Islamic Stock Indices and COVID-19 Pandemic

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Abstract

Motivated by the COVID-19 pandemic, we construct a single factor predictive model for stock returns that incorporates uncertainty index for pandemics and epidemics (UPE). Specifically, we examine whether Islamic stocks are either vulnerable or have better hedge potential when compared to the performance of their conventional counterparts. In general, we find that the Islamic stocks can be used to hedge whereas the conventional stocks are seen to be vulnerable to uncertainty due to pandemics across different time periods. In particular, during COVID-19 pandemic, although the hedging effectiveness of Islamic stock seems to decline, it is still better compared to the worse performance of the conventional stocks. The outcome remains the same even after controlling our model for oil price, geopolitical risk and economic policy uncertainty. We further evaluate the predictive power of the UPE both for the in-sample and out-of-sample periods by comparing its forecast performance with that of a benchmark model. Our results suggest that the consideration of the UPE information in the valuation of stocks is crucial for investment decisions.

Keywords: Islamic stocks; COVID-19; Uncertainty index for pandemics and epidemics, Stock returns; Conventional stocks

JEL Classification: C15, C58, G15

1. Introduction:

The unprecedented and rapid spread of COVID-19 pandemic has created uncertainty and severely affected the financial stock markets and exposed the stability of the global financial system[4]. The fall in the global stock markets due to COVID-19 resembles the Global Financial Crisis, but the major difference is that the latter is caused due to an endogenous shock based on the actions of financial market players whereas the former is the result of an exogenous shock affecting the real economy (Ashraf, et al., 2020; Quinsee, 2020; Roy & Kemme, 2020). The quest for safe havens during the periods of crises either due to endogenous or exogenous shocks like infectious disease pandemics has always been an area of interest for the investment managers, practitioners,

[4] International Monetary Fund. *Global Financial Stability Report*. April 2020. https://www.imf.org/en/Publications/GFSR/Issues/2020/04/14/global-financial-stability-report-april-2020

academicians and policy makers. In essence, we focus on Islamic stocks due to evidence of it serving as a hedge and safe haven during crises, and the consideration for COVID-19 is timely given its impact on conventional stock market. For example, the economic impact of the global spread of COVID-19 has heightened market risk aversion in ways not seen since the global financial crisis. Stock markets have declined severely; implied volatilities of equities and oil have spiked to crisis levels; and credit spreads on non-investment grade debt have widened sharply as investors reduce risks[5].

Our attraction to Islamic stocks is underscored by some distinct characteristics it possesses, compared to the conventional markets. Conventional capital markets have historically been too volatile and disconnected from real activity. In this market, there is a lot of uncertainty, which hinders investment. Islamic finance, on the other hand, eliminates capital market volatility and misalignment of returns with the economy's real growth and net profit rate. It is centered on taking and sharing risks, and it is closely tied to real economic activities. Furthermore, stock returns accurately reflect the net rate of profit and are unaffected by speculation. Also, because interest-based financing is non-existent, bankruptcy is not an option (Krichene 2012). Theoretically, the difference between Islamic equity markets and their conventional counterparts lies in the role of *Shariah* screening (see McGowan & Muhammad, 2010; Dewandaru, et al., 2014). Thus, due to the screening criteria, Islamic stocks are theoretically less susceptible to any shock because they have a smaller leverage effect (see Dewandaru, et al., 2014).

The investments in Islamic capital markets have gained momentum after the Global Financial Crisis of 2007-2009 as the empirical studies suggest that they performed well during the endogenous shocks like global financial crisis compared to the conventional investments (Masih, Kamil & Bacha, 2018; Al-Khazali & Mirzaei, 2017; Anagnostidis et al., 2016; Alam & Rajjaque, 2016; Alam et al., 2016; Saiti, Bacha & Masih, 2014; Ashraf, 2013). The performance of the Islamic investment vehicles is often credited to the distinct nature of the Islamic finance which endorses the idea of profit distribution and loss bearing and screens the companies based on the high exposure to interest-based leverage, low working capital, omission of complex financial products like derivatives and other exotic assets, prohibits firms whose investments are involved in activities like gambling, selling alcohol or pork, and connections with the real economy (Hassan

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[5] See https://www.oecd.org/coronavirus/policy-responses/global-financial-markets-policy-responses-to-covid-19-2d98c7e0/

et al., 2020; Ibrahim & Alam, 2018; Ibrahim & Rizvi, 2017; Ibrahim, 2015, 2019; Abedifar et al., 2015).

Prior to COVID-19 pandemic, it is well established in the literature that, in general, global stock markets react negatively to the exogenous shocks caused due to other infectious diseases like SARS (Yeung & Aman, 2016; Chen et al., 2009; Chen, Jang & Kim, 2007; Nippani & Washer, 2004), Ebola (Funck & Gutierrez, 2018; Ichev & Marinc, 2018), H7N9 influenza (Jiang et al., 2017), swine influenza (Kim et al., 2020), and Dengue fever (Wang et al.,2013). Recently, there are quite a few studies in the literature that looked at the impact of COVID-19 on stock market behaviour using different methodologies like regression analysis (Al-Awadhi et al., 2020; Pavlyshenko, 2020; Yilmazkuday, 2020; Ziren & Hizarci, 2020), event-study based analysis (Khanthavit A, 2020; Singh & Shaik, 2021), sectoral specific analysis (Aravind & Manojkrishnan, 2020; Öztürk et al., 2020; Ramelli & Wagner, 2020), and comparative analysis of COVID-19 with other diseases (Ru, Yang & Zhou, 2020). It is worthy of mention that these studies only deal with impact analysis (that is, in-sample predictability) of COVID-19 and stock markets, whereas, the presence of in-sample predictability between the two variables does not necessarily guarantee out-of-sample forecast gains. Thus, we advance the literature to see if the consideration for uncertainty information in the valuation of Islamic stocks can be explored for investment decisions. In other words, we extend our analysis to include the out-of-sample forecast performance of the UPE-based model for Islamic stocks. We do all this to assess the hedging potential of Islamic stocks during pandemic-induced crisis. Closely related studies to ours are Ashraf et al. (2020) and Salisu and Sikiru (2020), however, we differ from them in a number of ways: One, Ashraf et al. (2020) only appraise the behaviour of Islamic equity investment during COVID-19 crisis while ours assesses the nexus between Islamic stocks and COVID-19 using a standard measure (index) that captures all the pandemics and epidemics, as developed by Baker et al. (2020), other than a dummy, as in the case of Ashraf et al. (2020). Also, we evaluate the predictive power of the uncertainty index both for the in-sample and out-of-sample periods by comparing its forecast performance with that of a benchmark model that ignores uncertainty in the valuation of stocks, as evidence abound that in-sample predictability is not a guarantee for improved out-of-sample predictability. Finally, as a form of additional analysis, and to drive home the main objective of our study, which is to investigate if Islamic stock can serve as a hedge during COVID-19, we extend our analyses to cover conventional stock markets so as to bring to fore, the vulnerability of the market during the crisis. While Salisu and Sikiru (2020) offer both in-sample and out-of-sample forecast analyses, the outcome is however limited to the Asia-Pacific region and therefore it will be difficult to generalize with this outcome. Given the global coverage of Islamic stocks in our study, we are able to offer some meaningful generalization about the reaction of Islamic stocks to epidemics and pandemics.

There is a strong connection between financial markets and the COVID-19 pandemic which has been well espoused in the literature focusing on conventional stocks (see for example, Al-Awadhi et al., 2020; Ali et al., 2020; HaiYue et al., 2020; Haroon & Rizvi, 2020 a & b; Liu, Wang & Lee, 2020; Salisu & Akanni, 2020; Salisu & Vo, 2020; Topcu & Gulal, 2020). The overarching evidence from these studies suggests that the financial markets are vulnerable to the pandemic. However, given the resilience of Islamic stocks during the global financial crisis (see Masih, Kamil & Bacha, 2018; Al-Khazali & Mirzaei, 2017; Anagnostidis et al., 2016; Alam & Rajjaque, 2016; Alam et al., 2016; Saiti, Bacha & Masih, 2014; Ashraf, 2013), it will not be out of place to express the same sentiment for this category of stocks during the current pandemic whose impact is also assumed to be global in nature. Ashraf et al. (2020), analyze the impact of Islamic Equity Investments (IEIs) during the COVID-19 pandemic and find that IEIs provide hedging benefits especially for those markets following the market value of equity-based Shariah screening criteria.

In this paper, to assess the nexus between Islamic stocks and COVID-19 pandemic, we employ a newly developed real-time forward-looking uncertainty measure like Infectious Disease Equity Market Volatility Tracker (EMV-ID) compiled by Baker et al. (2020), which is a newspaper-based index that tracks daily equity market volatility, in particular the movements in the Chicago Board Options Exchange (CBOE)'s Volatility Index (VIX), due to infectious diseases. The foregoing marks a major disparity between our contribution to the literature and that of Ashraf et al. (2020) who only employ a dummy to investigate how IEIs behaves during COVID-19. Here onwards, we call this measure as uncertainty index for pandemics and epidemics (UPE). We construct a predictive model for Islamic stocks that incorporates the UPE. We are able to achieve four objectives, which again form our contributions to the literature, with this construction. First, the model helps to test whether Islamic stocks are either vulnerable or can be used to hedge against uncertainty due to pandemics or not; second, we are able to further assess whether the relationship is time-varying particularly between the pre- COVID-19 and COVID-19 sample periods, and third, we also evaluate the predictive power of the uncertainty index both for the in-sample and out-of-sample periods by comparing its forecast performance with that of a benchmark model that ignores uncertainty in the valuation of stocks. Fourth, we offer additional analyses by controlling for other predictors of stock returns such as oil price, geopolitical risk and economic policy uncertainty whose impact on stock returns has been empirically validated in the literature.[6] The main idea of these additional analyses is to test for the robustness of the UPE's impact on stock returns under alternative specifications. Finally, we replicate all the analyses for the conventional stock markets in order to have a balanced representation of the stock market reaction to UPE as well as possible hedging relationship between them. All these considerations in the empirical analyses enable us to make meaningful generalization about the connection between Islamic stocks (as well as conventional stocks) and UPE including COVID-19 pandemic. Investors seeking to maximize returns amidst systematic risk (or undiversifiable risk) such as those associated with pandemics and epidemics would find this study useful when making investment decisions.

The rest of the paper is organized as follows. In Section 2, we describe the data and conduct preliminary analysis which reveal that as the uncertainty due to pandemics in the global market drops, better returns can be expected. In Section 3, we describe the methodology followed by results and discussion in Section 4. Finally, we conclude the paper in Section 5.

2. Data and preliminary analyses

The Infectious Disease Equity Market Volatility (EMV-ID) tracker which we refer to in this paper as uncertainty for pandemics and epidemics (UPE) was recently compiled by Baker et al. (2020) which is a real-time forward-looking economic uncertainty newspaper-based index available at daily frequency from January 1985 and is updated daily. The data is downloaded from the Federal Reserve Bank of Saint Loise, FRED Economic Research data[7]. The EMV-ID tracker is constructed based on textual analysis of four sets of terms including its variants, namely E: economic, economy, financial; M: "stock market", equity, equities, "Standard and Poors"; V: volatility,

[6] A number of studies have shown strong connections between stock returns and factors such as oil price (see Narayan & Gupta, 2015; Phan et al., 2015; Narayan, 2019; and Salisu, Swaray & Oloko, 2019), geopolitical risk (see for example, Bouri et al., 2019; Salisu et al., 2021; Ndako et al., 2021) and economic policy uncertainty (EPU) (Bekiros et al., 2016; Phan et al., 2018; Adam et al., 2022).

[7] Baker, Scott R., Bloom, Nick and Davis, Stephen J., Equity Market Volatility: Infectious Disease Tracker [INFECTDISEMVTRACKD], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/INFECTDISEMVTRACKD, August 03, 2020.

volatile, uncertain, uncertainty, risk, risky; ID: epidemic, pandemic, virus, flu, disease, coronavirus, mers, sars, ebola, H5N1, H1N1, and then finding daily totals of newspaper articles that contain at least one term in each of E, M, V, and ID across approximately 3000 US newspapers. The raw index of uncertainty connected with infectious diseases (EMV-ID) count was scaled by the number of all articles in the same day, next, multiplicatively rescaled the resulting series to match the level of the VIX, by using the overall EMV index, and then scaling the EMV-ID index to reflect the ratio of the EMV-ID articles to total EMV articles (Baker et al., 2020).

The stock market index data set in this paper consists of 11 major global Islamic sharia stock indices from across the developed, GCC and emerging nations namely: S & P 500 Sharia Index of U.S.A, MSCI Turkey Islamic Index, MSCI Qatar Islamic Index, MSCI Oman Islamic Index, MSCI Bahrain Islamic Index, Jakarta Stock Exchange Islamic Index of Indonesia, FTSE Bursa Malaysia Hijra Sharia Index, NSE Nifty 50 Sharia Index of India, FTSE TWSE Sharia Index of Taiwan, FTSE Sharia China Index, and FTSE SGX Asia Sharia Index of Singapore. Overall the sample data set has 1 Islamic index from developed nation from North America region (USA) and 10 Islamic indices from Emerging markets of which 6 indices are from Asia Pacific region (Indonesia, Malaysia, India, Taiwan, China, and Singapore), 1 from European region (Turkey) and 3 are from Middle Eastern region (Qatar, Oman, and Bahrain). The Islamic stock indices data is downloaded from the source Bloomberg.

The data sample is divided into 3 sections; the first section covers the pre-COVID-19 period, the second section covers the COVID-19 period while the third section, full sample, is an amalgamation of both periods. The pre- COVID-19 sample period stretches from 12/11/2008 to 31/12/2019 making a total of 2905 data periods while the COVID-19 sample period covers 1/1/2020 to 03/08/2020 with 154 data periods. In total, the full sample has 3059 data periods. Uncertainty due to pandemic index is available for all periods considered. The general restriction of our start date (as well as our pre-COVID-19) to 12/11/2008 is done to accommodate countries with no available data beyond the said date. On the other hand, for our COVID period, although the World Health Organization declared the disease a pandemic on March 11, 2020, but it should be emphasized that the outbreak started in December 2019, and that some countries such as China, which is also the epicenter of the disease, have already recognized the virus a deadly one. Consequently, some non-pharmaceutical measures like lockdown have since been imposed since

January 23, 2020[8] in order to curtail the spread of the virus. We therefore in this study set our COVID-19 period to January 1, 2020, as the impact of the virus has already been felt in the financial market as of this time (see Zeren & Hizarci, 2020; Ashraf, 2020; Liu et al., 2020). A comprehensive description of data is presented in **Table 1**, while **Table 2** illustrates the results of preliminary analyses - which comprises of mean and standard deviation - for both pre- COVID-19 and COVID-19 periods. We also conduct a scenario analysis for both periods to examine stock behaviour under different conditions of market uncertainty. Some graphical presentations are also rendered to highlight the probable co-movements between stock prices and stock returns.

Table 1: List of countries and their Islamic stock indices and codes

	Index	Country	Code
1	MSCI Bahrain Islamic Index	Bahrain	MIBH
2	SWCHN: FTSE Shariah China Index	China	SWCHN
3	INSHNIFT: India NSE Nifty 50 Shariah Index	India	INSHNIFT
4	JAKISL: Jakarta Stock Exchange Islamic Index	Indonesia	JAKSIL
5	FBMHS: FTSE Bursa Malaysia Hijrah Shariah Index	Malaysia	FBMHS
6	MIOM: MSCI Oman Islamic Index	Oman	MIOM
7	MIQA: MSCI Qatar Islamic Index	Qatar	MIQA
8	FTSE SGX Asia Shariah Index	Singapore	SGS100
9	TWSH: FTSE TWSE Taiwan Shariah Index	Taiwan	TWSH
10	MITR - MSCI Turkey Islamic Index	Turkey	MITR
11	SHX: S&P 500 Shariah Index	USA	SHX

As earlier mentioned, in **Table 2**, we show the descriptive analysis of countries' stock returns and evaluate their relationship with market uncertainty due to infectious disease. The table summarizes the mean and standard deviation for all 11 countries as well as their behavior as market uncertainty rises and falls. Columns designated A and B for both pre-COVID-19 and COVID-19 periods report average stock returns and standard deviation when market uncertainty is below and above its average value, respectively. Our findings show that most of the countries with the exception of a few (Bahrain and Oman) recorded on the average, positive stock returns before the outbreak of the pandemic although with high market volatility. The results show that Turkey enjoys the highest pre- COVID-19 stock returns albeit in a very volatile environment, followed by USA, India and Indonesia, with the rest countries including China and Taiwan also recording positive but modest returns. Bahrain suffered the most pre-COVID-19 slump in stock returns from the sample.

[8] https://en.wikipedia.org/wiki/COVID-19_lockdown_in_China

Meanwhile, scenario analysis of returns in this period reveals that stock returns increase as the uncertainty level rises for most of the countries (and reasonably so, the higher the uncertainty, the higher the gain) except for Bahrain, China and Taiwan that record lower returns at increased level of uncertainty. As the pandemic struck, the result changed with more countries (Indonesia, Qatar) recording negative stock returns and earlier negative countries even slump further. Surprisingly, majority of the countries held on to their positive stock returns with some countries recording even better returns, although scenario analysis will later on this, provide better clarity. The result of scenario analysis shows that all countries, especially the ones like USA, Turkey, India, Malaysia and Singapore that recorded an improved COVID-19 period average stock returns, have in fact initially suffered during the outbreak, particularly when the uncertainty level rose, with some of them dropping as low as recording negative returns. The observed improvement in the average stock returns was not recorded until the market uncertainty fell below its COVID-19 average. The implication of this result is vast for world, it simply means that gradually, the global economy may in fact be healing and emerging out of the pandemic-induced recession, and as the uncertainty in the global market drops, even better returns can be expected.

Fig 1 illustrates the co-movements between stock returns and stock price for both pre-COVID-19 and COVID-19 periods demarcated by a vertical line as seen on the graph. The graphical illustration shows a co-movement between the two variables with stock returns being more volatile. For most of the country except Turkey, the pre- COVID-19 period witnessed minimal fluctuation compared with the COVID-19 period. The graph also shows that volatility in stock returns during the COVID-19 period did not peak until the 3rd month after its outbreak and about time when it was declared a pandemic by the World Health Organization (WHO).

Table 2: Summary statistics for country-specific Islamic stock returns

Country		Pre- COVID-19	A	B	COVID-19	A	B
Bahrain	mean	-0.08359	-0.07466	-0.10257	-0.11153	0.042114	-0.27132
	SD	1.370448	1.300529	1.508929	1.724207	0.677445	2.361816
China	mean	0.046814	0.053446	0.032715	0.044268	0.149208	-0.06487
	SD	1.853103	1.467739	2.481851	1.844277	1.340433	2.256833
India	mean	0.05118	0.039272	0.076495	0.078608	0.193701	-0.04109
	SD	1.155591	1.077786	1.305955	2.194266	0.922802	2.995879
Indonesia	mean	0.051234	0.031457	9.33E-02	-0.1396	-1.23E-01	-0.15637
	SD	1.324047	1.303165	1.367144	2.423967	1.081857	3.293996
Malaysia	mean	0.025072	0.023815	0.027745	0.112151	0.105326	0.119249
	SD	0.620919	0.599636	0.664231	1.368497	0.968424	1.694353
Oman	mean	-0.01012	-0.02254	0.016276	-0.14136	0.090314	-0.3823
	SD	1.062897	0.996203	1.192504	1.90169	0.817016	2.572614
Qatar	mean	0.026009	0.019376	0.040109	-0.01531	0.016311	-0.0482
	SD	1.329988	1.214684	1.547454	1.509498	0.786729	2.00852
Singapore	mean	0.031456	0.02697	0.040993	0.05864	0.05864	-0.04106
	SD	1.005579	0.985398	1.047671	0.957321	0.957321	2.017236
Taiwan	mean	0.037771	0.040292	0.032413	0.060687	0.111217	0.008135
	SD	1.048442	1.024933	1.097297	1.673584	1.191255	2.066653
Turkey	mean	0.079118	0.061394	0.1168	0.173289	0.347632	-0.00803
	SD	1.544266	1.508031	1.618797	1.948672	1.542292	2.293348
USA	mean	0.051776	0.020875	0.117468	0.088652	0.034649	0.144815
	SD	1.030686	0.980398	1.127932	2.651021	1.07834	3.635861
UPE	mean	4.17E-01			21.35565		
	SD	1.077546			16.13093		

Note: The average stock returns are presented in percentages. Column A indicates the average stock returns and its standard deviation when the uncertainty index is below its overall mean, while Column B considers the same requirements when the uncertainty index is above its average value. SD represents standard deviation and UPE is uncertainty due to pandemics.

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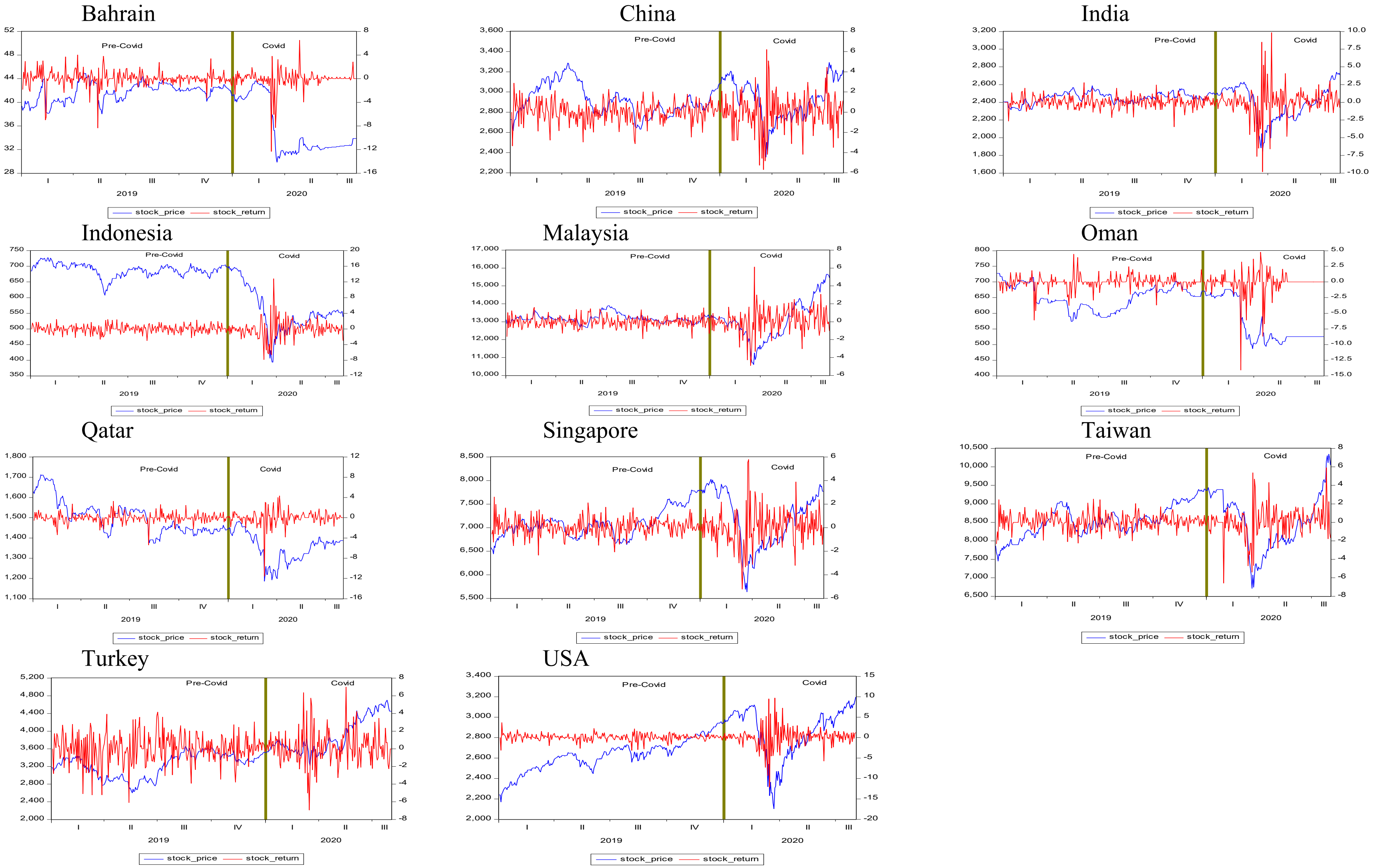
Fig 1: Country-specific stock price – stock return relationship



Note: The blue and red legends connote stock price and stock return, respectively; as the latter is computed as 100*$\Delta\log(p_t)$, where p_t is the price level. While the region before the vertical line denotes the period before the outbreak of COVID-19, the region after it is after the outbreak of the pandemic –COVID-19, with the start date, according to this study, being 1/1/2020.

3. Methodology

We construct a predictive model for Islamic stocks that incorporates the uncertainty index for pandemics and epidemics (UPE) [we have previously described the nature of the UPE data]. Two variants of the model are considered: the first variant is a single-factor model where UPE is the only predictor while the second variant extends the first variant to include other predictors of stock returns and we begin with oil price (a good proxy for global factor). Studies such as Narayan & Gupta (2015), Phan et al. (2015), Narayan (2019), and Salisu, Swaray & Oloko (2019) have established a strong link between oil and stocks.[9] Thereafter, we estimate other variants of the extended model where oil price is distinctly replaced with geopolitical risk (see for example, Bouri et al., 2019; Salisu et al., 2021; Ndako et al., 2021) and economic policy uncertainty (Bekiros et al., 2016; Phan et al., 2018; Adam et al., 2022) whose impact on stock returns has been empirically validated in the literature. The main idea of these additional analyses is to test for the robustness of the UPE's impact on stock returns under alternative specifications. From the foregoing, we construct a predictive model for stock returns which accommodates any inherent heterogeneity and unobserved common factors among the cross-sections in addition to the predictor series[10] (see Chudik and Pesaran, 2015; Chudik et al., 2016; Westerlund et al., 2016; Ditzen, 2018):

$$r_{it} = \alpha_i + \sum_{j=1}^{5} \beta_{ij} UPE_{i,t-j} + \varepsilon_{it} \quad [1]$$

$$\varepsilon_{it} = \lambda_i c_t + u_{it} \quad [2]$$

$$i = 1, 2, ..., N; \; t = 1, 2, ..., T.$$

where r_{it} denotes stock returns computed as log return given as: $100 * \log\left(S_{it} / S_{i,t-1}\right)$ with S_{it} defined as the stock index data for country i at period t; UPE_{it} represents uncertainty due to pandemics and epidemics; α_i and β_i represent the heterogeneous intercept and slope coefficients which are allowed to vary across the units; and ε_{it} is the composite error term comprising an

[9] Recent literature during the pandemic have established a strong connection between oil price and the pandemic (see Devpura & Narayan, 2020; Gil-Alana & Monge, 2020; Iyke, 2020; Liu, Wang & Lee, 2020; Narayan, 2020; Salisu & Adediran, 2020; Qin et al., 2020) with implications on financial market (see Liu, Wang & Lee, 2020; Liu et al., 2020; Salisu, Ebuh & Usman, 2020; Prabheesh et al., 2020).

[10] In addition, this approach also helps resolve any inherent nonstationarity which is a suspect when dealing with long T.

unobserved common factor loading $\left(c_t\right)$ accompanied with a heterogeneous factor loading $\left(\lambda_i\right)$ and the remainder error term $\left(u_{it}\right)$. Thus, in addition to allowing for heterogeneity in the predictability, we also incorporate unobserved common factors for the selected stocks. For the predictability of UPE, we allow for up to five lags given the 5-day daily data frequency in which stock return is expected to exhibit day-of-the-week effect as well as the need to capture more dynamics in the estimation process (see also Zhang et al., 2017; Salisu & Akanni, 2020; Salisu & Vo, 2020). Thus, the hedging potential of Islamic markets against risk associated with pandemics is evaluated using the Wald test for joint significance $\sum_{j=1}^{5}\beta = 0$. The considered markets are likely to at least retain the value of their returns, on the average, in the face of pandemics, if $\sum_{j=1}^{5}\beta_j \geq 0$; otherwise, they are more likely to be vulnerable. The first variant of the model is expressed in equation 1 while second variant which includes oil price is given as:

$$r_{it} = \alpha_i + \sum_{j=1}^{5}\beta_{ij}UPE_{i,t-j} + \phi_i p_{it} + \varepsilon_{it} \qquad [2]$$

where p_{it} is the log return of oil price using Brent crude oil price that seems to reflect movements in global oil prices. Note that equation [2] is further re-specified to separately accommodate other important predictors of stock returns such as geopolitical risk and economic policy uncertainty.

The forecast evaluation is conducted for both the in-sample and out-of-sample periods using 75:25 data split. The benchmark model is the historical average or constant return model [$r_{it} = \alpha + \varepsilon_{it}$; $t = 1,2,3,...,T;\ i = 1,2,3,...,N$] and is described as the restricted model.[11] The unrestricted model is the one that includes the UPE series (see equations 1 & 2). We employ the

[11] This is because the historical average model for return series is technically the random walk for the corresponding price index. For example, if we express our random walk for a price index (p) as:
log(p) = constant + log (p (-1)) + error [1]
This can be equivalently expressed in return form as:
log(p) – log(p(-1)) = constant + error [2]
Equation [2] is the historical average model for the return series which is an equivalent specification for the corresponding price series. This explains why most studies involving return predictability consider historical average model rather than random walk as the benchmark model (see for example, Narayan & Gupta, 2015; Salisu and Vo, 2020; among others).
[11] The Diebold and Mariano (1995) test is not considered here since it is more suitable for non-nested models.

Clark & West (2007) test to compare the difference in the forecast errors of the two models. For a forecast horizon h, the CW (2007) test is specified as:

$$\hat{f}_{t+h} = M\hat{S}E_r - (M\hat{S}E_u - adj) \quad [4]$$

where $\hat{f}_{t+h}$ is the forecast horizon; $M\hat{S}E_r$ and $M\hat{S}E_u$ respectively denote the mean squared errors of the restricted and unrestricted predictive models and they are respectively computed as: $P^{-1}\sum\left(r_{i,t+h} - \hat{r}_{ri,t+h}\right)^2$ and $P^{-1}\sum\left(r_{i,t+h} - \hat{r}_{ui,t+h}\right)^2$. The term adj is included to adjust for noise in the unrestricted model and it is defined by $P^{-1}\sum\left(\hat{r}_{ri,t+h} - \hat{r}_{ui,t+h}\right)^2$; P is the amount of predictions that the averages are computed. The statistical significance of regressing $\hat{f}_{t+h}$ on a constant confirms the CT test. The null hypothesis of a zero coefficient is rejected if this statistic is greater than +1.282 (for a one sided 0.10 test), +1.645 (for a one sided 0.05 test) and +2.00 for 0.01 test (for a one sided 0.01 test) (see Clark and West, 2007). Three out-of-sample forecast horizons, namely a 10-day, a 20-day and a 30-day ahead forecast horizons are considered.

4. Main results

We consider two variants of the UPE-based model for Islamic stocks: one that singly captures the response of Islamic stock returns to uncertainty due to pandemics and epidemics (UPE) and the other which extends the first variant to include control variable. We also compare the performance of Islamic stocks with the conventional stocks based on the same variants and the results are presented in **Table 3**. We find that Islamic stocks can be used to hedge uncertainty due to pandemics, on average, albeit with lower performance during COVID-19 pandemic. The outcome remains the same even after controlling for oil price, a major driver of stock returns. However, the conventional stocks are seen to be vulnerable to uncertainty due to pandemics, on the average and the performance is worse during the COVID-19 pandemic. This result is consistent with the literature demonstrating vulnerability of conventional stocks to pandemics (Al-Awadhi et al., 2020; Ali et al., 2020; Haroon & Rizvi, 2020 a & b; Liu, Wang & Lee, 2020; Salisu & Akanni, 2020; Salisu & Vo, 2020; Topcu & Gulal, 2020) and resilience of Islamic stocks during crisis (Masih, Kamil & Bacha, 2018; Al-Khazali & Mirzaei, 2017) and hedging benefits of Islamic equity investments during COVID-19 (Ashraf et al., 2020).

Table 3: Predictability results for pandemics and stock returns

	Full Sample		Pre-COVID-19		COVID-19	
	Islamic stocks	Conventional stocks	Islamic stocks	Conventional stocks	Islamic stocks	Conventional stocks
Without Control	-.0004	-0.0035[a]	0.0322[a]	0.0213[a]	0.0017	-0.0015
	(0.16)	(18.08)	(30.68)	(11.69)	(0.58)	(1.00)
With Control	0.0008	-0.0033[a]	0.0410[a]	0.0225[a]	0.0009	-0.0016
	(0.51)	(14.70)	(64.71)	(12.61)	(0.16)	(0.95)

Note: "Without Control" implies the original model with the predictor of interest only while "With Control" is an extension of the original model to include relevant control variables. Irrespective of the model, the coefficient reported under each data sample [i.e. Full, Pre-COVID-19 & COVID-19 data samples] is the sum of the coefficients of the five lags whose significance are jointly evaluated using the Wald test for coefficient restriction. As such, the values in parentheses - ( ) are the F statistics for the joint coefficients; a, b & c indicate statistical significance at 1%, 5% and 10% levels respectively.

Table 4: In-Sample and Out-of-Sample Forecast Evaluations using Clark & West test

	Islamic Stocks		Conventional Stocks	
Panel A: In-Sample Forecast Evaluation				
	Model 1 vs Model 2	**Model 1 vs Model 3**	**Model 1 vs Model 2**	**Model 1 vs Model 3**
Full Sample	0.0153[a] [4.22]	0.0911[a] [16.55]	0.0150[a] [7.02]	0.0242[a] [9.88]
Pre-Covid	0.0165[a] [4.26]	0.0984[a] [16.67]	0.0156[a] [7.02]	0.0249[a] [9.78]
Covid	0.3629[a] [4.79]	0.9783[a] [7.53]	0.2317[a] [5.47]	0.2997[a] [6.55]
Panel B: Out-of-Sample Forecast Evaluation [h=10]				
Full Sample	0.0152[a] [4.23]	0.0907[a] [16.55]	0.0150[a] [7.03]	0.0242[a] [9.91]
Pre-Covid	0.0163[a] [4.24]	0.0977[a] [16.63]	0.0156[a] [7.02]	0.0249[a] [9.79]
Covid	0.3259[a] [4.66]	0.9029[a] [7.53]	0.2189[a] [5.41]	0.2813[a] [6.47]
Panel C: Out-of-Sample Forecast Evaluation [h=20]				
Full sample	0.0152[a] [4.23]	0.0902[a] [16.51]	0.0150[a] [7.03]	0.0241[a] [9.91]
Pre-Covid	0.0163[a] [4.24]	0.0976[a] [16.68]	0.0155[a] [7.02]	0.0248[a] [9.79]
Covid	0.3109[a] [4.80]	0.8475[a] [7.63]	0.2139[a] [5.59]	0.2709[a] [6.61]
Panel D: Out-of-Sample Forecast Evaluation [h=30]				
Full sample	0.0151[a] [4.22]	0.0890[a] [16.51]	0.0149[a] [7.04]	0.0239[a] [9.88]
Pre-Covid	0.0162[a] [4.25]	0.0971[a] [16.67]	0.0154[a] [7.00]	0.0246[a] [9.78]
Covid	0 .2918[a] [4.81]	0.7944[a] [7.68]	0.2183[a] [5.83]	0.2731[a] [6.83]

Model 1 is the Historical Average model; Model 2 is the model without control; Model 3 is the model with control. The Clark & West test measures the significance of the difference of the forecast errors of two competing models. The null hypothesis of a zero coefficient is rejected if this statistic is greater than +1.282 (for a one sided 0.10 test), +1.645 (for a one sided 0.05 test) and +2.00 for 0.01 test (for a one sided 0.01 test) (see Clark and West, 2007). Values in square brackets – [ ] are for t-statistics. a, b & c indicate statistical significance at 1%, 5% and 10% levels respectively.

The forecast evaluation results are presented in **Table 4** (Panel A for the in-sample forecast evaluation and Panels B, C, & D for the out-of-sample forecasts). The rejection of the null hypothesis based on the Clark & West test equation implies superiority of the UPE-based model for stock return predictability over the benchmark model. Further evaluation of the significance of the UPE in the valuation of Islamic stocks suggests that its inclusion in a predictive model improves forecast accuracy both for the in-sample and out-of-sample forecasts of Islamic stock returns. Thus, financial/investment analysts who rely on accurate forecasts of stock returns when making investment decisions may need to account for the risk associated with pandemics.

As previously noted, we further extend the analysis to capture additional predicators which are majorly news-based such as geopolitical risk (GPR) (see for example, Bouri et al., 2019; Salisu et al., 2021; Ndako et al., 2021) and economic policy uncertainty (EPU) (Bekiros et al., 2016; Phan et al., 2018; Adam et al., 2022) in the predictive model of stock returns for both the Islamic and Conventional stocks and therefore we are able to measure how the categories of stock respond to such news. While these studies show evidence of the significance of economic policy uncertainty and geopolitical risks in the predictability of stock returns, such analyses are largely focus on specific countries and more devoted to conventional stocks and therefore the extent to which their results compare with the two classifications of stocks considered in our study is yet to be seen. This is the motivation for the additional analysis.

We use the monthly updated global EPU (GEPU) index constructed by Baker et al. (2016) which is freely downloadable from https://www.policyuncertainty.com/global_monthly.html. The GEPU Index is a GDP-weighted average of national EPU indices for 21 countries that account for about 71% of global output on a PPP-adjusted basis and roughly 80% at market exchange rates. There are two versions of the GEPU Index - one based on current-price GDP measures, and one based on PPP-adjusted GDP and we use both in the robustness analyses.[12]

The geopolitical risk (GPR) index used here is the one constructed by Caldara and Iacoviello (2018) and it is also freely downloadable from https://www.matteoiacoviello.com/gpr.htm. It is a text-based index using an array of newspaper articles covering words related to geopolitical tensions. There are two categories of the GPR index based on the number of newspapers used. This is the Recent GPR (RGPR) Index involving 10 newspapers and starts in 1985 and the Historical GPR (HGPR) Index which uses 3 newspapers and starts in 1900. In addition, two sub-indices are also constructed based on whether the GPR occurred (described as GPR Acts) or were mere threats (i.e., GPR Threats). The search is organized

[12] For more technical details on the GEPU, see Baker et al. (2016) and follow this link https://www.policyuncertainty.com/global_monthly.html.

in eight groups: War Threats (Category 1), Peace Threats (Category 2), Military Build-ups (Category 3), Nuclear Threats (Category 4), Terror Threats (Category 5), Beginning of War (Category 6), Escalation of War (Category 7), Terror Acts (Category 8). Based on the search groups above, the Geopolitical Threats (GPRT) includes words belonging to groups 1 to 5 while the Geopolitical Acts (GPRA) index includes words belonging to groups 6 to 8.[13] We use all the variants of the GPR data, about six of them [HGPR and RGPR as well as their threats and acts sub-indices]. Also, given the nature of the data for the GPR and EPU, we resize the stock return series to monthly frequency and use the same for the empirical analyses. While the data split of 75:25 is still upheld, the out-of-sample forecast horizons are now 3-, 6-, and 12-month ahead forecasts. Since this exercise is to test whether the relationship between Islamic stocks and pandemics is robust to alternative specifications and given the shortness of monthly observations for the COVID-19 pandemic, we limit the analysis to the full sample.

The predictability results are presented in Table 5 while the forecast evaluation results are in Tables 6 and 7 for Islamic stocks and conventional stocks, respectively. We observe significant results for Islamic stocks in this case relative to the results obtained for the full sample in Table 3 where predictability coefficients are not significant for Islamic stocks. Notwithstanding the consistency in the outcome for the conventional stocks, the Islamic stocks counterparts are sensitive to alternative specifications. More importantly, the inclusion of geopolitical risk and economic policy uncertainty offers improved predictability for the UPE-based model for Islamic stocks relative to oil price returns. Given the significant positive relationship between UPE and Islamic stocks, the hedging potential of this category of stocks to uncertainty due to pandemics and epidemics is further strengthened and goes to validate the increasing evidence in favour of Islamic stocks amidst crisis (see Masih et al., 2018; Salisu and Sikiru, 2020, among others). The forecast evaluation results attest to the importance of including UPE as well as other predictors when forecasting both Islamic and conventional stock returns. In other words, regardless of the forecast horizons, the out-of-sample forecasts of both categories of stocks improve with UPE. The combined evidence from both in-sample and out-of-sample predictability analyses further advances the literature on Islamic finance and investors seeking to invest in stocks will find the

[13] For more technical details on the variants of GPR, see Caldara and Iacoviello (2018) and follow this link https://www.matteoiacoviello.com/gpr.htm.

results useful particularly when the equity market is confronted with systematic risk (or undiversifiable risk) such as those associated with pandemics and epidemics.

Table 5: Predictability of pandemics and stock returns under alternative control variables

	Islamic stocks	Conventional stocks	Islamic stocks	Conventional stocks	Islamic stocks	Conventional stocks
	HGPR		**HGPRT**		**HGPRA**	
UPE	0.0862[a]	-0.1253[a]	0.0903[a]	-0.1264[a]	0.08261[a]	-0.1238[a]
	(11.77)	(7.03)	(13.39)	(6.99)	(9.83)	(6.94)
	RGPR		**RGPRT**		**RGPRA**	
UPE	0.0917[a]	-0.1247[a]	0.0925[a]	-0.1254[a]	0.0912[a]	-0.1203[b]
	(13.67)	(6.78)	(14.10)	(6.79)	(12.99)	(6.59)
	GEPU_CURRENT		**GEPU_PPP**			
UPE	0.0737[a]	-0.1270[a]	0.0793[a]	-0.1273[a]		
	(9.11)	(7.09)	(10.56)	(7.07)		

Note: UPE (Uncertainty Due to Pandemics and Epidemics) is the predictor series of interest and we examine its behavior after controlling for the variants of Geopolitical Risk (GPR) and Economic Policy Uncertainty (EPU). HGPR is the Historical Geopolitical Risk; HGPRT is the Historical Geopolitical Risk Threats while HGPRA is the Historical Geopolitical Risk Acts. The RGPR, RGPRT and RGPRA are as defined as the Historical GPR variants except that the former's first letter "R" denotes "Recent". Also, GEPU_CURRENT and GEPU_PPP respectively denote the Global Economic Policy Uncertainty measured in terms of the current-price GDP and PPP-adjusted GDP. As presented in the methodology, the coefficient reported for UPE under each alternative specification is the sum of the coefficients of the five lags $\left(\sum_{j=1}^{5} \beta_{ij} UPE_{i,t-j}\right)$ whose significance are jointly evaluated using the Wald test for coefficient restriction. As such, the values in parentheses - ( ) are the F statistics for the joint coefficients; [a, b] & [c] indicate statistical significance at 1%, 5% and 10% levels respectively.

Table 6: Forecast Evaluations using Clark & West test [Islamic Stocks]

	HGPR	HGPRT	HGPRA
In-Sample	2.0033[a] [3.67]	1.9722[a] [3.58]	2.0387[a] [3.77]
Out-of-Sample			
3-Month	1.9555[a] [3.69]	1.9364[a] [3.61]	1.9959[a] [3.79]
6-Month	1.8941[a] [3.66]	1.8784[a] [3.60]	1.9378[a] [3.78]
12-Month	1.8991[a] [3.87]	1.8772[a] [3.78]	1.9344[a] [3.96]
	RGPR	**RGPRT**	**RGPRA**
In-Sample	2.0309[a] [3.69]	2.0230[a] [3.63]	2.0479[a] [3.75]
Out-of-Sample			
3-Month	1.9793[a] [3.70]	1.9771[a] [3.65]	2.0059[a] [3.78]
6-Month	1.9095[a] [3.65]	1.8996[a] [3.60]	1.9647[a] [3.80]
12-Month	1.9094[a] [3.84]	1.9012[a] [3.79]	1.9363[a] [3.93]
	GEPU_CURRENT	**GEPU_PPP**	
In-Sample	3.5985[a] [5.75]	3.4296[a] [5.52]	
Out-of-Sample			
3-Month	3.5054[a] [5.77]	3.3407[a] [5.54]	
6-Month	3.3991[a] [5.73]	3.2673[a] [5.56]	
12-Month	3.3393[a] [5.91]	3.2227[a] [5.76]	

Note: The Clark & West test measures the significance of the difference of the forecast errors of two competing models, that is, the benchmark model without any predictor series and the UPE-based model with control variables as depicted in the table. HGPR is the Historical Geopolitical Risk; HGPRT is the Historical Geopolitical Risk Threats while HGPRA is the Historical Geopolitical Risk Acts. The RGPR, RGPRT and RGPRA are as defined as the Historical GPR variants except that the former's first letter "R" denotes "Recent". Also, GEPU_CURRENT and GEPU_PPP respectively denote the Global Economic Policy Uncertainty measured in terms of the current-price GDP and PPP-adjusted GDP. The null hypothesis of a zero coefficient is rejected if this statistic is greater than +1.282 (for a one sided 0.10 test), +1.645 (for a one sided 0.05 test) and +2.00 for 0.01 test (for a one sided 0.01 test) (see Clark and West, 2007). Values in square brackets – [ ] are for t-statistics. [a, b] & [c] indicate statistical significance at 1%, 5% and 10% levels respectively.

Table 7: Forecast Evaluations using Clark & West test [Conventional Stocks]

	HGPR	HGPRT	HGPRA
In-Sample	1.5435[a] [6.55]	1.5103[a] [6.38]	1.5340[a] [6.48]
Out-of-Sample			
3-Month	1.4930[a] [6.51]	1.4600[a] [6.34]	1.4862[a] [6.46]
6-Month	1.4538[a] [6.52]	1.4216[a] [6.35]	1.4538[a] [6.49]
12-Month	1.4040[a] [6.63]	1.3681[a] [6.43]	1.3925[a] [6.55]
	RGPR	**RGPRT**	**RGPRA**
In-Sample	1.5817[a] [6.64]	1.4772[a] [6.30]	1.7887 [7.23]
Out-of-Sample			
3-Month	1.5318[a] [6.61]	1.4289[a] [6.27]	1.7327[a] [7.20]
6-Month	1.4853[a] [6.58]	1.3896[a] [6.26]	1.7013[a] [7.26]
12-Month	1.4398[a] [6.71]	1.3263[a] [6.29]	1.6478[a] [7.38]
	GEPU_CURRENT	**GEPU_PPP**	
In-Sample	1.7421[a] [6.85]	1.7381[a] [6.88]	
Out-of-Sample			
3-Month	1.6863[a] [6.83]	1.6821[a] [6.85]	
6-Month	1.6454[a] [6.82]	1.6460[a] [6.88]	
12-Month	1.5775[a] [6.89]	1.5780[a] [6.95]	

Note: The Clark & West test measures the significance of the difference of the forecast errors of two competing models, that is, the benchmark model without any predictor series and the UPE-based model with control variables as depicted in the table. HGPR is the Historical Geopolitical Risk; HGPRT is the Historical Geopolitical Risk Threats while HGPRA is the Historical Geopolitical Risk Acts. The RGPR, RGPRT and RGPRA are as defined as the Historical GPR variants except that the former's first letter "R" denotes "Recent". Also, GEPU_CURRENT and GEPU_PPP respectively denote the Global Economic Policy Uncertainty measured in terms of the current-price GDP and PPP-adjusted GDP. The null hypothesis of a zero coefficient is rejected if this statistic is greater than +1.282 (for a one sided 0.10 test), +1.645 (for a one sided 0.05 test) and +2.00 for 0.01 test (for a one sided 0.01 test) (see Clark and West, 2007). Values in square brackets – [ ] are for t-statistics. [a, b] & [c] indicate statistical significance at 1%, 5% and 10% levels respectively.

5. Conclusion

This study attempts to contribute to the growing literature on the role of pandemics in the valuation of stocks with a focus on Islamic stocks. This category of stocks has remained understudied during the pandemic compared to the huge literature on the conventional stocks. While most studies on the latter suggest the vulnerability of these stocks to pandemics, this outcome may not be valid for the Islamic stocks that seem to show some level of resilience during the global financial crisis in which the prices of most financial assets crashed. Thus, we construct a predictive model that allows us to examine either the vulnerability or hedging potential of Islamic stocks during pandemics including COVID-19 pandemic. We cover Islamic stock markets across the globe and for completeness, we also replicate the analyses for the conventional stocks. In line with the evidence in the extant literature, we find conventional stocks to be vulnerable to pandemics while the reverse is the case for Islamic stocks. In other words, Islamic stocks can be used to hedge against uncertainty due to pandemics including COVID-19 pandemic although the hedging effectiveness seems to decline during the current pandemic. The in-sample and out-of-sample forecast evaluation results suggest that the consideration of the uncertainty information in the valuation of stocks is crucial for investment decisions. This outcome offers useful insights particularly in terms of the resilience of stocks when confronted with systematic risk (or undiversifiable risk) such as those associated with pandemics and epidemics. An extension of this study that accounts for the role of climate risk in the valuation of stocks including Islamic stocks would further advance the extant literature. The issue of climate change-related risks is becoming topical and contributing to the growing debate is crucial for a broader understanding of the sensitivity of Islamic stocks, as well other securities to environmental and sustainability concerns.

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