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FTSE BURSA MALAYSIA HIJRAH SHARIAH INDEX AND UNCERTAINTY INDEX: EVIDENCE FROM AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) MODEL AND THEIL'S INEQUALITY COEFFICIENT

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ABSTRACT

The performance of financial markets is influenced by a myriad of factors and one of them is uncertainty. Uncertainty is said to be a great predictor of both the returns and volatility of financial market instruments. In this study we examined the long run cointegration of two uncertainty indexes namely the Global Economic Policy Uncertainty (GEPU) and Geopolitical Risk (GPR) on the returns of FTSE Bursa Malaysia Hijrah Shariah Index (FBM HS) for the period January 2000 to December 2022. The Auto Regressive Distributed Lag (ARDL) approach was employed to analyze the possible long run cointegration between the uncertainty indexes and the Islamic stock index return. Our findings revealed that the GEPU index have a significant negative on the returns of FBM HS over the long run whilst GPR's impact on FBM HS was found to be insignificant. Our results via Theil's Inequality Coefficient revealed GEPU as the better predictor compared to GPR in terms of predicting the returns of FBM HS. The findings strongly advice those who are in the investment ecosystem especially investment managers and investors in the Malaysian markets to closely monitor GEPU and GPR to manage return risks effectively. Policymakers are also urged to pay a careful attention to uncertainty measures as they significantly influence the returns of FBM HS.

***JEL classification**: G15, G19*

***Keywords**: Cointegration; Geopolitical Risk (GPR); Global Economic Policy Uncertainty (GEPU); Predictability; Uncertainty*

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1. INTRODUCTION

Over the past few years, in the finance and economics literature, extensive studies have been documented focusing on the presence of uncertainties in the financial markets. These studies have extensively examined the impact of uncertainty on various financial market instruments. On one hand, studies have examined the role of

uncertainty on traditional financial market instruments such as stocks (Ma, Lu, & Tao, 2022; Cheng & Shi, 2020), bonds (Iaonnidis & Ka, 2018), forex (Iyke, Phan, & Narayan, 2022, Christou,Gupta, Hassapis, & Suleman, 2018), commodities (Qian, Zeng, & Li, 2022; Liang, Wei, Li, Zhang & Zhang, 2020) and on the other hand, studies have focused on the influence of uncertainty on modern financial market instruments such as cryptocurrencies (Liang, Zhang, Li, & Ma, 2020; Yu, 2019).

What is uncertainty? How is it measured? And how vital is it to the financial market's performance?

According to the Cambridge Dictionary, uncertainty is broadly defined as 'a situation in which something is unknown, or something is not known or certain'. Now an interesting question rises, how do we measure something that is unknown? In 2013, a group of researchers began a quest to capture and record uncertainty. Baker, Bloom, and Davis (2013) successfully managed to develop an uncertainty index which is known as the Economic Policy Uncertainty (EPU) index. This index is developed based on text mining method from 10 large newspapers in the United States such as Boston Globe, New York Times, USA Today, and several others. The researchers searched and record for words such as, 'uncertainty', 'uncertain', 'economy', 'Federal Reserve'. 'regulatory', 'White House', etc., that appears on the newspaper articles that was issued from January 1985 onwards. By utilizing the records, the researchers then transform them in an index called the EPU index. Later, the domestic EPU indexes was developed for several other countries.

Davis (2016), then developed an index (global EPU, GEPU) which captures and aggregates the domestic EPU indexes of 16 different countries into one single index. These 16 countries contribute to the 75% of the global GDP. Following the success of Baker, Bloom, and Davis (2013), another group of researchers went on to develop another type of uncertainty index. This index is known as the Geopolitical Risk (GPR) index. This index was developed by Caldara and Iacoviello (2018) by employing the same methodology of Baker, Bloom, and Davies (2013). However, the words selection was quite different since this index mainly focused on uncertainty caused by geopolitical tensions between two or more countries. The words selected for the development of GPR index was, 'geopolitical risk', 'military related tension', 'nuclear tension', 'war threats', 'terrorist threats' etc. Both these EPU and GPR indexes are available at https://policyuncertainty.com/

As mentioned earlier, extensive studies have been documented focusing on the impact of uncertainty in the financial markets, however most of these studies mainly focused on financial market instruments such as stocks and bonds that are offered in the developed market exchanges and relatively limited studies paid attention on emerging markets. On top of that, existing studies rarely focus on Islamic instruments. Henceforth, in this present study, we intend to analyze the long run cointegration and predictability of both the uncertainty indexes, the GEPU and GPR on the returns of Malaysian Islamic stock index, the FTSE Bursa Malaysia Hijrah Shariah Index (FBM HS).

This study adds to the literature in several ways. Firstly, in most of the previous studies exploring the impact of GEPU on stock returns, the researchers used the older version of the GEPU index. The older version captures and aggregates the domestic EPU of 16 countries only, however the updated version that we adopted in this current

study aggregates the domestic EPU of 21 countries. Secondly, previous studies used various techniques to assess the impact of GEPU and GPR on stock returns, however in this present study we employed the Autoregressive Distributed Lag (ARDL) model to identify the long run cointegration and on top of that we also assess the predictability of this model using the Theil's Inequality Coefficient.

2. LITERATURE REVIEW

In general, Islamic instruments have a distinctive characteristic compared to its conventional counterpart mainly due to the strict enforcement of Shariah principles. Some of the unique characteristics of Islamic stocks are that they are, (1) less volatile as they are closely tied to real economic activities, (2) interest-based financing is strictly prohibited instead they use profit-rate concept, (3) it revolves around taking and sharing risks, and (4) bankruptcy is completely out of the equation (Krichene, 2012).

As at the end of third quarter (Q3) 2023, the FTSE Bursa Malaysia EMAS Shariah Index, the main Shariah benchmark of the Kuala Lumpur Stock Exchange (KLSE), registered a total of 212 constituents with a net market capitalization of MYR 414,983 million. Among its top ten constituents at end of September 2023 were, Tenaga Nasional (TENAGA) Petronas Chemical Group Berhad (PCHEM), IHH Health Care (IHH), Celcomdigi (DIGBF), Press Metal Aluminium Holdings (PMETAL), Sime Darby Plantation (SIMEPLT), Petronas Gas Bhd (PETGAS), Telekom Malaysia Bhd (TM), MISC Bhd (MISC), and Maxis Bhd (MAXIS). The constituents of the FBM EMAS Shariah Index are screened based on the Malaysian Securities Commission's Shariah Advisory Council (SAC) screening methodology.

Figure 1: 5-Year performance-total return of FBM HS Index

Meanwhile, the FTSE Bursa Malaysia Hijrah Shariah Index (FBM HS), is a tradeable index that is constructed by including 30 largest companies that are listed in the FTSE Bursa Malaysia EMAS Index. These 30 companies that are listed under this index are subject to three level of screening methodology which includes, (1) FTSE's global standards of free float, liquidity, and investability, (2) Yasaar's international Shariah screening methodology, and (3) SAC screening methodology. The constituents of this index are strictly prohibited from core activities such as, banking

and interest-related services, alcohol, tobacco, gaming, arms manufacturing, life insurance, and pork and non-halal productions. As at end of September 2023, the net market capitalization for this index stood at MYR 289,944 million. Figure 1 below plots the total return of the FBM HS Index over the past 5 years.

Various quantitative studies have been performed by researchers on the FTSE Bursa Malaysia Hijrah Shariah index. For instance, Abduh (2020), examined the effects of financial crisis on the Islamic index and found that the Islamic index is less volatile during crisis. In another study, Isa et al. (2020), analyzed the cointegration and causality among the FTSE Bursa Malaysia Hijrah Shariah index, FTSE Bursa Malaysia Mid 70 index, and 7 other sectoral indices. Apart from that Yusof, Mahmud, Embong, Nor, & Fatah (2020) attempted to identify the macroeconomic determinants of the return of FTSE Bursa Malaysia Hijrah Shariah index and found that, exchange and interest rate have the most significant impact on the FTSE Bursa Malaysia Hijrah Shariah index. Meanwhile, the study of Sampurna and Maronrong (2019) investigates the impact of commodity prices on FTSE Bursa Malaysia Hijrah Shariah index and the authors pointed out that the commodity prices have substantial effects on the volatility of FTSE Bursa Malaysia Hijrah Shariah index.

As mentioned earlier, studies exploring the effects of uncertainty on Islamic stock market are relatively limited compared to studies that explored the conventional counterparts. At the time of writing this research paper, we manage to identify three studies that analyses how the FTSE Bursa Malaysia Hijrah responds to uncertainty. The first paper is a study that explored the impact of uncertainty on Islamic stock market by Salisu and Shaik (2022) in which the authors compared the impact of uncertainty stirred by Covid-19 on Islamic and conventional stocks. The study employed the Infectious Disease Equity Market Uncertainty (EMV-ID) that was developed by Baker, Bloom, Davis, and Terry (2020). The authors used Islamic stock indices from 11 different stock exchanges and Malaysia was represented by the FTSE Bursa Malaysia Hijrah Shariah index. By using a predictive model, this study concluded that Islamic stocks are less vulnerable to EMV-ID compared to conventional stocks.

The second study is by Rajput, Siyal, and Bajaj (2019) in which the authors assessed the short and long run asymmetric impact of GPR on Islamic stock returns for 4 regions namely Saudi Arabia, Indonesia, Turkey, and Malaysia. In this study, the FTSE Bursa Malaysia Hijrah Shariah index was employed to represent the Islamic stock returns of Malaysia. The result of this study indicated that, (1) Islamic stock returns and geopolitical risk move together in the long run, and (2) the short run asymmetric impact was captured in the case of Saudi Arabia and Indonesia whilst the long run asymmetric impact was registered in the case of Indonesia. The third study by Hoque, Zaidi, and Hassan (2021), also found that the FTSE Bursa Malaysia Hijrah Shariah returns responded asymmetrically towards the changes in global GPR as well as the country specific GPR. All these studies mainly focused on the impact of uncertainty on the Islamic stock markets.

Based on the above discussions, the current study aims to examine the long run cointegration between the returns of FTSE Bursa Malaysia Hijrah Shariah index, global EPU, and GPR. Although existing studies have investigated on related topics, this study differentiated itself from past studies and contributes to the literature in the following ways. First, this study employs the ARDL methodology to unveil the long run cointegration relationship between the variables under observation. Besides that,

in this study we will also investigate whether or not the GEPU and GPR measures can be used as a predictor for the returns of FTSE Bursa Malaysia Hijrah Shariah index by employing the Theil's Inequality Coefficient. On top of that, we will compare the predictive power of both the GEPU and GPR in terms of predicting the returns of FTSE Bursa Malaysia Hijrah Shariah index. Besides that, in this study we will employed the most recent version of the global EPU index which was introduced in 2021 which aggregates the EPU of 21 countries.

3. METHODOLOGY

The frequency of the data in this current study is monthly and the period of the current study covers from January 2000 to December 2022. The data comprises of two uncertainty indexes namely the GEPU and GPR, and two control variables to control the proxy effects namely the Exchange Rate (EXR) and Malaysian Treasury Bill (MTB). As mentioned previously, the dependent variable for this study is the FTSE Bursa Malaysia Hijrah Shariah index (FBM HS). The data descriptions are tabulated in Table 1 below.

Table 1: Data description.

No	Variables	Symbol	Time Period	Source
1	Global Economic Policy Uncertainty	GEPU	2000:M1 – 2022M12	Policyuncertainty.com
2	Geopolitical Risk	GPR	2000:M1 – 2022M12	Policyuncertainty.com
3	FTSE Bursa Malaysia Hijrah Shariah	FBM HS	2000:M1 – 2022M12	Bursa Malaysia
4	Malaysia Treasury Bill	MTB	2000:M1 – 2022M12	Bloomberg
5	Exchange Rate	EXR	2000:M1 – 2022M12	Bloomberg

3.1 Unit Root Test

In order to utilize the ARDL model effectively, it is imperative to confirm the stationarity of the data, either at level I(0) or with a unit root at I(1). In this study, we employed the Augmented Dickey Fuller (ADF) test to examine the existence of a unit root. At level, the logarithmic values of FBM HS, GEPU, GPR, and MTB were found to be stationary as per the ADF unit root test results whilst, EXR was only found to be stationary at first difference.

3.2 ARDL Model

In this study we employed the ARDL model introduced by Pesaran and Shin (1995) to analyze the long run cointegration relationship between the Islamic stock index and uncertainty indexes. The ARDL model for this study is expressed by equation (1).

$$FBM\ HS\ RET_t = a_0 + a_1 GEPU_t + a_2 GPR_t + a_3 MTB_t + a_4 EXR_t + e_t \qquad (1)$$

$FBM\ HS\ RET$ = Return of FTSE Bursa Malaysia Hijrah Shariah Index at time t

$GEPU_t$ = Global Economic Policy Uncertainty index at time t

GPR_t = Geopolitical Risk index at time t

MTB_t = Malaysian Treasury Bill at time t
EXR_t = Exchange Rate at time t
e_t = Error term at time t

3.3 Theil's Inequality Coefficient

As for the predictive analysis, we employed the Theil's Inequality Coefficient approach. The Theil's Inequality Coefficient has two types of specification namely the U_1 and the U_2. The U_1 and the U_2 are expressed by equation (2) and equation (3) respectively.

$$U_1 = \frac{\sqrt{\frac{1}{n}\sum_{t=1}^{n}(u_i)^2}}{\sqrt{\frac{1}{n}\sum_{t=1}^{n} y_t^2} + \sqrt{\frac{1}{n}\sum_{t=1}^{n} f_t^2}} \quad (2)$$

$$U_2 = \frac{\sqrt{\sum_{t=1}^{n=1}(\frac{f_{t+1} - y_{t+1}}{y_t})^2}}{\sqrt{\sum_{t=1}^{n=1}(\frac{y_{t+1} - y_t}{y_t})^2}} \quad (3)$$

4. DISCUSSIONS AND FINDINGS

Table 2 presents the results of the ARDL Bounds test, a crucial step in determining the presence of a long run relationship among the variables under consideration. The significance of a long run relationship becomes apparent only when the null hypothesis is successfully rejected.

Table 2: ARDL Bounds test results.

Critical Value	Lower Bound I(0)	Upper Bound I(1)
1%	3.29	4.27
5%	2.56	3.49
10%	2.2	3.09
Model	**FBM HS**	
F-statistics	44.4728 ***	
k	4	
Result	Cointegrated	

Notes: *** indicates the rejection of the null hypothesis at 1% significance level. The optimal lag length selection for FBM HS is (1,1,2,2,3).

Based on the results tabulated in Table 2 above, the F-statistics result of the FBM HS model exceeds the critical value's upper bound at 1% significant level which then successfully rejects the null hypothesis and conclude that the variables are cointegrated in the long run.

4.1 ARDL Cointegration and Long Run Coefficient

The results of the long run cointegration between the variables are presented in Table 3 below.

Table 3: Long-run coefficient of ARDL approach result

Model	FBM HS
GEPU	-2.0401 ***
GPR	1.0902
EXR	0.5192
MTB	-8.0493 ***
Constant	15.6833 **

Notes: *, **, ***, indicates the rejection of null hypothesis at 10%, 5%, and 1% significance level. The optimal lag length selection for FBM HS is (1,1,2,2,3).

Based on Table 3, it is evident that GEPU affects the FBM HS returns negatively in the long run with a significance level of 1%. To be more accurate, for every 1% increase (decrease) in GEPU, on average, *ceteris paribus*, the FBM HS returns will decrease (increase) by 2.0401%. This result contradicts to the findings of Hammoudeh, Mensi, Reboredo and Nguyen, 2014 and Nazlioglu, Hammoudeh, and Gupta, 2015 in which these studies concluded that Islamic stock market are not affected by economic policy uncertainty. This discrepancy may stem from differences in methodology, data period, or market conditions. For instance, the present study used the GEPU index that was introduced in 2021 which incorporates the EPU data from 21 different countries unlike the earlier version that incorporates data from 16 different countries. Apart from that, changes in global economic dynamics, market structure, or the role of uncertainty over time may also contribute to the contrasting findings.

On the contrary, GPR exerts a positive influence on FBM HS. However, the result indicated an insignificant impact. The findings are consistent with the study of Bouri, Demirer, Gupta, and Marfatia (2018) in which the authors found that geopolitical risk generally affects the volatility of Islamic equity market rather that the returns. While we do not directly analyze volatility in this present study, our findings provide indirect support for the conclusion of Bouri et al., (2018) in terms of returns analysis.

EXR was found to be having a positive impact on FBM HS. However, the impact was insignificant. Meanwhile MTB registered a significant negative impact on the returns of FBM HS. For every 1% in MTB, on average, *ceteris paribus*, FBM HS returns decreases by 8.0493%.

The findings above indicates that, the measure of uncertainty especially the GEPU can be used as a valuable reference to determine the trends in the FBM HS returns. For instance, when the GEPU is on the rise, investors and market players should anticipate that the returns of FBM HS will drop.

4.2 Error Correction Term (ECT) and Diagnostic Checking

The outcomes of the Error Correction Model (ECM) and diagnostic checks are detailed in Table 4 below. The diagnostic checking encompasses, the Breusch-Godfrey Lagrange Multiplier (LM) test, Breusch-Pagan-Godfrey Heteroscedasticity test, Ramsey RESET test, CUSUM, and CUSUMSQ test.

The ECT signifies the speed at which the correction mechanism operates to restore equilibrium following a disturbance in the long run relationship. In this study, the calculated ECT is denoted by a negative sign and statistically significant at 1% significance level. The FBM HS will be corrected based on 101.0007% per period and it will take 1/1.0007 = 0.9993 months for the model to move back into the long run relationship if there is a disturbance occurs in the long run equilibrium relationship.

Table 4: Error Correction Term (ECT) and diagnostic checking

Model	FBM HS
ECT (-1)	-1.0007 ***
LM (2)	0.0741
B-P-G	0.9130
RESET (1)	1.1798
CUSUM	S
CUSUMSQ	S

Notes: The lag length for LM test is 2 whilst the lag length for the RESET test is 1. The letter 'S' denotes 'Stable'.

The LM test findings demonstrate that there is no serial correlation in the model, and the B-P-G results show that there is no heteroscedasticity issue in the model. Furthermore, the RESET test results indicates that there is no specification error in the model. As the statistics fall inside the 5% significance threshold, the CUSUM and CUSUMSQ show that the model is stable.

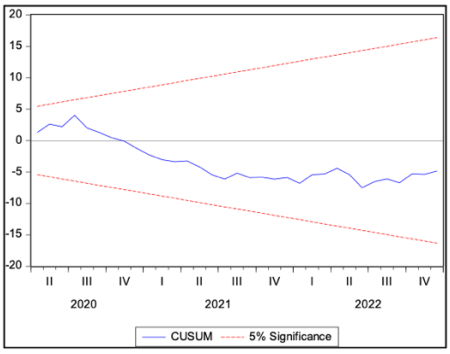

Figure 2: CUSUM.

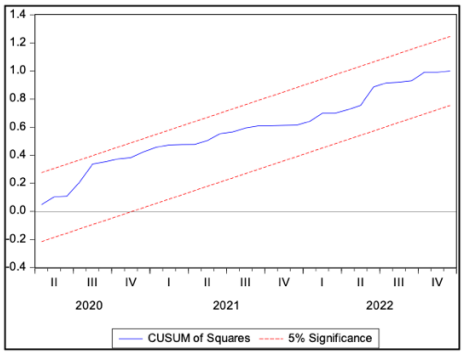

Figure 3: CUSUM of Squares.

4.3 Theil's Inequality Coefficient

As for the predictive analysis, we partitioned the full sample into three sample period with the proportions of 25%, 50%, and 75%. Specifically, the 25% proportion spans from January 2000 to September 2005, the 50% proportion encompasses data from January 2000 to June 2011, and the 75% proportion covers data from January 2000 to March 2017. On top of that, we developed two separate models to compete against the proposed ARDL model as well as to compare the predictive power of both the GEPU and GPR. The two models are expressed by equation (4) and equation (5).

$$FBM\ HS\ RET_t = a_0 + a_1 GEPU_t + a_2 MTB_t + a_3 EXR_t + e_t \quad (4)$$

$$FBM\ HS\ RET_t = a_0 + a_1 GPR_t + a_2 MTB_t + a_3 EXR_t + e_t \quad (5)$$

Table 5: Out-of-sample result for FBM HS

	FBM HS					
Sample	U1			U2		
	$ARDL_{EPU}$	$ARDL_{GPR}$	$ARDL_{EPU+GPR}$	$ARDL_{EPU}$	$ARDL_{GPR}$	$ARDL_{EPU+GPR}$
25%	0.7162	0.7196	**0.6541**	0.9960	0.9145	**0.9749**
50%	0.6305	0.6972	**0.5579**	0.9786	0.9473	**0.9510**
75%	0.6040	0.6606	**0.5532**	1.1792	1.0480	1.1415

According to Table 5, the U1 statistics indicates that the proposed $ARDL_{EPU+GPR}$ model outperformed the two other competing models namely the $ARDL_{EPU}$ and the $ARDL_{GPR}$ models in terms of predicting FBM HS returns in all three out-of-sample periods. Meanwhile the U2 suggest that the proposed model performed best at 25% and 50% sample period. At 75%, the U2 registered a score of 1.1415 indicating that the model is no better than a naïve model. As for the comparative analysis, at all three sample period, GEPU stands out to be a better predictor than GPR.

5. CONCLUSION

In this study we investigated the potential long run cointegration relationship between uncertainty indices, specifically Global Economic Policy Uncertainty (GEPU) and Geopolitical Risk (GPR), and the returns of FTSE Bursa Malaysia Hijrah Shariah (FBM HS) index. We applied the Auto Regressive Distributed Lag (ARDL) and the data for this study covers from January 2000 to December 2022. The result of the study indicated that GEPU negatively affects FBM HS in the long run. GPR on the other hand has a positive impact on the returns of FBM HS in the long run, however, the relationship was found to be insignificant. We also examined the predictability of GEPU and GPR on the returns of FBM HS using the Theil's Inequality Coefficient. The results from this experiment suggested that GEPU has a better predictive power compared to GPR in terms of predicting the returns of FBM HS. Beyond its relevance to policymakers, regulators, and investment community, the findings of this study contribute to the growing empirical literature on the correlation between uncertainty variables and Islamic stock returns in emerging markets. The COVID-19 pandemic had an unprecedented impact on global financial market, introducing unique challenges to data analysis. We acknowledge that the anomaly may influence the generalizability of the findings. Henceforth, future research could explore advanced methods to isolate these effects or focus specifically on the pandemic's long-term implications. Apart from that, future research should explore the impacts of other uncertainty indexes such as World Uncertainty Index (WUI), Financial Stress Index (FSI), and Monetary Policy Uncertainty (MPU) on the returns of Islamic stock index, thereafter, providing a more nuanced understanding of the dynamics at play.

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