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Predicting financial market returns in the presence of health crisis: evidence from conventional and Islamic stock markets

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ABSTRACT

The purpose of this study is to examine the usability of the news about the COVID-19 outbreak as a predictor in financial markets. Index values of 11 different sectors in conventional and Islamic stock markets and the index values obtained from COVID-19 deaths, COVID-19 cases and health news were used for this purpose. News variables indices were calculated through Google search volume (G.S.V.) values obtained from Google trend. The daily data between 19 March 2020 and 27 July 2020 were used in the study for 25 index values in total. Regression analysis was used in the study. According to the study results, COVID-19 deaths, COVID-19 cases and health news used as predictors have higher performance than historical return values in all sectors of both conventional and Islamic financial markets. In addition, Islamic stock markets show more attention to the news about the COVID-19 outbreak than conventional stock markets. Accordingly, COVID-19 deaths, COVID-19 cases and health news can be used as effective predictors in Islamic financial markets.

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1. Introduction

Accurate prediction of asset prices is important for the effective implementation of portfolio strategies in financial markets. ‘Efficient market hypothesis’, ‘investor recognition hypothesis’ and ‘price pressure hypothesis’ can be counted among the theories trying to explain the financial asset prices in literature. According to the efficient market hypothesis, all new information coming to the market is reflected in the prices immediately. Investors cannot get abnormal returns in such an environment. One of the theories that defends the opposite of this case is the ‘investor recognition hypothesis’. In this theory stock prices are trying to be explained by investor attention. According to this theory, increasing the attention (demand) of investors for stocks increases the purchased stock price (Barber & Odean, 2008; Odean, 1999). This is explained as the fact that new investors who do not have information about the

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company are persuaded to buy the stocks of this company, causing an increase in the awareness of the company (Merton, 1987). Another theory, 'price pressure hypothesis' or 'attention theory' states that investors do not have enough time and resources to access information on all stocks they can buy. It is indicated in the theory that investors tend to include the stocks they pay attention to in their portfolio (Barber & Odean, 2008). This leads the stocks that attract the attention of investors and want to be purchased intensely to be in the tendency to generate abnormally high returns (Takeda & Wakao, 2014). Also, the increasing investor attention leads to more information discovery and it is suggested that this contributes to market efficiency by decreasing return forecast (Tantaopas et al., 2016; Vozlyublennaiia, 2014; Vlastakis & Markellos, 2012).

Markets have been globally affected by various crises throughout history. The COVID-19 outbreak, which emerged in Wuhan, China, in December 2019 as a health crisis and affected the whole world, is an important event that strongly affects financial markets (Smales, 2020). Especially in the COVID-19 outbreaks that emerged as a new health crisis, the solvency of businesses is decreasing (Mirza, Rahat, et al., 2020). Therefore, this situation, which also affects the activities and profitability of enterprises, is important in terms of performance evaluation and return estimates of investment options in financial markets. In the research about the performance evaluation of investment funds in the COVID-19 outbreaks, it is stated that especially social entrepreneurship funds provide high returns (Mirza, Naqvi, et al., 2020; Rizvi et al., 2020). Investment funds of enterprises with high human capital efficiency also show high performance in the COVID-19 outbreak (Yarovaya et al., 2021; Mirza, Hasnaoui, et al., 2020). However, unlike the health crises experienced in the past, in the COVID-19 outbreak, volatility in the financial markets has increased too much (Baker et al., 2020). One of the most important reasons for this situation is fast information flow into financial markets. In this atmosphere of high volatility, the prediction of financial asset prices becomes more important for investors who want to realise their optimal portfolio preferences. At this point, the prediction of financial asset prices by the use of new predictors depending on changing market conditions becomes important. In addition to factors such as interest rates, exchange rates and inflation, which are widely used in financial forecasts, some variables, including new information emerging due to the COVID-19 outbreak, should be included in the prediction processes during this health crisis period because investors, active players of financial markets, are social creatures and they cannot always make rational decisions. Also, people pay more attention to the news related to COVID-19 deaths, COVID-19 cases and health news during outbreak. At this point, the question of 'Could the news widely heard in the social circles with the COVID-19 outbreak be an effective parameter that can be used in financial markets to predict returns news?' comes out. For that reason, it is thought that COVID-19 deaths, COVID-19 cases and health news are the variables that can be used to estimate prices in financial markets to evaluate how the new information reaching markets affects financial asset prices during the COVID-19 outbreak. Therefore, in the study, an answer to the question of 'Can COVID-19 deaths, COVID-19 cases and health news be used effectively in stock return predictions?' is sought. The most important reason for choosing these

keywords is that they create newsgroups that are actively involved in our lives during the COVID-19 outbreak, which has affected the whole world. This study gains importance precisely at this point, which is thought to be an important gap in the literature, namely, in terms of evaluating the effect of the news on income predictions during health crisis periods because the efforts to create optimal portfolios with high performance by the investors in the markets of increasing volatility with COVID-19 outbreak have increased more. This reveals that the necessity to use new factors in prediction and forecast models.

Another contribution of the study to literature is that it was carried out comparatively for conventional and Islamic stock markets because conventional financial markets and Islamic financial markets are quite different from each other. Islamic stock markets are established according to some ethical and trade restrictions in line with Islamic ideology. Accordingly, while creating Islamic stock indices; It is one of the most important principles that the business is not involved in any non-sharia rules. Accordingly, alcohol production; gambling; Elements such as traditional financial contracts based on interest should not be in the business to be included in the Islamic stock index (Ho et al., 2014). In other words, investment instruments of businesses that carry out activities such as interest income or the production of alcoholic beverages, which are prohibited by Islam, are not included in these funds. The most important reason for this is that investors, who prefer Islamic stocks due to their beliefs, do not want to include investment instruments of businesses operating outside sharia rules in their portfolios (Tuna, 2019). However, in conventional stock markets, there is no restriction on the investment instruments of companies that contain returns prohibited by sharia rules. Hence, this difference is for both investment tools and investor profile. Although there are no physical borders for the markets in the world, the profile belonging to long-term investors determines the characteristics of that market. For that reason, carrying out the study comparatively for conventional and Islamic stock markets is new and important for the literature.

Businesses are affected by the COVID-19 outbreak in different ways and this reflects their profitability. For instance, while the profitability of businesses in the service sector whose activities are limited due to the taken measures and restrictions has reduced, the profitability of technology companies has increased due to the increasing demand for their products. Changing profitability and market value of businesses also caused the stock returns to change. This study aims to fill another important gap in the literature in terms of analysing the effect of the news related to COVID-19 on sectoral stock returns in conventional and Islamic markets because it is noteworthy that there are quite a limited number of news-based studies in this area as the COVID-19 deaths and case numbers are commonly used in the literature. Also, another feature that makes this study important and different is that the effect of COVID-19 deaths, case numbers and health news on stock returns is asymmetrically analysed because the reaction of investors to positive and negative news may be different. At this point, this study is very new and important in terms of analysing the asymmetric effect of COVID-19 outbreak news as sectors in conventional and Islamic financial markets. The study

also aimed to identify the most sensitive sector against positive and negative news about the COVID-19 outbreak.

The performance of COVID-19 deaths, COVID-19 cases and health news in return predictions in conventional and Islamic stock markets are analysed in this study. For this purpose, 11 different sector indices and COVID-19 deaths, case numbers and health news were used as data set for conventional and Islamic stock markets. The first study in the literature examining the usability of health news for stock price forecast is Salisu and Vo (2020). Unlike Salisu and Vo (2020), this study used not only health news, but also COVID-19 deaths and case numbers. Accordingly, this study consists of five parts. Following the introduction, the second part includes literature reviews, the third part includes data and methodology, the fourth part includes empirical findings and the fifth part includes a conclusion and policy implications.

2. Literature review

These studies are examining the effect of the news coming to the market in stock price predictions. The usability of COVID-19 deaths, case numbers and health news as a prediction tool in financial markets is examined in this study. It is thought that this news emerging in 2019 and affecting both social and economic life across the world is an important predictor for financial markets. The literature in this study is split into two groups; the literature examining investor sentiment and Google searches are used for accessing information, and the literature examining the effect of investor sensitivity on financial markets in COVID-19 outbreak.

2.1. Literature examining investor sentiment and Google searches

Investors use different news resources to access the required information for financial decisions. Individual investors access information via Google; however, corporate investors use the news resources such as Bloomberg and Reuters (Da et al., 2011, Da et al., 2015, Kostopoulos et al., 2020). The fastest and most common platform for sharing information is search engines such as Google (Ekinci & Bulut, 2020; Breitmayer et al., 2019). Therefore, Google search volume (G.S.V.) values for financial markets are important elements that can be used for measuring investor interest/attention. There are different results in the studies examining the relationship between investor attention and stock returns in financial markets. Accordingly, studies are arguing that there is either a positive, negative or no relationship between investor interest and stock returns. Takeda and Wakao (2014), Latoeiro et al. (2013) and Bijl et al. (2016) state that stocks have negative returns after Google searches. Da et al. (2011) and Adachi et al. (2017) state that there is a positive correlation between Google search intensity and returns. Nguyen et al. (2019) state that the search volume reduces stock returns. Swamy et al. (2019) indicate that high search speed will generate high returns.

While many studies are examining the effect of investor attention and/or sentiment on stock returns in conventional markets, it is remarkable that the studies on Islamic markets are limited in number (Aloui et al., 2016; Ftiti & Hadhri, 2019; Khan et al.,

2019; Perez-Liston et al., 2016). Accordingly, Perez-Liston et al. (2016) and Aloui et al. (2016) identified a positive relationship between Islamic stock returns and investor sentiment. Ftiti and Hadhri (2019) indicated that the information about investor sentiment in the ambiguity of economy is useful in estimating Islamic stock returns. Khan et al. (2019) set a sentiment index for the Islamic stock index by using the information by G.S.V. and indicated that it can be used as an effective tool for the prediction of Islamic stock returns. Jawadi et al. (2020) indicate that the information for investor attention can be useful for developing prediction for Islamic stock returns. Trichilli et al. (2020a) examined the investor sentiment for portfolio optimisation using Hidden Markov and Bayeşçi models. According to the study results, the effective boundary of Islamic and conventional stock portfolios is affected by the investor sentiment and the time horizon. In a different study, Trichilli et al. (2020b) tried to estimate investor sentiment and dynamics of Islamic index returns in Middle Eastern and North African (M.E.N.A.) financial markets. According to the study results, investor sentiment differs in the Islamic stock return prediction compared to the M.E.N.A. zone.

2.2. Literature examining the effect of investor sensitivity on financial markets during the COVID-19 outbreak

Investors aim to realise effective portfolio diversification in traditional and Islamic equity markets to hedge against the COVID-19 pandemic. For this purpose, they prefer tools that have a safe haven feature, such as gold in traditional financial markets. In Islamic stock markets, commodity groups such as Industrial Metals, Energy, Precious Metals, Agriculture, and Softs, which also comply with sharia rules, are preferred as a safe haven (Tuna & Tuna, 2019). In the COVID-19 pandemic, Islamic stock markets outperform conventional stock markets. For this reason, during the COVID-19 pandemic, investors prefer Islamic stocks as a safe haven (Arif et al., 2021; Yarovaya et al., 2020). Investors also evaluate investment options according to changing market conditions, depending on the information they have and how this information is perceived. The investor sentiment in the reviewed literature differs depending on whether the shared information is evaluated as good or bad (positive/negative) by investors. Accordingly, while some researchers suggest that only bad news is effective in investment decisions (Akıncı & Chahrour, 2018; Cohen et al., 2018; Svensson 2000), some indicate that both good and bad news is effective (Narayan, 2019; Narayan & Bannigidadmath, 2015, 2017). At this point, the importance of examining the effects of positive or negative news about the COVID-19 outbreak on the markets becomes evident because the news about COVID-19 may lead to positive or negative effects in various sectors. According to Zhang et al. (2020) and Al-Awadhi et al. (2020), the number of COVID-19 cases has a negative effect on financial markets. Baig et al. (2021) state that the increases in confirmed cases and deaths due to coronavirus caused a significant increase in market volatility and that the decreasing sentiment and restriction and lockdown practices also contribute to the stability of the markets. Albulescu (2021) examined the effect of official declarations about new infection cases and death rates on financial market volatility index

(V.I.X.). According to Albuлесcu (2021), the increase in new cases and death rates globally increases the volatility in financial markets. According to Harjoto et al. (2020), financial markets react to the cases and deaths caused by COVID-19 negatively. The effects of COVID-19 also vary in developed or developing markets. The studies examining the effect of COVID-19 outbreak in various financial markets indicate that the volatility in markets increased. Corbet et al. (2020), state that the volatility between Bitcoin markets and stock markets in China has increased with the global COVID-19 outbreak. Espinosa-Méndez and Arias (2021), state that there is an increase in volatility and return of five great European stock markets in the COVID-19 outbreak. Baek et al. (2020), state that there is also an increase in volatility of the U.S. stock market due to COVID-19 deaths. Zhang et al. (2020), the results indicating that COVID-19 has significantly increased the stock exchange market volatility in 11 developed countries and China. In general, the COVID-19 outbreak causes volatility increases in the world's financial markets due to the increasing ambiguity. Sherif (2020) examined the effect of the spread rate of coronavirus on conventional and Islamic stock markets in the U.K. According to the results, while the spread rate of coronavirus is statistically significant and strongly negative in conventional stock markets, this relationship is negative but statistically insignificant in Islamic stock markets.

2.3. General literature evaluation

The reviewed literature indicates that Internet-based search engines such as Google, which are important news sources for investors, have an effect on investor sentiment. The information here affects investor attention and reflects on stock prices. However, one of the most important factors is that investor sentiment to positive and negative news is different. For that reason, when examining the effect of the news on financial markets, it is very important to group them as positive and negative to obtain more detailed information.

It is seen the reviewed literature that the studies examining the effect of the news in Islamic financial markets are very limited in number. In addition, it is seen that the numbers of COVID-19 deaths and cases are widely used in the studies on the COVID-19 outbreak, but studies based on Google searches regarding the news of these values are very rare (Salisu & Vo, 2020). In addition, the studies examining how the investor attention was affected by the news about COVID-19 (health, deaths and cases) was not available. For that reason, examining the effects of positive and negative COVID-19 deaths, cases and health news in conventional and Islamic financial markets with a comparative approach on the sectoral basis is new and important for the literature.

3. Data and methodology

3.1. Data

The variables used in the study are the sectoral indices belonging to conventional and Islamic stock markets and health news obtained via Google trend and death and case news belonging to the COVID-19 outbreak. Both conventional and Islamic sectoral

Table 1. Used data set.

Islamic stock markets	Conventional stock markets
Basic materials	Basic materials
Consumer goods	Consumer goods
Consumer services	Consumer services
Financials	Financials
Health care	Health care
Industrials	Industrials
Oil and gas	Oil and gas
Technology	Technology
Telecommunications	Telecommunications
Utilities	Utilities
All sectors	All sectors
Health news	
COVID-19 death news	
COVID-19 case news	

Source: The Author.

stock index values are expressed in U.S. dollars. All the data set for the sectoral stock index was obtained from the values of Dow Jones Index. The keywords 'Health news', 'COVID-19 death' and 'COVID-19 case' were used for the search statistics obtained via Google trend. Using these keywords, indices for positive and negative news were created for 'Health news', 'COVID-19 death' and 'COVID-19 case'. The study covers the daily data set from 19 March 2020 to 27 July 2020. Google trend provides access to a maximum of 90 data in the daily data set. Considering the sectoral index values used in this research, the data set is limited to 90 days. Therefore, the variables are as in [Table 1](#).

Daily returns were calculated from the daily closing prices of all analysed industry indices. Google trend values belonging to the searches using 'Health news', 'COVID-19 death' and 'COVID-19 case' words across the world were grouped as positive and negative and the asymmetric effect of these words was analysed for the prediction of sectoral stock returns in all markets. Descriptive statistical values of all variables examined in the study are shown in [Tables 2](#) and [3](#).

According to [Table 2](#), while the stocks belonging to technology sector provide the highest average return in both conventional and Islamic stock markets in the examined period, the stocks belonging to the oil and gas sector provide the lowest average return. Except for the telecommunication and utility sectors, other countries have a positive skewness value and it is seen that the series are right-skewed. Kurtosis values are positive and show leptokurtic features as in other series. According to Jarque-Bera test results, all-sector index values in conventional stock markets do not show normal distribution. Except for the basic materials, oil and gas, telecommunication and utility sectors, other sector indices have a negative skewness value and it is seen that the series are left-skewed in conventional stock markets. Kurtosis values are positive and show leptokurtic features as in other series. According to Jarque-Bera test results, all index values in conventional and Islamic stock markets do not show normal distribution.

According to [Table 3](#), negative searches about death news due to COVID-19 have the highest average value in Google trend. The lowest searches belong to positive health news. All values belonging to the news have a negative skewness value and it is seen that the series are left-skewed. Kurtosis values are positive and show leptokurtic

Table 2. Descriptive statistics for conventional and Islamic stock markets.

	Basic materials	Consumer goods	Consumer services	Financials	Health care	Industrials	Oil and gas	Technology	Telecommunications	Utilities	All sectors
Conventional stock markets											
Mean	0.034	0.001	0.032	-0.203	0.032	-0.082	-0.328	0.065	-0.118	-0.147	-0.046
Median	0.414	0.170	0.348	-0.099	0.049	0.146	-0.033	0.506	-0.130	0.062	0.156
Maximum	11.358	7.674	7.253	11.338	7.331	11.396	14.871	10.695	7.893	12.223	7.960
Minimum	-11.472	-10.544	-11.718	-15.853	-10.820	-13.320	-23.179	-14.599	-8.565	-12.248	-9.969
Std. Dev.	3.437	2.787	2.761	3.891	2.684	3.452	5.093	3.338	2.494	3.511	2.447
Skewness	-0.614	-0.696	-0.955	-0.509	-0.371	-0.465	-0.932	-0.582	0.027	0.028	-0.991
Kurtosis	5.434	5.850	6.917	5.709	5.693	5.624	6.817	6.932	5.175	5.686	7.333
Jarque-Bera	35.003	47.370	89.430	39.426	36.732	36.490	84.935	79.163	22.297	33.992	106.885
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Islamic stock markets											
Mean	0.073	0.023	0.006	-0.037	0.060	-0.011	-0.267	0.088	-0.087	-0.045	0.035
Median	0.137	0.256	0.245	0.084	0.008	0.004	-0.098	0.389	-0.097	-0.060	0.286
Maximum	9.612	5.752	9.110	11.021	5.804	9.073	13.473	8.483	3.449	3.532	7.913
Minimum	-10.438	-9.330	-12.876	-13.729	-7.891	-9.586	-18.864	-12.479	-4.002	-5.442	-9.653
Std. Dev.	2.373	1.977	2.675	3.234	2.016	2.508	4.338	2.877	1.174	1.401	2.414
Skewness	-0.858	-1.096	-1.231	-0.353	-0.515	-0.584	-0.930	-0.706	-0.424	-0.933	-0.842
Kurtosis	8.682	7.763	9.781	6.503	5.704	6.424	6.805	7.035	4.796	5.587	7.160
Jarque-Bera	165.853	129.423	245.040	60.116	39.424	61.608	84.458	86.053	18.571	47.905	94.829
Probability	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: The Author.

Table 3. Descriptive statistics for COVID-19 cases, COVID-19 deaths and health news.

	Google trend volumes for news					
	Negative COVID-19 case news	Positive COVID-19 case news	Negative COVID-19 death news	Positive COVID-19 death news	Negative health news	Positive health news
Mean	69.788	45.646	115.354	71.575	50.434	43.575
Median	77	50	132	77	56	52
Maximum	107	86	188	154	81	78
Minimum	0	0	0	0	0	1
Std. Dev.	32.955	32.038	57.712	53.608	22.421	25.484
Skewness	-1.048	-0.308	-0.808	-0.091	-0.916	-0.481
Kurtosis	2.912	1.542	2.520	1.460	2.960	1.833
Jarque-Bera	20.715	11.791	13.382	11.324	15.815	10.770
Probability	0.000	0.003	0.001	0.003	0.000	0.005

Source: The Author.

features as all series. According to Jarque-Bera test results, all series do not show normal distribution. Stationary analysis of the variables used in the study was made by using A.D.F. unit root test. According to the analysis results, sectoral return values are stationary; however, Google trend search results based on 'Health news', 'COVID-19 death' and 'COVID-19 case' become stationary when their first difference is taken¹.

'COVID-19 death', 'COVID-19 case' and 'Health news' are grouped as positive and negative in order to examine the asymmetric effect in financial markets. Therefore, in both conventional and Islamic stock markets, it has been tried to evaluate whether the variables related to COVID-19 are effective prediction tools in sector-based return estimates.

3.2. Methodology

The methods followed by Salisu and Vo (2020) were used in the study. Accordingly, return predictions were performed by using historical returns for each sector index of conventional and Islamic stock markets. In this model, no predictors other than historical returns are used in return prediction. Therefore, the model created by using only historical return values is as in Equation (1):

$$r_{it} = \alpha + e_{it} \quad t = 1, 2, 3, \dots, T, \quad i = 1, 2, 3, \dots, N. \quad (1)$$

r_{it} refers to stock return, α refers to historical returns, e_{it} refers to the error term in this equation. In the study Equation (2) established by adding new predictors that are thought to affect investor decisions in the course of COVID-19 outbreak is stated as the following.

$$r_{it} = \alpha + \text{new predictor}_{it-1} + e_{it} \quad (2)$$

Return values are calculated by Equation (3):

$$r_i = \ln\left(\frac{P_t}{P_{t-1}}\right) \quad (3)$$

Equation (3) refers to:

Pt: index value in t period,

Pt-1: index value in t-1 period.

New predictors examined within the study are the indices created from Google trend volume values belonging to 'Health news', 'COVID-19 death' and 'COVID-19 case' words. It is accepted that if the Google searches with these words increase, stock returns will be negatively affected and if they decrease, it will be positively affected. Therefore, the variables used in stock return predictions should be considered separately due to their different asymmetric effects. In other words, the presence of asymmetric information and different investor profiles in the markets causes different reactions in positive and negative shocks on prices. Accordingly, Shin et al.'s (2014) procedure was followed as Salisu and Vo (2020). As a result, positive and negative shocks were separated by using $np_t^- = \sum_{j=1}^t \Delta np_j^- = \sum_{j=1}^t \min(\Delta np_j, 0)$ and $np_t^+ = \sum_{j=1}^t \Delta np_j^+ = \sum_{j=1}^t \max(\Delta np_j, 0)$. Thus, Equation (4) can be expressed as for this situation where positive and negative shocks are taken into account:

$$r_{it} = \alpha + \beta_1^+ \text{newpredictor}_{i,t-1}^+ + \beta_2^- \text{newpredictor}_{i,t-1}^- + \varepsilon_{it} \quad (4)$$

The models established for new predictors used within the study are as in Equations (5)–(7).

$$r_{it} = \alpha + \beta_1^+ \text{healthnews}_{i,t-1}^+ + \beta_2^- \text{healthnews}_{i,t-1}^- + \varepsilon_{it} \quad (5)$$

$$r_{it} = \alpha + \beta_1^+ \text{Covid-19death}_{i,t-1}^+ + \beta_2^- \text{covid-19death}_{i,t-1}^- + \varepsilon_{it} \quad (6)$$

$$r_{it} = \alpha + \beta_1^+ \text{Covid-19case}_{i,t-1}^+ + \beta_2^- \text{Covid-19case}_{i,t-1}^- + \varepsilon_{it} \quad (7)$$

In these models, while β_1^+ indicates the positive asymmetry coefficient, β_2^- is the negative asymmetry coefficient. $\text{healthnews}_{i,t-1}^+$ indicates an increase in health news, $\text{healthnews}_{i,t-1}^-$ indicates a decrease. Likewise, $\text{Covid-19 death}_{i,t-1}^+$ ($\beta_1^+ \text{Covid-19case}_{i,t-1}^+$) denotes an increase in COVID-19 death (case) news, and $\text{Covid-19death}_{i,t-1}^-$ ($\beta_2^- \text{Covid-19case}_{i,t-1}^-$) indicates a decrease.

Campbell and Thompson (CT; 2008) test was used in order to assess the performances of these new predictors used in the study. Accordingly, CT is expressed in Equation (6):

$$CT = 1 - \left(\frac{\widehat{MSE}_u}{\widehat{MSE}_r} \right) \quad (6)$$

Here \widehat{MSE}_u refers to mean squared error values obtained by using new predictors. \widehat{MSE}_r refers to mean squared error values calculated by using historical returns. If the value is $CT > 0$, it can be said that the model obtained by using new predictors is stronger than the model obtained by using historical returns. In other words, it can be said that the new predictor provides more information and is more efficient than historical returns in stock return predictions. However, in case of $CT < 0$, it states

Table 4. Results of model using historical returns.

	Conventional stock markets			Islamic stock markets		
	Coeff.	T Statistic	Probability	Coeff.	T Statistic	Probability
Basic materials	-0.207	-2.225	0.028**	0.018	0.194	0.846
Consumer goods	-0.264	-2.877	0.005*	-0.062	-0.65	0.517
Consumer services	-0.326	-3.629	0.000*	-0.205	-2.21	0.029**
Financials	-0.282	-3.095	0.003*	-0.317	-3.527	0.001*
Health care	-0.357	-4.019	0.000*	-0.221	-2.385	0.019**
Industrials	-0.247	-2.683	0.008*	-0.067	-0.706	0.482
Oil and gas	-0.144	-1.532	0.128	-0.131	-1.388	0.168
Technology	-0.458	-5.419	0.000*	-0.388	-4.428	0.000*
Telecommunications	-0.352	-3.956	0.000*	0.079	0.838	0.404
Utilities	-0.212	-2.279	0.025**	0.108	1.142	0.256
All sectors	-0.17	-1.819	0.072**	-0.266	-2.908	0.004*

Notes: *, ** and *** show significance at 1%, 5% and 10%, respectively.

Source: The Author.

that the new estimator provides less information than historical returns. In such a case, it can be said that it is more effective to make stock return estimates with historical returns.

4. Empirical results

Sectoral stock returns in Islamic and conventional stock markets are explained in this study by using 'Health news', 'COVID-19 death' and 'COVID-19 case' news. For that purpose predictions were made initially by using historical returns for all markets with the data that was made suitable for analysis. Accordingly, the model results by using Equation (1) are shown in Table 4.

According to Table 4, historical return data are statistically significant and have a negative effect in the predictions for all Islamic and conventional sector indices. However, the predictions for sub-sectors of Islamic stock markets are not statistically significant for any sub-sectors except for consumer services, financial, health care and technology sectors. Except for the oil-gas sector, predictions by using historical return data in all other sectors are statistically significant in the predictions for conventional stock markets. The predictions for all sub-sectors of conventional and Islamic stock markets indicate that historical return data have a negative effect.

Models were established in order to examine the effect of 'COVID-19 death', 'COVID-19 case' and 'Health news', used as new predictors, on sectoral stock returns in conventional financial markets. The results for Equations (5)–(7), which were established in order to assess the investor reactions to the new news coming to the market for the conventional financial markets, are as in Table 5.

Three different models created with new predictors for conventional financial markets are included in Table 5. The results of the model obtained by using Equation (5) for conventional financial markets are indicated in Table 5 between columns 2 and 6. According to this model, results in which asymmetric effect is examined, positive health news is not statistically significant for consumer services, financial, industrial, oil-gas and telecommunication and all sector indices in conventional stock markets. However, stock returns are positively affected by positive health news in all sectors

Table 5. Predictability results of sectoral stock returns for conventional stock markets.

Sector	Equation (5)			Equation (6)			Equation (7)											
	Health news (Positive)			Health news (Negative)			Death (Positive)			Death (Negative)			Case (Positive)			Case (Negative)		
	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.
Basic materials	0.359	1.668	0.098***	-0.644	-3.626	0.000*	0.013	0.109	0.913	-0.12	-1.23	0.221	0.205	1.081	0.282	-0.382	-2.611	0.010*
Consumer goods	0.311	1.828	0.070***	-0.609	-4.332	0.000*	0.069	0.705	0.482	-0.161	-2.072	0.041**	0.164	1.077	0.284	-0.363	-3.09	0.003*
Consumer services	0.26	1.552	0.124	-0.642	-4.638	0.000*	0.119	1.234	0.22	-0.145	-1.878	0.063***	0.184	1.225	0.223	-0.353	-3.034	0.003*
Financials	0.226	0.933	0.353	-0.821	-4.108	0.000*	-0.07	-0.509	0.612	-0.17	-1.545	0.125	0.082	0.383	0.702	-0.522	-3.175	0.002*
Health care	0.353	2.145	0.034**	-0.55	-4.043	0.000*	0.094	0.996	0.322	-0.131	-1.742	0.084***	0.216	1.492	0.139	-0.37	-3.303	0.001*
Industrials	0.239	1.108	0.27	-0.706	-3.976	0.000*	-0.028	-0.232	0.817	-0.156	-1.606	0.111	0.135	0.713	0.477	-0.444	-3.04	0.003*
Oil and gas	0.29	0.896	0.373	-0.92	-3.442	0.001*	-0.073	-0.405	0.686	-0.21	-1.459	0.147	0.17	0.606	0.546	-0.643	-2.972	0.004*
Technology	0.437	2.139	0.035**	-0.703	-4.172	0.000*	0.123	1.05	0.296	-0.149	-1.594	0.114	0.253	1.386	0.169	-0.411	-2.922	0.004*
Telecommunications	0.186	1.17	0.244	-0.435	-3.194	0.001*	0.037	0.421	0.675	-0.138	-1.971	0.051***	0.05	0.36	0.719	-0.26	-2.423	0.017**
Utilities	0.407	1.869	0.064***	-0.689	-3.827	0.000*	-0.176	-1.786	0.077***	-0.002	-0.017	0.986	0.102	0.532	0.596	-0.46	-3.098	0.003*
All sectors	0.223	1.502	0.136	-0.578	-4.724	0.000*	0.043	0.506	0.614	-0.147	-2.16	0.033**	0.145	1.105	0.272	-0.381	-3.768	0.000*

Notes: *, **, and *** show significance at 1%, 5% and 10%, respectively.

Source: The Author.

other than those and this effect is statistically significant. Negative health news affects the stock returns negatively in conventional financial markets. In addition, it is statistically significant in all coefficients. This result shows that investors are more sensitive to negative shocks (Tuna, 2017).

The results of the model obtained by using Equation (6) for conventional financial markets are indicated in Table 5 between columns 8 and 13. Accordingly, positive COVID-19 death news (such as the decrease in the number of death) only affects stock returns of utilities sector negatively and it is statistically significant. No statistically significant effect could be determined in any market belonging to the sector other than this sector. Negative COVID-19 death news (such as the increase in the number of deaths) has no statistically significant effects on stock returns of basic materials, financial, industrial, oil-gas, technology and utilities sectors in conventional stock markets. However, negative COVID-19 death news has a negative and statistically significant effect on stock returns of all sectors other than those sectors in conventional financial markets. This result is generally similar to Harjoto et al. (2020) and Baig et al. (2021).

In Table 5, the results of the model obtained by using Equation (7) are indicated between columns 14 and 19. Positive COVID-19 case news (such as the decrease in the number of cases) has no statistically significant effect on stock returns of any sectors in conventional financial markets. However, negative COVID-19 case news (such as the increase in the number of cases) has a negative and statistically significant effect on all sectoral stock returns in conventional financial markets. This result is similar to Zhang et al. (2020), Al-Awadhi et al. (2020), Sherif (2020) and Baig et al. (2021).

The results of the models created by using Equations (5)–(7) for Islamic financial markets are shown in Table 6.

The results of the model obtained by using Equation (5) for Islamic financial markets are indicated in Table 6 between columns 2 and 7. Accordingly, positive health news is not statistically significant for consumer services, financial, industrial, oil-gas and telecommunication and utilities sectors in Islamic financial markets. However, stock returns are affected by positive health news in all sectors other than those sectors and this effect is statistically significant. Negative health news negatively affects the stock returns in all sectors in Islamic financial markets. In addition, it is statistically significant in all coefficients.

The results of the model obtained by using Equation (6) for Islamic financial markets are indicated in Table 6 between columns 8 and 13. Accordingly, positive COVID-19 death news (such as the decrease in the number of death) has no statistically significant effects on any sectors in Islamic financial markets. Negative COVID-19 death news (such as the increase in the number of death) has a negative and statistically significant effect on stock returns of all sectors other than financials and oil-gas sectors in Islamic financial markets. This result is similar to Harjoto et al. (2020) and Baig et al. (2021).

The results of the model obtained by using Equation (7) are indicated in Table 6 between columns 14 and 19. Positive COVID-19 case news (such as the decrease in the number cases) has a statistically significant effect only on stock returns of health care sector in Islamic financial markets. This result is similar to Espinosa-Méndez

Table 6. Predictability results of sectoral stock returns for Islamic stock markets.

Sector	Equation (5)						Equation (6)						Equation (7)					
	Health news (Positive)			Health news (Negative)			Death (Positive)			Death (Negative)			Case (Positive)			Case (Negative)		
	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.	Coef.	T Stat.	Prob.
Basic materials	0.282	1.9	0.060***	-0.44	-3.595	0.001*	0.081	0.971	0.334	-0.121	-1.819	0.072***	0.205	1.588	0.115	-0.298	-2.99	0.003*
Consumer goods	0.235	1.977	0.051***	-0.468	-4.766	0.000*	0.083	1.225	0.223	-0.134	-2.455	0.016**	0.151	1.423	0.158	-0.291	-3.552	0.001*
Consumer services	0.248	1.558	0.122	-0.679	-5.156	0.000*	0.048	0.51	0.611	-0.156	-2.091	0.039**	0.134	0.937	0.351	-0.42	-3.794	0.000*
Financials	0.286	1.423	0.158	-0.649	-3.908	0.000*	0.016	0.14	0.889	-0.143	-1.566	0.12	0.14	0.798	0.426	-0.444	-3.265	0.002*
Health care	0.309	2.536	0.013**	-0.434	-4.315	0.000*	0.097	1.394	0.166	-0.121	-2.17	0.032**	0.194	1.79	0.076***	-0.274	-3.272	0.001*
Industrials	0.178	1.144	0.255	-0.52	-4.09	0.000*	0.021	0.236	0.814	-0.138	-1.966	0.052***	0.145	1.072	0.286	-0.356	-3.401	0.001*
Oil and gas	0.288	1.049	0.296	-0.811	-3.583	0.001*	-0.069	-0.453	0.652	-0.188	-1.534	0.128	0.177	0.748	0.456	-0.583	-3.182	0.002*
Technology	0.382	2.183	0.031**	-0.627	-4.345	0.000*	0.115	1.138	0.258	-0.135	-1.674	0.097***	0.236	1.511	0.134	-0.376	-3.115	0.002*
Telecommunications	0.061	0.821	0.413	-0.235	-3.854	0.000*	0.017	0.427	0.67	-0.09	-2.771	0.007*	-0.004	-0.063	0.95	-0.17	-3.445	0.001*
Utilities	0.073	0.824	0.412	-0.249	-3.383	0.001*	0.058	1.206	0.23	-0.103	-2.687	0.008*	0.069	0.934	0.352	-0.246	-4.327	0.000*
All sectors	0.294	2.013	0.047**	-0.554	-4.602	0.000*	0.077	0.912	0.364	-0.135	-2.011	0.047**	0.187	1.44	0.153	-0.351	-3.501	0.001*

Notes: *, **, *** Show the significance at 1%, 5% and 10%, respectively.

Source: The Author.

and Arias (2021). No statistically significant effect of positive COVID-19 case news on stock returns belonging sectors other than health care could be determined. However, negative COVID-19 case news (such as the increase in the number of cases) has a negative and statistically significant effect on all sectoral stock returns in Islamic financial markets. This result is similar to Zhang et al. (2020), Al-Awadhi et al. (2020) and Baig et al. (2021).

Models created for COVID-19 deaths, COVID-19 case numbers and health news, which are the new predictors used in the research, give similar results in both conventional and Islamic stock markets sub-sectors. In positive shocks, there are different results between markets for utilities and health care sector. While COVID-19 death and health news are statistically significant for positive shocks in conventional stock markets, this is not the case for Islamic stock markets. Similarly, the COVID-19 case predictor, which is statistically insignificant for health care in conventional stock markets, is statistically significant for Islamic stock markets.

While news about COVID-19 deaths in conventional stock markets is statistically insignificant in Basic Materials, Industrials, oil and gas, technology and utilities sectors, it is statistically significant in Islamic stock markets. For all other situations, conventional and Islamic stock markets have similar results.

The models created with Equations (5)–(7), which are implemented to evaluate the asymmetric effect, indicate that sectoral stock returns in conventional and Islamic financial markets are more sensitive to negative news. The performance evaluation of the models created for COVID-19 deaths, COVID-19 case numbers and health news, which are the new predictors used in the study, according to the benchmark model created with historical returns, was examined with the values of the C.T. (2008) test. A positive value for the C.T. value indicates that the performance of the model created with the new predictor is better than the model created by using historical returns. Prediction performances were separately calculated as in-sample and out-of-sample. Performance evaluations of these models created for evaluating investor reactions to the news coming to the market according to the model grounding on historical returns are included in Tables 7 and 8. Accordingly, C.T. values calculated for the sectors in conventional financial markets are shown in Table 7.

According to Table 7, as an alternative to the model in which historical returns are used in the evaluations for ‘in-sample’ the model in which health news, COVID-19 deaths and COVID-19 case numbers are used as new predictors in conventional financial markets has a better performance as compared to the model in which historical returns are used. This is true for all sectors. In the evaluations for ‘out-of-sample’ in conventional financial markets the model created with health news has lower performance than the model in which historical return is used in consumer services, oil–gas and telecommunication sectors. This indicates that historical return data are more efficient in stock return predictions for ‘out-of-sample’. Also COVID-19 death news does not perform as effectively as historical returns for consumer services and technology sector stock return forecasts in conventional financial markets. COVID-19 case news does not give as effective results as the model using the past returns in the stock return forecasts of the oil–gas sector in conventional financial markets. C.T. values calculated for the sectors in Islamic financial markets are shown in Table 8.

Table 7. C.T. statistic results of forecast evaluation for conventional stock markets.

According to historical returns Sector name	In sample			Out of sample		
	Health news	COVID-19 deaths	COVID-19 case numbers	Health news	COVID-19 deaths	COVID-19 case numbers
Basic materials	0.065	0.007	0.034	0.138	0.020	0.092
Consumer goods	0.088	0.021	0.045	0.071	0.055	0.102
Consumer services	0.094	0.022	0.045	-0.064	-0.012	0.039
Financials	0.072	0.012	0.043	0.203	0.144	0.129
Health care	0.083	0.018	0.055	0.272	0.021	0.114
Industrials	0.070	0.012	0.042	0.202	0.081	0.101
Oil and gas	0.053	0.010	0.039	-0.012	0.016	-2.023
Technology	0.087	0.016	0.044	0.055	-0.001	0.026
Telecommunications	0.052	0.018	0.026	-0.028	0.081	0.066
Utilities	0.074	0.014	0.042	0.165	0.116	0.088
All sectors	0.096	0.022	0.064	0.336	0.118	0.165

Source: The Author.

Table 8. C.T. statistic results of forecast evaluation for Islamic stock markets.

According to historical returns Sector name	In sample			Out of sample		
	Health news	COVID-19 deaths	COVID-19 case numbers	Health news	COVID-19 deaths	COVID-19 case numbers
Basic materials	0.068	0.019	0.048	0.268	0.014	0.122
Consumer goods	0.103	0.033	0.061	0.266	0.097	0.127
Consumer services	0.111	0.020	0.063	0.257	0.068	0.061
Financials	0.070	0.011	0.048	0.117	0.018	-0.027
Health care	0.098	0.029	0.058	0.246	0.034	0.077
Industrials	0.073	0.017	0.053	0.303	0.065	0.142
Oil and gas	0.058	0.012	0.045	0.018	0.020	0.060
Technology	0.093	0.018	0.050	0.069	0.016	0.016
Telecommunications	0.064	0.034	0.049	0.279	0.039	-0.022
Utilities	0.051	0.037	0.079	0.179	0.091	0.058
All sectors	0.098	0.021	0.059	0.233	0.048	0.084

Source: The Author.

Table 8 indicates the C.T. (2008) test values of the models using COVID-19 deaths, COVID-19 case numbers and health news used in the study for each sector index in Islamic financial markets. According to Table 8, as an alternative to the model in which historical returns are used in-sample evaluations, the model in which health news is used as a new predictor performs better for all sector indices. However, according to out-of-sample evaluations, COVID-19 case news have negative C.T. values for financial and telecommunication sectors in Islamic financial markets. This supports the result that COVID-19 deaths, COVID-19 case numbers and health news are more efficient predictors than using historical return values in stock return predictions of all other sectors except for financial and telecommunication sectors in Islamic financial markets.

According to Tables 7 and 8, the results of in-sample forecasts are similar for both conventional and Islamic financial markets. Accordingly, COVID-19 deaths, COVID-19 case numbers and health news, which are used as new predictors, give more effective results in stock return predictions in all sectors of conventional and Islamic financial markets than using historical return values. This result for health news is similar to

Salisu and Vo (2020). It can be said that these three new predictors are generally more efficient and more powerful than historical returns in out-of-sample predictions.

In-sample and out-of-sample predictions for conventional financial markets are generally consistent. According to in-sample predictions, COVID-19 deaths, COVID-19 case numbers and health news in conventional financial markets are more powerful predictors as compared to historical returns. However, according to out-of-sample predictions, COVID-19 case numbers is the most powerful and COVID-19 deaths and health news follow it. Health news and COVID-19 death news are powerful predictors for all sectors in Islamic financial markets. This result is also supported with both in-sample and out-of-sample predictions. COVID-19 case news is more powerful predictor than historical returns in all sectors of Islamic financial markets except for financial and telecommunication sectors. In general, according to the in-sample and out-of-sample predictions, this study supports the result that COVID-19 deaths, COVID-19 case numbers and health news are more effective and high-performing predictors in Islamic financial markets according to their historical return values.

5. Conclusion and policy implications

Whether 'COVID-19 deaths', 'COVID-19 case numbers' and 'health news' are good predictors for stock returns in conventional and Islamic financial markets or not is examined in this study. The return values of 11 different sector indices in conventional and Islamic financial markets from 19 March 2020 to 27 July 2020 and index values created from COVID-19 deaths, COVID-19 case numbers and health news obtained through Google trend were used for this purpose.

The study results are very important for the availability of new predictors in stock return predictions with the COVID-19 outbreak affecting the whole world. An investor as a social creature is affected by the surroundings and conditions and determines investment strategies accordingly. As shown in the results from this study, positive and negative COVID-19 deaths, COVID-19 case numbers and health news all affect the stock returns of all sectors. However, an important finding is that negative news has a stronger effect on stock returns than positive news. Also this news in stock return predictions outperforms historical returns.

In-sample and out-of-sample predictions as a result of the study are consistent with conventional and Islamic financial markets. However, the analyses performed for 11 different sector indices in both conventional and Islamic financial markets reveal that health, COVID-19 deaths and COVID-19 case numbers show superior performance in Islamic financial markets. In conventional financial markets, the performance of predictors can be listed from the highest to the lowest as COVID-19 case numbers, COVID-19 deaths and health news. The forecasts using these new predictive parameters in both conventional and Islamic financial markets were made according to the models in which historical returns are used.

These results are highly important for individual investors and portfolio managers. Besides traditionally-used macroeconomic indicators in stock return predictions, new estimators can be used effectively depending on the changing and developing conditions. Therefore, positive and negative developments in health, COVID-19 deaths and

case numbers during the COVID-19 outbreak can be used as effective predictors for conventional and Islamic stock markets.

Portfolio managers should consider that the effects of these new predictors differ in terms of sectors in stock price predictions they prefer. In addition, a more effective portfolio management can be achieved in situations where the asymmetric effect of new news coming to the market is considered because the investor reaction to positive and negative news can also be different.

Conventional and Islamic financial markets may be affected differently by new predictors. In general, investors are more sensitive to negative news. The results support this situation. In the positive news, while it is seen that both conventional and Islamic financial markets are affected together in some sectors (health news), in some of them only conventional (utilities for COVID-19 deaths), and in others only Islamic financial markets (health care for COVID-19 case numbers) are affected. For that reason, when making stock return predictions, predictions by considering the financial market differences will contribute to a more effective portfolio management process.

The parameters used as predictors may vary for financial markets regarding their performances as well as sectoral differences. Therefore, while developing investment strategies, the performance of the used new estimators compared to traditional estimators should be examined in detail and evaluations should be made according to the results.

This study seeks an answer to the question of whether new predictors can be used in stock return predictions during the COVID-19 outbreak. The conducted analyses indicate that news about COVID-19 can be used effectively in predicting stock returns. We think that stock-based studies can provide more detailed information in future studies. In addition, it can be investigated whether news-based studies, which can be made with new keywords such as the number of intubated patients, the infection rate, intensive care unit, can be used effectively in the investor stock return predictions. Therefore, new information will be provided to portfolio managers and individual investors to help them develop new strategies.

Note

1. Please contact the author(s) for unit root test results.

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No potential conflict of interest was reported by the author.

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