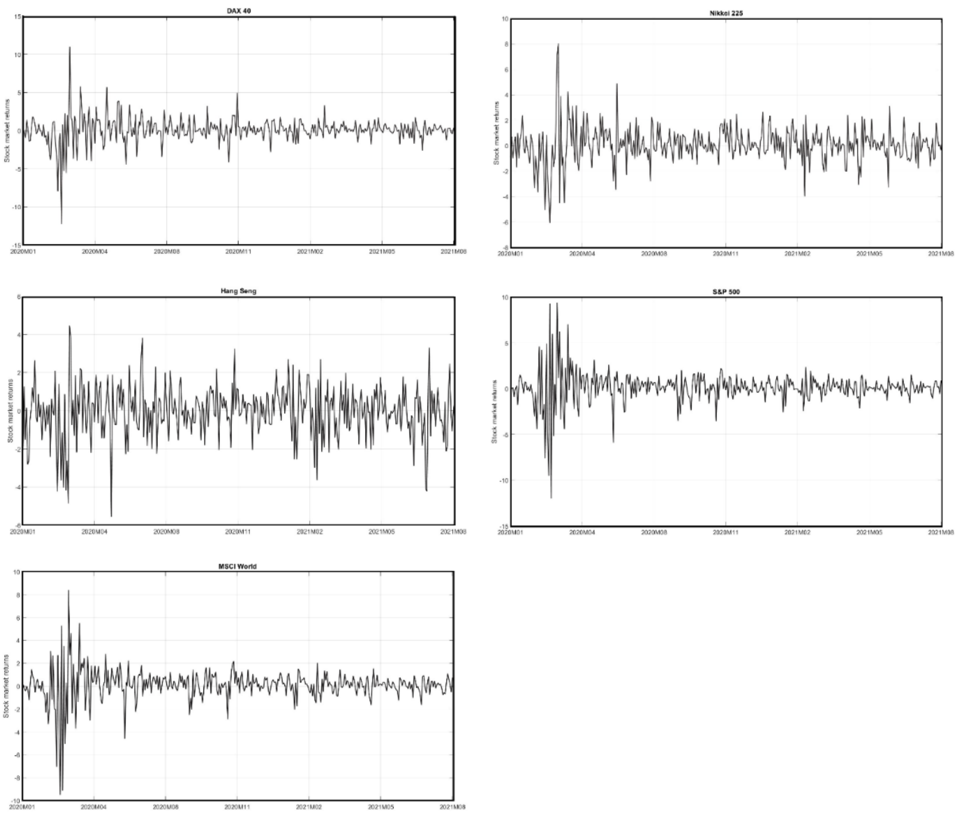
A p p e n d i x

F i g u r e 2

Returns of Stock Indices 2020 – 2021



Source: Bloomberg (2022).

Table A1

Descriptive Statistics – World (period from January 2020 until August 2021)

Variable	Mean	Std. Dev.	Min	Mdn	Max	Skewness	Kurtosis	ADF test
Mkt-RF	0.08	1.43	–9.62	0.17	8.32	–1.23	13.21	–12.03***
SMB	0.00	0.59	–5.26	0.02	1.99	–1.87	15.49	–27.26***
HML	–0.05	0.89	–3.11	–0.11	4.15	0.36	1.86	–13.62***
RMW	0.02	0.34	–1.51	0.03	1.18	0.00	1.19	–17.86***
CMA	–0.03	0.44	–1.91	–0.05	1.89	0.39	1.86	–13.91***
Covid_disease[1]	0.01	0.18	–0.59	0.00	1.81	4.03	32.86	–20.48***
Covid_vaccine[1]	0.01	0.20	–1.28	0.00	1.58	1.49	17.72	–17.09***
Stringency_Index[1]	0.00	0.05	–0.04	0.00	0.67	8.37	87.16	–24.42***
New_cases[1]	0.02	0.26	–2.01	0.02	2.01	0.24	19.01	–23.02***
New_deaths[1]	0.02	0.50	–3.41	0.02	3.92	0.74	30.26	–13.12***

Note: [1]After transformation by logarithmic differences.

Source: Own estimations.

Table A2

Descriptive Statistics – USA (period from January 2020 until August 2021)

Variable	Mean	Std. Dev.	Min	Mdn	Max	Skewness	Kurtosis	ADF test
Mkt-RF	0.10	1.79	–11.93	0.18	9.52	–0.80	11.72	–13.65***
SMB	0.00	0.92	–4.60	0.03	5.15	0.17	3.39	–20.12***
HML	–0.04	1.33	–4.37	–0.11	6.66	0.28	1.72	–18.49***
RMW	0.02	0.49	–1.52	0.00	1.73	0.04	0.38	–18.18***
CMA	–0.01	0.62	–2.68	–0.01	2.23	0.00	1.00	–18.57***
Covid_disease[1]	0.01	0.21	–0.77	0.00	2.51	5.35	56.29	–19.76***
Covid_vaccine[1]	0.01	0.27	–0.84	0.00	2.28	3.09	22.30	–21.14***
Stringency_Index[1]	0.03	0.54	–0.21	0.00	10.93	19.74	392.05	–20.34***
New_cases[1]	0.05	1.47	–11.00	0.01	10.60	0.30	40.95	–18.60***
New_deaths[1]	0.04	0.89	–9.21	0.00	11.00	4.48	108.71	–20.76***

Note: [1]After transformation by logarithmic differences.

Source: Own estimations.

Table A3

Descriptive Statistics – Europe (period from January 2020 until August 2021)

Variable	Mean	Std. Dev.	Min	Mdn	Max	Skewness	Kurtosis	ADF test
Mkt-RF	0.07	1.48	–12.00	0.21	8.54	–1.42	14.05	–11.69***
SMB	0.03	0.52	–3.33	0.03	1.84	–0.96	6.04	–21.18***
HML	–0.05	0.81	–3.04	–0.09	4.38	0.50	3.01	–17.64***
RMW	0.02	0.30	–1.01	0.04	0.93	–0.06	0.40	–19.47***
CMA	–0.06	0.39	–1.20	–0.12	1.31	0.58	0.90	–19.29***
Covid_disease[1]	0.01	0.20	–0.70	0.00	1.64	3.10	21.64	–20.14***
Covid_vaccine[1]	0.01	0.34	–2.04	0.00	2.08	0.45	10.77	–17.12***
Stringency_Index[1]	0.03	0.54	–0.16	0.00	10.93	19.85	395.53	–20.37***
New_cases[1]	0.04	2.04	–19.37	0.07	19.17	0.00	47.36	–24.96***
New_deaths[1]	0.03	2.25	–14.72	0.00	15.17	0.49	20.32	–22.56***

Note: [1]After transformation by logarithmic differences.

Source: Own estimations.

T a b l e A4

Descriptive Statistics – Asia (period from January 2020 until August 2021)

Variable	Mean	Std. Dev.	Min	Mdn	Max	Skewness	Kurtosis	ADF test
Mkt-RF	0.06	1.20	–6.90	0.20	5.20	–1.26	7.47	–12.07***
SMB	0.02	0.60	–3.28	0.06	2.21	–0.78	3.94	–23.99***
HML	–0.04	0.73	–2.87	–0.06	3.11	0.26	2.43	–11.95***
RMW	0.05	0.60	–2.65	0.04	3.33	0.09	3.67	–13.06***
CMA	–0.03	0.48	–1.49	–0.04	1.79	0.15	0.86	–11.71***
Covid_disease[1]	–0.00	0.60	–2.38	0.00	2.16	–0.01	1.54	–23.59***
Covid_vaccine[1]	–0.01	4.94	–11.41	0.00	11.41	0.04	0.87	–25.47***
Stringency_Index[1]	0.00	0.09	–0.35	0.00	1.15	7.62	87.83	–18.06***
New_cases[1]	–0.00	0.99	–10.30	–0.03	12.10	1.73	82.99	–21.12***
New_deaths[1]	–0.00	4.50	–14.01	0.00	14.22	–0.01	1.77	–22.91***

Note: [1]After transformation by logarithmic differences.

Source: Own estimations.

T a b l e A5

Descriptive Statistics – Japan (period from January 2020 until August 2021)

Variable	Mean	Std. Dev.	Min	Mdn	Max	Skewness	Kurtosis	ADF test
Mkt-RF	0.05	1.27	–7.82	0.08	6.72	–0.18	6.20	–12.47***
SMB	–0.01	0.59	–1.73	0.00	3.12	0.67	3.64	–22.51***
HML	–0.04	0.98	–2.72	–0.05	4.57	0.16	0.72	–18.96***
RMW	0.03	0.49	–1.71	0.04	1.48	–0.08	0.31	–17.89***
CMA	–0.02	0.54	–2.36	–0.03	2.30	0.06	1.69	–14.62***
Covid_disease[1]	0.00	0.29	–2.04	0.00	2.35	0.20	19.98	–16.18***
Covid_vaccine[1]	0.01	0.35	–1.39	0.00	1.48	0.18	1.97	–18.30***
Stringency_Index[1]	0.00	0.08	–0.26	0.00	1.09	9.77	119.80	–12.78***
New_cases[1]	0.05	1.57	–10.82	0.03	10.82	0.72	35.82	–26.96***
New_deaths[1]	0.03	2.47	–10.59	0.00	10.82	0.17	12.29	–23.11***

Note: [1]After transformation by logarithmic differences.

Source: Own estimations.