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Research Article

The Effect of Pandemic News on Stock Market Returns During the Covid-19 Crash: Evidence from International Markets

Covid-19 Çöküşü Sırasında Salgın ile ilgili Haberlerin Borsa Getirileri Üzerindeki Etkisi: Uluslararası Piyasalar Örneği

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ABSTRACT

This study investigates the effect of pandemic-related news on stock market returns in international markets using the quantile regression method. The media hype index, fake news index, country sentiment index, infodemic index, and media coverage index provided by the RavenPack data platform are used for the analysis. In this research, 2,996 observations from 80 countries, consisting of daily data from January 22, 2020, to April 17, 2020, were used. The results show that the impact of Covid-19-related news on market returns varies among the quantiles of the stock market; in other words, there is an asymmetric dependency between the news and financial markets. With the increase in coverage about the pandemic in the media, the negative impact on market returns exhibits a decreasing trend from low quantiles to high quantiles. More intense use of effective communication channels is required to alleviate the financial crash caused by Covid-19. To capture the effect of the news on financial markets, this analysis also categorized countries according to the Morgan Stanley Classification Index (MSCI, n.d.), such as by developed, emerging, standalone, and frontier markets and by geographical location, including Europe, Africa, North and South America, Asia, and the Middle East. The results are consistent with the previous findings and the dependency between the news and financial markets remains asymmetric.

Keywords: Covid-19, financial markets media hype index, country sentiment index, media coverage index, quantile regression

JEL Codes: F65, G40, D53

ÖZ

Bu çalışma salgın haberlerinin uluslararası piyasaların getirileri üzerindeki etkisini kantil regresyon yöntemi kullanarak araştırmaktadır. Analiz için RavenPack veri platformu tarafından sağlanan medyatiklik endeksi, sahte haber endeksi, ülke duyarlılık endeksi, infodemi endeksi ve medya ilgi endeksi kullanılmıştır. Bu araştırmada 22 Ocak 2020'den 17 Nisan 2020'ye kadar günlük verilerle 80 ülkeden 2.996 gözlem kullanılmıştır. Analiz sonuçlarına göre Covid-19 ile ilgili haberlerin piyasa getirileri üzerindeki etkisinin kantiller arasında farklılık gösterdiğini, diğer bir deyişle haberler ve finansal piyasalar arasında asimetrik bir bağımlılık bulunmuştur. Medyada salgın ile haberlerin artmasıyla birlikte piyasa getirileri üzerindeki olumsuz etkisi düşük kantillerden yüksek kantillere doğru düşüş eğilimi göstermektedir. Covid-19'un neden olduğu finansal çöküşü hafifletmek için etkili iletişim kanallarının daha yoğun kullanılması gerekmektedir. Haberlerin finansal piyasalar üzerindeki etkisini yakalamak için, bu çalışma aynı zamanda ülkeleri Morgan Stanley Sınıflandırma İndeksine göre (MSCI, n.d.), gelişmiş, gelişmekte olan, sınır pazarları ve bağımsız pazarlar olarak ve coğrafi konumuna göre Avrupa, Kuzey ve Güney Amerika, Asya ve Ortadoğu ülkeleri olarak sınıflandırmıştır. Sonuçlar önceki bulgular ile tutarlılık göstermiş ve haberler ile finansal piyasalar arasındaki asimetrik bağımlılık sürmüştür.

Anahtar Kelimeler: Covid-19, uluslararası finansal piyasalar medyatiklik endeksi, ülke duyarlılık endeksi, medya ilgi endeksi, kantil regresyon

JEL Sınıflandırılması: F65, G40, D53

INTRODUCTION

The novel coronavirus that first appeared in December 2019, referred to simply as "Covid-19," rapidly evolved into a global pandemic, posing significant health and economic difficulties (Ahundjanov, Akhundjanov, & Okhunjanov, 2020, p. 1). The first confirmed death in China was announced on January 11, 2020. After the first cases in the United States and Western Europe were confirmed at the end of January 2020, the total number of cases soared dramatically, especially in March. On March 11, 2020, the World Health Organization (WHO) declared a pandemic and warned countries to take precautions. The pandemic's threat has prompted people to alter their usual habits and governments to take extraordinary steps, such as issuing stay-at-home orders and travel bans, closing schools and businesses, mandating masks, and imposing similar restrictions (Ahundjanov et al., 2020; Chen et al., 2020; Nicola et al., 2020; Zaremba et al., 2021) that have caused global economic downturns (Yilmazkuday, 2020) and crashes in financial sectors (Baker et al., 2020). Stock markets, especially in the U.S, Japan, Germany and the U.K, experienced a collapse of around 10%-20% (Akhtaruzzaman, Boubaker, & Sensoy, 2020; Ali, Alam, & Rizvi, 2020; Ashraf, 2020b; Zhang, Hu, & Ji, 2020). On March 16, the volatility index of the Chicago Board Options Exchange, known as the VIX, reached its all-time high (Wagner, 2020).

Covid-19-related news and information have since appeared widely in the media, and investors make their investment decisions based on the information generated.

Disease-related news can trigger panic and affect investor sentiment (Tetlock, 2007). Political and economic news in the media is essential to share prices (Broadstock & Zhang, 2019; Shi & Ho, 2020). Social media news has a major effect on share prices, especially during a time of political and economic uncertainty (Cepoi, 2020). The economic significance and effects of such information in times of unparalleled access to news and information are difficult for investors to reasonably evaluate (Haroon & Rizvi, 2020). García (2013) reveals that the negative or positive tone of reporting in financial columns in the *New York Times* affects daily stock returns in recession times and Hanna, Turner, & Walker (2020) reveal that the tone of the *Financial Times* impacts trading volume during bull markets. Groß-Klußmann & Hautsch (2011) and Smales (2014b) demonstrate that negative news has a greater impact than positive news; Dzielinski (2011) shows that negative (positive) news causes below (above) average market returns.

This study tries to contribute to the literature by investigating the influence of Covid-19-related news on international stock markets. It reveals that there is an asymmetric dependence between news and stock returns by applying the quantile regression method. The few existing studies in the literature examine the U.S. and European stock markets (Cepoi, 2020; Corbet et al., 2020; Haroon & Rizvi, 2020); this study includes the stock market returns of 80 countries. The purpose of the paper is to fill the gap that exists in the literature.

Several studies focus on the effect of Covid-19 on financial markets, such as the impact on stock market returns and volatility (Al-Awadhi et al., 2020; Albulescu, 2020; Ali et al., 2020; Ashraf, 2020b, 2020c; Bahrini & Filfilan, 2020; Contessi & Pierangelo, 2020; Gu et al., 2020; Harjoto et al., 2020; Kartal, Kılıç-Depren, & Depren, 2020; Mazur, Dang, & Vega, 2020; Rababah et al., 2020; Sergi et al., 2021; Thorbecke, 2020; Topcu & Gulal, 2020), trade volume (Chiah & Zhong, 2020; Harjoto et al., 2020), stock repurchases (Pirgaip, 2021), government responses or interventions (Ashraf, 2020a; Chen et al., 2020; Zaremba et al., 2020; Zaremba et al., 2021), contagion effect (Okorie & Lin, 2020), market illiquidity (Baig et al., 2020), tourism and leisure sectors (Karabulut et al., 2020; Ghosh, 2020; Kaczmarek et al., 2021), herding behavior (Chang, McAleer, & Wang, 2020; Espinosa-Méndez & Arias, 2020), cryptocurrencies (Conlon & McGee, 2020; Corbet, Larkin, & Lucey, 2020; Demir et al., 2020), mutual funds (Mirza et al., 2020; Yarovaya et al., 2021), dividends (Krieger, Mauck, & Pruitt, 2020; Mazur, Dang, & Vo, 2020), uncertainty (Jeris & Nath, 2020), housing prices (Qian, Qiu, & Zhang, 2021) and oil prices (Corbet, Goodell,

& Günay, 2020; Devpura & Narayan, 2020; Fu & Shen, 2020; Huang & Zheng, 2020; Salisu, Ebuh, & Usman, 2020).

Among the studies related to the impact of pandemic news, Cepoi (2020) examines stock market responses to Covid-19-related news in the six most affected developed markets (France, Germany, Italy, Spain, the U.S. and the U.K.) and finds that the news has an asymmetric effect on financial markets. Ambros et al., (2020) use 30-minute news and market data to capture the impact of the Covid-19-related news on financial markets. While the news about Covid-19 does not have an impact on returns, it is found to have a significant effect on volatility. Salisu & Vo (2020) examine the effect of pandemic-related health news on the stock markets of 20 countries. Health news and Volatility Index (VIX) predictability results combine impact returns negatively. Corbet et al., (2020) analyze the stock performances of firms with the word "corona" in their brands or product names (Constellation Brands Inc. [U.S.], Corona Corp. [Japan], and Coronation Fund Managers [South Africa]. The results of the study indicate that the stock prices of these firms are affected negatively on the whole. Haroon & Rizvi (2020) investigate the effect of coronavirus-related news on the volatility of equity markets for the world, the U.S and sub-sectors. The rising panic index creates volatility for the world, the U.S. and within some sectors of the U.S, specifically: energy, travel, leisure, automobiles & components and transportation. A negative sentiment index induces volatility in the U.S. market, and, interestingly, higher media coverage in global markets is correlated with lower volatility. To summarize the studies examining the impact of the Covid-19-related news on markets, it can be seen that the news has an effect on market returns and volatility in general.

AIM AND METHODOLOGY

This part of the study will explain the purpose of the study, and then the methodology, and finally the data collection.

Aim

The panic atmosphere that occurred with the spread of Covid-19 all over the world affected not only social life but also the decisions of financial investors. In this paper, the effect of the Covid-19-related news on international markets is analyzed with the quantile regression method to analyze whether the effect of the news on different quantiles is symmetrical or not.

Methodology

Based on the conditional mean function *E(y|x),* the classical regression model analyzes the relationship between an independent *(x)* and a dependent variable *(y)*. Therefore, based on a moment of the distribution of *y,* this model provides a relatively limited measure of the relationship (Barış-Tüzemen, Tüzemen, & Çelik, 2020, p. 20792-20793). The Ordinary Least Square (OLS) estimators lose their effectiveness when the errors are not suitable for normal distribution and contain outliers. In some situations, the quantile varying estimations disclose that OLS approaches cannot ensure a solution for extreme events. Considering the excess volatility during the Covid-19 turmoil, the quantile regression model was employed in this study. In contrast to other econometric techniques that primarily focus on mean effects, the quantile regression is the technique most often used for handling with the fat tails or extreme values in asset return distributions (Cepoi, 2020; du Plooy, 2019). The quantile regression model was first suggested by Koenker & Basset (1978) and applied to cover a set of regression curves that differ across different quantiles of the dependent variable's conditional distribution. The advantages of quantile regressions are as follows:

- This technique is more adaptable for modeling data with heterogeneous conditional distributions.
- In comparison to mean regression, median regression is more robust to outliers.
- This method can seize the potential nonlinear relationship between independent and dependent variables, which cannot be solved using other linear approaches.

It can be written as the basic quantile model in equation (1):

$$Y_{i} = x_i'\beta\tau + \mu\tau_i \; with \; Q\tau(y_t|x_t) = x_t'\beta\tau \qquad (1)$$

where, x_t' vshows a vector of regressors, $\beta\tau$ displays the vector of parameters to be estimated and $\mu\,\tau_i$ represents a vector of residuals. $Q\tau(y_t|x_t)$ demonstrates τ^{th} conditional quantile of $\boldsymbol{y}_i$ granted x_i'. The approximation of is supported by the undermentioned optimization problems:

$\beta\tau$=argminβ

$0 < \tau < 1$

$$\left\{\sum_{t:yt>x_t'\beta} \tau|yi - x_i' \quad| + \sum_{t:yt>x_t'\beta}(1-\tau)|y_i - x_i'\beta|\right\} \qquad (2)$$

The median regression is received by $\tau = 0.5$. Different quantiles of conditional distribution can be found through variations of (Chellaswamy, Natchimuthu, & Faniband, 2020, p. 149).

Data Collection

The data of the indices were acquired from the Thomson Reuters DataStream. If the data is not available on this platform, it can be obtained from https://www.investing.com (Investing, n.d.). The data from the Trinidad & Tobago Stock Exchange, however, can only be retrieved from their own website (Trinidad & Tobago Stock Excange, n.d.). The study period lasted from January 22, 2020, to April 17, 2020, with daily data being used. The reason for making the last day April 17 is that although as of mid-April the uncertainty was still continuing, the stock markets had started to recover to a certain extent (Cepoi, 2020). The financial market indices of 80 countries were used in the study, as shown in Table 1. After eliminating weekend holidays, countries' national holidays and incomplete data sets, the final data consisted of 2,296 observations. The sample data was also classified into 1,113 observations across 24 developed markets, 1,066 observations across 27 emerging markets, 561 observations across 18 frontier markets, and 256 observations across 11 standalone and unclassified markets. The Covid-19-related news variables were obtained from RavenPack. This data analytics platform provides the latest information about panic, sentiment and misinformation regarding coronavirus measures. The platform has a country-specific media hype index, fake news index, country sentiment index, infodemic index and media coverage index (Blitz et al., 2020; Cepoi, 2020; Shi & Ho, 2020; Smales, 2014a). The description of each index is given in the appendix.

FINDINGS

The descriptive statistics of the variables used in the study are shown in Table 2. The average returns are -0.004 with a standard deviation of 0.0405. A zero mean value endorses the random walk property of stock market returns (Ashraf, 2020a, p. 4). All indices except the country sentiment index assign values between 0 and 100. An increase in value means that news about Covid-19 is getting more coverage in the media. The sentiment index, on the other hand, assigns a value between -100 and 100, and when it approaches 100, the improving sentiment positively affects returns. The infodemic index shows the highest values, while the fake news index has the lowest average values and standard deviation.

Table 3 shows the correlation matrix table. Stock returns have negative and significant correlations with media hype, infodemic and media coverage index, and negative but insignificant correlation with fake news index. In contrast, as expected, it has a positive and significant correlation with the country sentiment index. Variance inflation factor (VIF) displays the multicollinearity problem among the independent variables. In the respective regression model, multicollinearity is considered too high if the VIF is larger than 5 or 10 (Guizani, 2017, p. 139). In our study, the mean VIF was 2.09, so there is no multicollinearity problem among variables.

Table 4 indicates the quantile regression results for all countries from the 0.05 to 0.95 quantiles. The media hype index has a negative effect on stock returns, but the magnitude of the effect decreases from the lowest to the upper quantiles. It has a negative and significant impact on stock returns between the 0.05 and 0.25 quantiles. The fake news index does not affect market returns at times of extremely bearish (the 0.05 quantile) and bullish (0.95) markets and, interestingly, stock returns indicate the positive influence over time of financial turbulence for the 0.10 and 0.25 quantiles (Cepoi, 2020). When good news about the coronavirus circulates in a given country, the sentiment index of the country is positively affected for the lower quantiles. Interestingly however, the sentiment index influences the highest quantile negatively but insignificantly. The infodemic index is the only one that has a negative and significant effect on all quantiles. In addition, the media coverage index has a negative effect on stock returns, but an insignificant one, for the 0.90 and 0.95 quantiles. Fang & Peress (2009) finds that stocks with no media coverage have a higher return than stocks with higher media coverage and suggests that the extent of information propagation affects stock returns. Stock market returns are affected by the coverage of Covid-19-related news in the media and the increase in coverage of entities (Cepoi, 2020; Haroon & Rizvi, 2020). Figure 1 illustrates the graphical results of each variable.

This analysis also categorized markets based on the MSCI classification system (https://www.msci.com/market-classification) to examine the effect of the news on different financial markets. Table 5 shows the results in the developed, emerging, and frontier markets, respectively. The results in standalone and unclassified markets are shown in the Appendix. The findings are similar to those mentioned above, as identifying an asymmetric dependency between the indices and market returns. The country sentiment index has a positive effect on developed markets for the 0.90 and 0.95 quantiles and the index is positive and significant for emerging and frontier markets

for the lower quantiles (0.05 and 0.10). The media coverage index has a negative and significant effect on developed and emerging markets. Except for the 0.50 and 0.75 quantiles, the media hype index has a negative and significant effect on stock returns for emerging markets. Finally, this analysis categorizes countries according to their geographical regions based on MSCI classification. Table 6 displays the results for Europe, the Americas (North and South America), Asia, Africa and the Middle East, respectively. The results are in line with those previously mentioned. Furthermore, the robustness is tested by conducting equal testing among the different quantile levels for international markets and other sub-groups. Because of the brevity of the study, only the results for international markets have been reported. Table 7 displays the F-tests results for each pair of quantile levels. The results of the test reject the null hypothesis that the coefficients of each quantile level are equal or homogeneous. These findings demonstrate that each independent variable has different effects on the dependent variables (Nguyen, 2020).

DISCUSSION AND CONCLUSION

In this information age, people can be bombarded with a large amount of true or false news from different media channels. The Covid-19 pandemic, which emerged as of the end of December 2019, 100 years after the Spanish flu, dramatically spread all over the world and has created chaos. The presence of both true or false information in the news about what the disease is, how it is transmitted, and whether a vaccine would be developed or not has affected not only social and economic life, but also the rational decisions of investors. As a result, since not all investors could access the most accurate information at the same time, as investors sold in a panic, volatility increased, and returns were negative. Especially as of the end of January 2020, with the virus having spread to the whole of the U.S and Europe, the financial markets experienced unprecedented declines, then started to recover from mid-April thanks to the support governments gave to the markets. This study attempts to examine the impact of pandemic-related news on stock returns in international markets from January 22, 2020, to April 17, 2020, with a sample of 2,996 observations across 80 countries. The media hype index, fake news index, country sentiment index, infodemic index, and media coverage index provided by the RavenPack data platform were used to capture the effect of the news on international markets. This paper demonstrates that the effect of the news on stock returns varies amongst the quantiles. In other words, there is an asymmetric dependency between the news and market returns. The results of the

study are consistent with the findings of Cepoi (2020). An equality test is also applied to confirm the results, and the impact is not found to be homogenous on quantiles. According to the results, it can be interpreted those investors in international markets react at different levels to the Covid-19-related news. Furthermore, the speed at which markets respond to news might indicate policy implications in terms of assuring well-timed dissemination of news to all market participants (Smales, 2014). In conclusion, to alleviate the financial turmoil associated with Covid-19, more extensive use of proper communication channels is needed. Since this study is limited to the effect of pandemic-related news on international market returns, future papers might analyze the impact of the pandemic on volatility and volume with different techniques for examining international or other sub-markets by adding country-specific variables.

ENDNOTES

[1] Although China had Covid-19 cases before 22.01.2020, databases started reporting information on this day.

[2] Australia, Austria, Belgium, Canada, Chile, Czech Republic, Colombia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Iceland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Switzerland, Sweden, Turkey, United Kingdom, United States

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TABLES AND FIGURES

Table 1: Sample Information about Countries

Country	Index	MSCI Classification	First Covid-19 case was confirmed	Obs.	Source
Argentina	MERVAL	Emerging	03.03.2020	28	Thomson Reuters
Australia	ASX 200	Developed	26.01.2020	57	Thomson Reuters
Austria	ATX	Developed	25.02.2020	36	Thomson Reuters
Bahrain	BAX	Frontier	24.02.2020	38	https://www.investing.com
Bangladesh	DSE 30	Frontier	08.03.2020	12	https://www.investing.com
Belgium	BEL 20	Developed	04.02.2020	51	Thomson Reuters
Brazil	BOVESPA	Emerging	26.02.2020	36	https://www.investing.com
Bulgaria	BSX Sofia	Standalone	08.03.2020	26	Thomson Reuters
Canada	TSX Composite	Developed	26.01.2020	57	Thomson Reuters
Chile	CLX IGPA	Emerging	03.03.2020	32	Thomson Reuters
China	Shanghai Composite	Emerging	22.01.2020[1]	54	Thomson Reuters
Colombia	COLCAP	Emerging	06.03.2020	26	https://www.investing.com
Cote D'Ivoire	BRVM	Frontier	11.03.2020	24	https://www.investing.com
Croatia	CROBEX	Frontier	25.02.2020	36	Thomson Reuters
Cyprus	Cyprus SE	Unclassified	09.03.2020	24	Thomson Reuters
Czechia	Prague SE	Emerging	02.03.2020	32	Thomson Reuters
Denmark	OMX Copenhagen 20	Developed	27.02.2020	33	Thomson Reuters
Egypt	Hermes	Emerging	14.02.2020	43	Thomson Reuters
Estonia	OMX Tallinn	Frontier	27.02.2020	34	Thomson Reuters
Finland	OMX Helsinki	Developed	29.01.2020	55	Thomson Reuters
France	CAC 40	Developed	26.01.2020	57	Thomson Reuters
Germany	DAX 30	Developed	28.01.2020	56	Thomson Reuters
Greece	ATHEX	Emerging	26.02.2020	32	Thomson Reuters
Hong Kong	Hang Seng	Developed	23.01.2020	57	Thomson Reuters
Hungary	BSE	Emerging	04.03.2020	30	Thomson Reuters
Iceland	OMX Iceland	Standalone	28.02.2020	32	Thomson Reuters
India	Nifty 500	Emerging	30.01.2020	50	Thomson Reuters
Indonesia	IDX	Emerging	02.02.2020	31	Thomson Reuters
Iraq	ISX 60	Unclassified	24.02.2020	14	https://www.investing.com
Ireland	ISEQ Overall	Developed	29.02.2020	32	Thomson Reuters
Israel	TA 125	Developed	21.02.2020	34	Thomson Reuters
Italy	FTSE MIB	Developed	31.01.2020	53	Thomson Reuters

Jamaica	Jamaica SE	Standalone	11.03.2020	22	https://www.investing.com
Japan	Nikkei 225	Developed	22.01.2020	59	Thomson Reuters
Kazakhstan	KASEX	Frontier	15.03.2020	21	https://www.investing.com
Kenya	NSE20	Frontier	13.03.2020	23	https://www.investing.com
Kuwait	BKA	Emerging	24.02.2020	31	https://www.investing.com
Latvia	OMX RGI	Unclassified	03.03.2020	28	https://www.investing.com
Lebanon	BLOM	Frontier	21.02.2020	32	Thomson Reuters
Lithuania	OMX VIL	Frontier	28.02.2020	31	https://www.investing.com
Luxembourg	LX SE	Developed	02.03.2020	32	Thomson Reuters
Malaysia	KLCI	Emerging	25.01.2020	59	Thomson Reuters
Malta	Malta SE	Standalone	07.03.2020	25	Thomson Reuters
Mexico	BOLSA	Emerging	28.02.2020	32	Thomson Reuters
Morocco	Moroccan All Shares	Frontier	02.03.2020	34	https://www.investing.com
Netherlands	AEX	Developed	27.02.2020	34	Thomson Reuters
New Zealand	NZX 50	Developed	28.02.2020	33	Thomson Reuters
Nigeria	NSE 30	Frontier	01.03.2020	33	https://www.investing.com
Norway	OSBX	Developed	26.02.2020	34	https://www.investing.com
Oman	Muscat	Frontier	24.02.2020	38	Thomson Reuters
Pakistan	Karachi 100	Emerging	26.02.2020	36	Thomson Reuters
Peru	BVL	Emerging	06.03.2020	28	Thomson Reuters
Philippines	IPSEI	Emerging	30.01.2020	51	Thomson Reuters
Poland	WIG 30	Emerging	04.03.2020	30	https://www.investing.com
Portugal	PSI 20	Developed	02.03.2020	32	Thomson Reuters
Qatar	QE General	Emerging	02.03.2020	33	https://www.investing.com
Romania	BET	Frontier	26.02.2020	36	Thomson Reuters
Russia	MOEX	Emerging	31.01.2020	53	Thomson Reuters
Saudi Arabia	Tadawul	Emerging	02.03.2020	33	https://www.investing.com
Serbia	BELEX 15	Frontier	08.03.2020	29	https://www.investing.com
Singapore	Straits Time	Developed	23.01.2020	58	Thomson Reuters
Slovak Republic	SAX 16	Unclassified	06.03.2020	25	Thomson Reuters
Slovenia	SBI TOP	Frontier	05.03.2020	29	Thomson Reuters
South Africa	JSE	Emerging	05.03.2020	29	Thomson Reuters
South Korea	KOSPI	Emerging	22.02.2020	59	Thomson Reuters
Spain	IBEX 35	Developed	01.02.2020	52	Thomson Reuters

Sri Lanka	CSE All Share	Frontier	27.02.2020	29	https://www.investing.com
Sweden	OMX Stockholm 30	Developed	31.01.2020	53	Thomson Reuters
Switzerland	SMI	Developed	25.02.2020	36	Thomson Reuters
Taiwan	TSE	Emerging	22.01.2020	54	Thomson Reuters
Thailand	SET INDEX	Emerging	22.01.2020	60	Thomson Reuters
Trinidad & Tobago	TTSE	Standalone	16.03.2020	21	https://www.stockex.co.tt
Tunisia	TUNINDEX	Frontier	04.03.2020	29	Thomson Reuters
Turkey	BIST 100	Emerging	10.03.2020	27	Thomson Reuters
United States	S&P 500	Developed	22.01.2020	60	Thomson Reuters
United Arab Emirates	ADX	Emerging	29.01.2020	56	https://www.investing.com
United Kingdom	FTSE 100	Developed	31.01.2020	53	Thomson Reuters
Ukraine	PFTS	Standalone	03.03.2020	17	https://www.investing.com
Venezuela	Venezuela SE	Unclassified	16.03.2020	21	Thomson Reuters
Vietnam	VN	Frontier	23.01.2020	54	https://www.investing.com
Total				**2996**	

Table 2: Descriptive Statistics

VARIABLES	**Obs.**	**Mean**	**P25**	**Median**	**P75**	**Std. Dev.**
Index Returns	2996	-0.004	-0.017	-0.0007	0.013	0.040
Media Hype Index	2996	53.49	39.16	57.20	68.94	21.004
Fake News Index	2996	2.19	0.76	1.38	2.41	3.661
Country Sentiment Index	2996	-18.02	-27.10	-13.2	-5.28	18.168
Infodemic Index	2996	53.84	35.38	55.56	71.43	22.957
Media Coverage Index	2996	67.00	56.03	73.06	80.35	17.622

Table 3: Pairwise Correlation Matrix

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**VIF**
Index Returns (1)	1						
Media Hype Index (2)	-0.1438*	1					2.63
Fake News (3)	-0.0028	0.2227	1				1.07
Country Sentiment Index (4)	0.0363*	-0.0481*	-0.0047	1			1.00
Infodemic Index (5)	-0.1359*	0.2413*	0.0193	0,0115	1		1.07
Media Coverage Index (6)	-0.1562*	0.7720*	0.1030*	-0.0495*	0.2049*	1	2.48

Table 4: Quantile Regression Results for International Markets

Variables	τ=0.05	τ=0.10	τ=0.25	τ=0.50	τ=0.75	τ=0.90	τ=0.95
Media Hype Index	-0.000514**	-0.00046***	-0.000198**	-0.00008	-0.00005	-0.000160	-0.000240
	(0.000248)	(0.000109)	(0.000008)	(0.00006)	(0.00006)	(0.000161)	(0.000206)
Fake News Index	0.000288	0.000489***	0.000293***	0.00002	0.00005	-0.00008	0.00008
	(0.000295)	(0.000114)	(0.000107)	(0.00007)	(0.000115)	(0.000196)	(0.000357)
Sentiment Index	0.000545***	0.000311***	0.000184**	0.00003	0.00003	0.00005	-0.00009
	(0.000185)	(0.00009)	(0.00008)	(0.00005)	(0.00004)	(0.000109)	(0.000274)
Infodemic Index	-0.00060***	-0.00041***	-0.00039***	-0.00019***	-0.00025***	-0.00028***	-0.00028*
	(0.000161)	(0.000125)	(0.0006)	(0.00003)	(0.00005)	(0.00007)	(0.000161)
Media Coverage Index	-0.00085***	-0.00069***	-0.00051***	-0.00020***	-0.00023***	-0.00008	-0.000294
	(0.000203)	(0.000159)	(0.000100)	(0.00007)	(0.00009)	(0.000245)	(0.000302)
Constant	-0.0542***	-0.0379***	-0.0165***	-0.000510	0.0124***	0.0287***	0.0450***
	(0.00250)	(0.00123)	(0.000879)	(0.000420)	(0.000500)	(0.00124)	(0.00211)
Observations	2996	2996	2996	2996	2996	2996	2996
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.							

Table 5: Quantile Regression Results for Developed, Emerging and Frontier Markets

Variables	τ=0.05	τ=0.10	τ=0.25	τ=0.50	τ=0.75	τ=0.90	τ=0.95
Panel A. Developed Markets							
Media Hype Index	-0.000661	0.0005	0.000140	-0.000138	-0.000180	-0.000246	-0.000505
	(0.000537)	(0.000443)	(0.000307)	(0.000202)	(0.000209)	(0.000325)	(0.000357)
Fake News Index	0.000179	0.000591	-0.000146	-0.000695	-0.00009	-0.000181	0.000378
	(0.00180)	(0.00088)	(0.000974	(0.00062)	(0.00067)	(0.00053)	(0.0011)
Sentiment Index	0.000505	0.000470*	0.000262	0.000113	0.000149	0.000572**	0.000723*
	(0.000366)	(0.000250)	(0.000184)	(0.000125)	(0.000135)	(0.000249)	(0.00040)
Infodemic Index	-0.000317	-0.000613**	-0.000618***	-0.000433***	-0.000332**	-0.000402	-0.000802***
	(0.000362)	(0.000243)	(0.000193)	(0.000134)	(0.000169)	(0.000349)	(0.00024)
Media Coverage Index	-0.00177***	-0.00186***	-0.00139***	-0.000594**	-0.000341*	-0.000662	-0.000146
	(0.000545)	(0.000476)	(0.000387)	(0.000279)	(0.000192)	(0.000478)	(0.00058)
Constant	-0.0521***	-0.0385***	-0.0175***	0.00007	0.0138***	0.0327***	0.0482***
	(0.00368)	(0.00188)	(0.00175)	(0.00115)	(0.000929)	(0.00194)	(0.00223)
Observations	1113	1113	1113	1113	1113	1113	1113
Variables	τ=0.05	τ=0.10	τ=0.25	τ=0.50	τ=0.75	τ=0.90	τ=0.95
Panel B. Emerging Markets							
Media Hype Index	-0.000878**	-0.000540**	-0.000211***	-0.000177	-0.000110	-0.000392**	-0.000576**
	(0.000440)	(0.000237)	(0.00008)	(0.000111)	(0.000104)	(0.000194)	(0.000234)
Fake News Index	0.000852	0.000801*	0.000355	0.000172	0.000381	0.000398	-0.000247
	(0.00101)	(0.000425)	(0.000299)	(0.000402)	(0.000391)	(0.000621)	(0.000581)
Sentiment Index	0.000648*	0.000432**	0.000120	-0.00003	0.00006	-0.000186	-0.000604
	(0.000334)	(0.000202)	(0.000215)	(0.000159)	(0.000184)	(0.000354)	(0.000464)
Infodemic Index	-0.000809***	-0.000830***	-0.000643***	-0.000291***	-0.000389***	-0.000356	-0.000233
	(0.000181)	(0.000188)	(0.000121)	(0.00009)	(0.000112)	(0.000242)	(0.000298)

Media Coverage Index	-0.00179**	-0.00143***	-0.00103***	-0.000459***	-0.000434***	-0.000103	-0.00008
	(0.000761)	(0.000441)	(0.000129)	(0.000132)	(0.000147)	(0.000453)	(0.000670)
Constant	-0.0588***	-0.0414***	-0.0192***	-0.000316	0.0152***	0.0335***	0.0517***
	(0.00369)	(0.00196)	(0.00151)	(0.000816)	(0.00111)	(0.00335)	(0.00315)
Observations	1066	1066	1066	1066	1066	1066	1066
Variables	***τ=0.05***	***τ=0.10***	***τ=0.25***	***τ=0.50***	***τ=0.75***	***τ=0.90***	***τ=0.95***
Panel C. Frontier Markets							
Media Hype Index	-0.000546	0.00001	-0.00006	-0.00006	-0.000203**	-0.00007	0.00009
	(0.000366)	(0.000312)	(0.000195)	(0.00008)	(0.00009)	(0.000209)	(0.000265)
Fake News Index	0.000280	-0.00007	0.000165	0.00001	-0.00001	-0.000164	-0.000147
	(0.000475)	(0.000263)	(0.000178)	(0.00008)	(0.000182)	(0.000260)	(0.000271)
Sentiment Index	0.00204***	0.00107*	0.000154	0.00008	-0.000283*	-0.000244	-0.000498
	(0.000619)	(0.000581)	(0.000196)	(0.00008)	(0.000162)	(0.000272)	(0.000380)
Infodemic Index	-0.000578**	-0.000367**	-0.000143*	-0.00005	-0.000107	-0.00009	-0.000313*
	(0.000255)	(0.000167)	(0.00008)	(0.00004)	(0.00008)	(0.000118)	(0.000182)
Media Coverage Index	0.000114	-0.000573**	-0.000218	-0.00003	0.000149	-0.00005	-0.000199
	(0.000373)	(0.000228)	(0.000229)	(0.000111)	(0.000113)	(0.000216)	(0.000311)
Constant	-0.0450***	-0.0306***	-0.0115***	-0.00117**	0.00706***	0.0184***	0.0288***
	(0.00413)	(0.00266)	(0.00104)	(0.000504)	(0.000958)	(0.00171)	(0.00269)
Observations	561	561	561	561	561	561	561

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Quantile Regression Results for Europe, Americas, Asia, Middle East and Africa

Variables	τ=0.05	τ=0.10	τ=0.25	τ=0.50	τ=0.75	τ=0.90	τ=0.95
Panel A. Europe							
Media Hype Index	0.00009	0.000143	0.000219	0.00007	-0.00007	-0.000109	-0.000210
	(0.000527)	(0.000350)	(0.000172)	(0.000134)	(0.000166)	(0.000265)	(0.000421)
Fake News Index	-0.000163	0.00003	0.000109	0.00002	-0.0007	-0.000134	-0.00048*
	(0.000599)	(0.000286)	(0.000128)	(0.0009)	(0.000123)	(0.000186)	(0.000285)
Sentiment Index	0.00104***	0.000456**	0.000434***	0.00005	0.000116	0.00007	0.000144
	(0.000333)	(0.000223)	(0.000154)	(0.000105)	(0.00008)	(0.000244)	(0.000479)
Infodemic Index	-0.00081***	-0.00067***	-0.00055***	-0.00037***	-0.00034***	-0.00031**	-0.00035*
	(0.000287)	(0.000225)	(0.00007)	(0.00007)	(0.00008)	(0.000155)	(0.000190)
Media Coverage Index	-0.00161***	-0.00141***	-0.00092***	-0.000332**	-0.000195	-0.00003	-0.000196
	(0.000532)	(0.000254)	(0.000230)	(0.000166)	(0.000221)	(0.000372)	(0.000561)
Constant	-0.0558***	-0.0392***	-0.0180***	0.000489	0.0142***	0.0290***	0.0456***
	(0.00309)	(0.00133)	(0.00168)	(0.000772)	(0.000857)	(0.00130)	(0.00255)
Observations	1273	1273	1273	1273	1273	1273	1273
Variables	τ=0.05	τ=0.10	τ=0.25	τ=0.50	τ=0.75	τ=0.90	τ=0.95
Panel B. Americas							
Media Hype Index	-0.00109**	-0.00106**	-0.000236	0.00009	0.000155	0.000141	0.000600
	(0.000499)	(0.000524)	(0.000354)	(0.000232)	(0.000278)	(0.000412)	(0.000640)
Fake News Index	0.000648	0.00160	0.000161	-0.000407	0.000350	0.00128	-0.00104
	(0.00277)	(0.00279)	(0.00200)	(0.00198)	(0.00235)	(0.00575)	(0.00707)
Sentiment Index	0.000757	-0.00008	-0.000205	-0.000330	-0.000514	-0.000834*	-0.00141
	(0.000742)	(0.000768)	(0.000580)	(0.000244)	(0.000382)	(0.000455)	(0.00102)
Infodemic Index	-0.00127**	-0.00100**	-0.00093***	-0.000524*	-0.000471	-0.00003	0.00162
	(0.000553)	(0.000414)	(0.000218)	(0.000285)	(0.000314)	(0.000746)	(0.00102)
Media Coverage Index	-0.000766	-0.000511	-0.00100**	-0.000756**	-0.000565	-0.00109	-0.00179
	(0.000513)	(0.000614)	(0.000390)	(0.000315)	(0.000398)	(0.000698)	(0.00165)
Constant	-0.0704***	-0.0488***	-0.0220***	-0.000419	0.0180***	0.0453***	0.0794***
	(0.00565)	(0.00483)	(0.00320)	(0.00244)	(0.00307)	(0.00879)	(0.0110)
Observations	363	363	363	363	363	363	363
Variables	τ=0.05	τ=0.10	τ=0.25	τ=0.50	τ=0.75	τ=0.90	τ=0.95
Panel C. Asia							
Media Hype Index	-0.00098***	-0.00074***	-0.000342**	-0.000185	-0.000281*	-0.000315	0.000325
	(0.000351)	(0.000275)	(0.000151)	(0.000172)	(0.000154)	(0.000354)	(0.000499)
Fake News Index	0.00005	-0.000932	-0.000833	-0.000236	-0.000222	0.000415	-0.000979
	(0.00172)	(0.00118)	(0.000702)	(0.000402)	(0.000413)	(0.00119)	(0.00138)
Sentiment Index	0.000358	0.000242	0.000221	0.00008	0.000104	0.000101	0.000349
	(0.000241)	(0.000178)	(0.000170)	(0.000135)	(0.000127)	(0.000296)	(0.000369)
Infodemic Index	-0.000595	-0.000458**	0.00001	0.00007	0.000146	0.000326*	0.00002
	(0.000445)	(0.000188)	(0.000210)	(0.000112)	(0.000114)	(0.000189)	(0.000546)
Media Coverage Index	-0.000173	-0.00008	-0.00055***	-0.000321	-0.000280	-0.000507	-0.000933
	(0.000738)	(0.000258)	(0.000188)	(0.000219)	(0.000187)	(0.000336)	(0.000595)

Constant	-0.0464*** (0.00266)	-0.0326*** (0.00224)	-0.0133*** (0.00169)	-0.00127 (0.000795)	0.00991*** (0.00109)	0.0238*** (0.00205)	0.0405*** (0.00446)
Observations	713	713	713	713	713	713	713
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1							

Table 6: (continued)

Variables	τ=0.05	τ=0.10	τ=0.25	τ=0.50	τ=0.75	τ=0.90	τ=0.95
Panel A. Middle East							
Media Hype Index	-0.00119 (0.00103)	-0.000551 (0.000443)	-0.000405 (0.000269)	-0.000297* (0.000173)	-0.000466* (0.000278)	-0.000338 (0.000463)	-0.00117** (0.000465)
Fake News Index	0.00131 (0.00225)	0.000476 (0.00130)	-0.000657 (0.000486)	-0.000317 (0.000539)	-0.000547 (0.000546)	0.000630 (0.000958)	0.00295 (0.00191)
Sentiment Index	-0.00003 (0.000547)	-0.000104 (0.000266)	-0.000319 (0.000218)	-0.000113 (0.000154)	-0.00005 (0.000297)	0.00004 (0.000361)	0.000296 (0.000648)
Infodemic Index	-0.000119 (0.000520)	-0.000193 (0.000232)	-0.000155 (0.000116)	-0.000141 (0.00009)	-0.000151 (0.00009)	-0.000294 (0.000190)	-0.000518 (0.000419)
Media Coverage Index	-0.000712 (0.00125)	-0.000830 (0.000531)	0.00006 (0.000270)	0.000105 (0.000229)	0.000434** (0.000220)	-0.00006 (0.000527)	0.000158 (0.000696)
Constant	-0.0426*** (0.00903)	-0.0326*** (0.00301)	-0.0123*** (0.00267)	-0.00255** (0.00120)	0.00721*** (0.00138)	0.0239*** (0.00328)	0.0415*** (0.00637)
Observations	308	308	308	308	308	308	308
Variables	τ=0.05	τ=0.10	τ=0.25	τ=0.50	τ=0.75	τ=0.90	τ=0.95
Panel B. Africa							
Media Hype Index	-0.00127 (0.00077)	-0.00100* (0.0005)	-0.000467 (0.000290)	-0.000157 (0.0002)	-0.000228 (0.000227)	-0.000144 (0.00028)	-0.000289 (0.00035)
Fake News Index	-0.000980 (0.00238)	-0.000779 (0.00149)	-0.000696 (0.000814)	-0.000321 (0.000293)	0.00008 (0.000217)	-0.00002 (0.000407)	0.000526 (0.00115)
Sentiment Index	0.00106 (0.00113)	0.00124 (0.000790)	0.000648 (0.000481)	0.00001 (0.000211)	-0.000254 (0.000399)	-0.000740* (0.000384)	-0.00111* (0.000583)
Infodemic Index	-0.000101 (0.000507)	-0.000109 (0.000248)	-0.00008 (0.000144)	-0.00005 (0.00009)	-0.000106 (0.000139)	-0.000231 (0.000205)	-0.000252 (0.000254)
Media Coverage Index	0.000539 (0.000979)	0.000694 (0.000635)	0.000221 (0.000327)	0.00008 (0.000171)	0.000134 (0.000206)	-0.000319 (0.000509)	-0.000524 (0.000908)
Constant	-0.0472*** (0.00791)	-0.0349*** (0.00395)	-0.0139*** (0.00217)	-0.00282** (0.00121)	0.00699*** (0.00176)	0.0206*** (0.00419)	0.0344*** (0.00511)
Observations	244	244	244	244	244	244	244
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1							

Table 7: Robust Test of the Equality Slope Estimates across Various Quantile for International Markets

	Media Hype Index	Fake News Index	Sentiment Index	Infodemic Index	Media Coverage Index
q[.05 - .10]	0.05	0.5	0.97	4.21**	0.48
q[.05 - .25]	1.84	0.01	1.95	2.11	1.41
q[.05 - .50]	3.03*	0.63	3.12*	6.49**	3.93**
q[.05 - .75]	3.30*	0.92	2.5	3.40*	3.31*
q[.05 - .90]	2.07	0.53	1.79	2.96*	4.76**
q[.05 - .95]	0.74	0.89	1.61	1.56	2.92*
q[.10 - .25]	9.85***	1.65	1.75	0.06	1.53
q[.10 - .50]	13.11***	11.07***	3.94**	5.15**	8.59***
q[.10 - .75]	16.16***	12.9***	2.4	1.68	5.79***
q[.10 - .90]	7.63***	4.54**	0.9	1.01	5.12**
q[.10 - .95]	0.99	3.94**	0.61	0.5	2.75*
q[.25 - .50]	4.31**	5.38**	1.8	17.17***	13.35***
q[.25 - .75]	3.37*	4.31**	0.92	4.11**	4.86**
q[.25 - .90]	0.08	0.06	0.23	0.83	3.85**
q[.25 - .95]	0.06	1.29	0.19	0.31	1.06
q[.50 - .75]	0.14	0.46	0.01	1.04	0.06
q[.50 - .90]	0.59	0.01	0.08	0.64	0.37
q[.50 - .95]	0.5	0.19	0.01	0.05	0.01
q[.75 - .90]	1.62	0.15	0.1	0.1	0.73
q[.75 - .95]	0.79	0.04	0.1	0.01	0.01
q[.90 - .95]	0.21	0.3	0.01	0.03	0.39
The coefficient numbers indicate the F-statistics. *** p<0.01, ** p<0.05, * p<0.1.					

Table 8: Quantile Regression Results for OECD[2] Countries

Variables	***τ=0.05***	***τ=0.10***	***τ=0.25***	***τ=0.50***	***τ=0.75***	***τ=0.90***	***τ=0.95***
Media Hype Index	0.000102	0.000125	0.000209	-0.00003	-0.00002	-0.00003	-0.000120
	(0.000250)	(0.000216)	(0.000170)	(0.00009)	(0.000115)	(0.000207)	(0.000249)
Fake News Index	0.00009	0.000192	0.000183	0.00007	0.00007	-0.000102	-0.000484
	(0.000297)	(0.000233)	(0.000129)	(0.000178)	(0.000166)	(0.000183)	(0.000320)
Sentiment Index	0.000610	0.000355	0.000300*	0.00007	0.000143	0.000344	0.000330
	(0.000389)	(0.000238)	(0.000173)	(0.00006)	(0.00009)	(0.000277)	(0.000330)
Infodemic Index	-0.00084***	-0.00079***	-0.00067***	-0.00044***	-0.00041***	-0.00036**	-0.00062***
	(0.000157)	(0.000119)	(0.00009)	(0.00007)	(0.00009)	(0.000161)	(0.000202)
Media Coverage Index	-0.00207***	-0.00158***	-0.00110***	-0.00044***	-0.000303**	-0.000179	-0.000207
	(0.000421)	(0.000221)	(0.000190)	(0.000107)	(0.000151)	(0.000313)	(0.000416)
Constant	-0.0571***	-0.0398***	-0.0183***	0.000316	0.0145***	0.0316***	0.0476***
	(0.00291)	(0.00145)	(0.00141)	(0.000862)	(0.000611)	(0.00178)	(0.00178)
Observations	1444	1444	1444	1444	1444	1444	1444
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1							

Table 9: Quantile Regression Results for Standalone and Unclassified Markets

Variables	τ=0.05	τ=0.10	τ=0.25	τ=0.50	τ=0.75	τ=0.90	τ=0.95
Media Hype Index	-0.00004	0.000199	0.00004	-0.00003	0.00008	-0.00007	0.00144
	(0.000684)	(0.000287)	(0.000279)	(0.000121)	(0.000214)	(0.000370)	(0.00123)
Fake News Index	0.000302	0.00002	0.000278	0.000109	-0.00007	-0.00003	-0.00117
	(0.000441)	(0.000296)	(0.000224)	(0.000147)	(0.000150)	(0.000284)	(0.000955)
Sentiment Index	-0.00152	-0.00101	-0.000805	-0.000222	-0.000297	-0.000596	-0.00313
	(0.00126)	(0.000902)	(0.000569)	(0.000350)	(0.000506)	(0.00143)	(0.00257)
Infodemic Index	-0.000427	-0.000461**	-0.000330**	-0.000201**	-0.000137	-0.000254	0.000144
	(0.000332)	(0.000194)	(0.000139)	(0.00009)	(0.000118)	(0.000203)	(0.000489)
Media Coverage Index	-0.000402	-0.000439*	-0.000120	0.00003	-0.00009	0.000163	-0.000974
	(0.000768)	(0.000251)	(0.000249)	(0.00008)	(0.000258)	(0.000557)	(0.00145)
Constant	-0.0345***	-0.0243***	-0.0115***	-0.000855	0.00872***	0.0234***	0.0607***
	(0.00574)	(0.00163)	(0.00178)	(0.000806)	(0.00203)	(0.00636)	(0.0142)
Observations	254	254	254	254	254	254	254
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1							

Table 10: Definition of Variables

Variables	**Description**	**Source**
Index Return	Daily index returns are calculated. $R_{i,t} = (P_{i,t} - P_{i,t-1})/P_{i,t-1}$ in where *i* is the return of the index at day *t*.	Thomson Reuters DataStream and https://tr.investing.com
Media Hype Index	It measures the percentage of news talking about the coronavirus. Value range between 0 and 100.	https://coronavirus.ravenpack.com/turkey
Fake News Index	It measures the level of media chatter about the novel virus that makes reference to misinformation or fake news alongside Covid-19. The higher the index value, the more references to fake news found in the media.	https://coronavirus.ravenpack.com/turkey
Country Sentiment Index	It measures the level of sentiment across all entities mentioned in the news alongside the coronavirus. The index ranges between -100 and 100 where a value of 100 is the most positive sentiment, -100 is the most negative, and 0 is neutral.	https://coronavirus.ravenpack.com/turkey
Infodemic Index	It measures the percentage of all entities (places, companies, etc.) that are somehow linked to Covid-19. Value range between 0 and 100.	https://coronavirus.ravenpack.com/turkey
Media Coverage Index	It measures the percentage of all news sources covering the topic of the novel coronavirus. Value range between 0 and 100.	https://coronavirus.ravenpack.com/turkey

Figure 1: Estimated coefficients of model. Grey line quantile regression (QR) and shaded area (%95 of QR)