

# Mispricing on Islamic Stock Markets in ASEAN Countries

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**Abstract**—The purpose of this study is to detect any mispricing on Islamic stock in four countries which are the founding fathers of ASEAN (Indonesia, Malaysia, Singapore, and Thailand). Three-factor Asset Pricing Model [1] is employed in this study with daily individual stock price from June 2005 until December 2017, and later categorized into 25 portfolios based on their size and book-to-market equity. This study found no evidence of mispricing in Indonesia and Malaysia so that these Islamic stock markets are efficient. Different evidence was found in Singapore and Thailand as in those Islamic stock markets significant mispricing can be found in Thailand Islamic Stock Market and marginally significant mispricing in Singapore Islamic Stock Market, which indicates those markets are not efficient. Moreover, this study also found that Financial Crisis 2008 only has a significant effect in Indonesia and Thailand Islamic Stock Market. This paper gives new insight of Islamic Stock Market Efficiencies by focusing on Islamic stock in ASEAN which is a region dominated by emerging markets and this study also used the daily stock price of an individual stock and not index level data.

**Index Terms**—ASEAN, efficient market hypothesis, mispricing, three-factor asset pricing model

## I. INTRODUCTION

Efficient Market Hypothesis (EMH) is introduced by Fama to test whether security market prices already reflect all available information related to those securities (efficient) [2]. To reject that hypothesis or not, an asset pricing model that can specify price formed under rational pricing in a market equilibrium is needed [3]. A market can be categorized as an efficient market if the differences between the actual return and expected return of an asset are indistinguishable from zero. In such situation, a market is efficient since there is no mispricing detected in that market.

In 1993, Fama and French came up with a more comprehensive asset pricing model [1] since many empirical evidence shows that some firm-specific factors play a better role in asset pricing than market factors that previously become the only factors being included in CAPM as introduced by Sharpe [4] and Lintner [5] [6]–[10]. This model is known as the Fama-French Three Factor Asset Pricing Model (FF3F model). This model modifies CAPM by adding two more factors, which are size factor (that is being included in the model as found size effect [6]), and value factor (that is being included as found value effect [9], [10]). By adding those factors, FF3F

successfully performs better compared to CAPM and shows a good empirical result.

In the midst of many researches about EMH and asset pricing model which mostly focus on a conventional stock from developed countries, on the other hand, Islamic finance is rapidly growing in the last decades, including Islamic stock itself. A stock can be categorized as Islamic stock when the stock complies with Islamic principle (sharia). Therefore, to come up with a conclusion whether a stock is sharia-compliant, the screening process that includes business screening and financial screening, should be performed. This process excludes stocks from a firm with forbidden core business in Islam (such as tobacco, gambling, alcohol, etc.) or business in the conventional financial sector. More than that, the screening process also affects risk profile and the return of Islamic stocks since the issuer of the stock are more ethical, low leverage, and not involved in the high-risk financial sector, such as derivative market [11]. This is proven by risk and return pattern of Islamic stock that is different from its conventional counterparts where Islamic stock stay profitable during global crisis [12], [13].

The efficiency of the Islamic stock market has become a concern for researchers. Some studies that already held focus about Islamic stock market efficiency include research about the efficiency of Islamic stock market in Organization of Islamic Corporation (OIC) [14], comparison efficiency of Islamic stock market in emerging and developed market [15], and comparison of efficiency during pre-crisis and post-crisis period [16]. However, the methodology that is used is still limited to return predictability by past return, which is not ideal and less scientific compared to asset pricing model methodology [3]. Another study focus on the performance of FF3F on Islamic stock has been done by Hassan, Antoniou, and Paudyal using index level data of US Islamic stock [17]. Nevertheless, this study is not using individual-level data as performed by Fama and French [1] and still focusing on the developed market.

Therefore, this study fills the research gap by testing efficient market hypothesis and detecting mispricing using FF3F model using individual stock level data with daily frequencies to capture the heterogeneity of price movements of Islamic stock mostly from emerging countries, which in this study

is the four founding fathers of ASEAN (Indonesia, Malaysia, Singapore, and Thailand). Our finding shows that mispricing did not exist in Indonesia and Malaysia, so these Islamic stock markets are efficient. Different evidence was found in Singapore and Thailand as significant mispricing can be found in Thailand Islamic Stock Market and marginally significant mispricing exist in Singapore Islamic Stock Market, which indicates those markets are not efficient. Moreover, this study also found that Financial Crisis 2008 only has a significant effect in Indonesia and Thailand Islamic Stock Market.

This paper is divided into these following structure, section 2 discusses the literature review related to this study, section 3 discusses the data and methodology used, section 4 shows the research results, section 5 discusses the research results and section 6 contains the conclusion from this paper.

## II. LITERATURE REVIEW

### A. *Mispricing in Islamic Stock*

In general, mispricing is any kind of deviation of security market price from a price that already expected by investor and its intrinsic value. This deviation, either in form of positive or negative abnormal return, is desired by an active investor and also act as an indicator of whether an investor is able to beat the market. Positive (negative) abnormal return shows that security actual return is higher (lower) than expected return. Mispricing, as an indicator to detect any inefficiencies on the market, was introduced by Jensen [18]. This method to identify mispricing can be performed using intercept that estimated by asset pricing model.

The Fama-French Three Factor Asset Pricing Model (FF3F) is an asset pricing model that can be used to do the job. This model modified CAPM, which only use market factor as the only factor that is considered in price formation of securities, by adding size factor and value factor into the model. This attempt by Fama and French [1] makes a better asset pricing model with a good empirical evidence. Using US conventional stock as the sample, this model can capture the variation of stock return that categorized as 25 portfolios based on size and book-to-market equity with R<sup>2</sup> more than 80% in every portfolio. More than that, FF3F model is also capable to capture size effect, a tendency of stock return to decrease from stock with small market capitalization to big market capitalization. Using it, size factor that is proved by factor loading of size factor decreases monotonically the same way as found on size effect. Moreover, value effect, the tendency of stock return to increase as book-to-market equity increases, is also captured by this model using value factor proved by its factor loading that increases monotonically as book-to-market equity increases. However, all of these good results are not always found with other samples. Nartea, Ward, and Djajadikerta's research using New Zealand conventional stock as the sample found that FF3F model still left many variations of stock return not captured by the model [19]. Different finding in the South Africa stock market shows that explanatory power of FF3F model ranged from 54% to 94%. With US Islamic Stock as a sample, Hassan et al. found that

FF3F model only captures about 40% of the variation of stock returns using data in index level [17].

By detecting mispricing using an asset pricing model, we can conclude whether a stock market is efficient. The efficient market was defined by Fama as a market with a big amount of rational investor that maximize their profit by actively competing for one another and trying to predict future market values of securities and the latest information related to those securities available and publicly available [20]. Guidi and Gupta found inefficiency in Malaysia and Indonesia conventional stock market while Singapore and Thailand was found to be efficient [21]. On pre-crisis and post-period, Kim and Shamsuddin found that the crisis has a different effect on the efficiency of each stock market [16]. The conventional stock market in Indonesia and Malaysia found to be inefficient during pre-crisis and post-crisis periods while Singapore and Thailand, on the contrary, found their efficiency after the crisis. Other studies that focus on Islamic stock using index level data found that Islamic stock in an emerging market is less efficient compared to the Islamic stock in the developed market [15]. Different from previous studies, Arshad focuses on individual market of each country which are members of OIC and found that Malaysia and Indonesia have a sufficiently good level of efficiency compared to other members [14]. Using MF-DFA, Islamic stock market in Indonesia was found to be most efficient after financial crisis 2008 while Malaysia was found to be the most efficient during 2005 and after 2011.

### B. *Impact of Sharia Screening on Islamic Stock Pricing*

Based on Zaremba, Karathanasopoulos, Maydybura, Czapkiewicz, dan Bagheri, the unique characteristics of Islamic stock will give some impact to price formation of Islamic stock in many ways [22]. First, Islamic stock gets extra attention from two groups of investors that usually do not invest in a conventional stock, which are religious and/or ethical investors and also Islamic funds, which will create extra supply and demand that may result on mispricing. Moreover, those additional investors may cause an increase liquidity and analyst coverage that increase informational efficiency. Second, as the screening process excludes the entire sector, some anomaly and cross-sectional pattern of return on the stock market may not appear on Islamic stock market as they are industry driven [23], [24]. Lastly, Sharia screening excludes high leverage firm and high credit risk that lead to popular market anomalies such as value, momentum, and size effect.

## III. RESEARCH METHODOLOGY

### A. *Data*

This study used data from Thomson Reuters Datastream. The list of Islamic stock from Indonesia and Malaysia that are used are issued by the Indonesia Stock Exchange for Indonesia and Securities Commission (SC) Malaysia for Malaysia. On the other hand, the list of Islamic stock issuer for Singapore and Thailand were obtained by performing screening on stock available on those market using MSCI Islamic Index

TABLE I  
AVERAGE NUMBER OF FIRMS FROM EVERY PORTFOLIO BASED ON SIZE AND BOOK-TO-MARKET EQUITY OF EACH COUNTRY IN 2005–2017

Size Quintile	Book-to-market Equity Quintile									
	Low	2	3	4	High	Low	2	3	4	High
	<b>Indonesia</b>					<b>Malaysia</b>				
<b>Small</b>	8	7	7	6	9	7	10	17	29	44
<b>2</b>	8	7	7	7	9	7	16	25	30	29
<b>3</b>	7	8	8	7	7	12	24	30	23	17
<b>4</b>	9	8	7	7	6	25	30	22	20	9
<b>Big</b>	7	7	8	8	6	57	27	14	6	3
	<b>Singapore</b>					<b>Thailand</b>				
<b>Small</b>	2	2	4	6	11	7	6	8	8	17
<b>2</b>	2	3	6	7	7	4	9	10	10	11
<b>3</b>	4	7	6	5	4	5	9	10	12	9
<b>4</b>	7	7	6	4	3	11	12	10	8	4
<b>Big</b>	11	7	4	3	NA	18	9	7	7	3

Note: this table shows an average component in each portfolio constructed based on its size (small–big) and book-to-market equity (low–high) from a full period sample.

TABLE II  
AVERAGE EXCESS RETURN FROM 25 PORTFOLIOS BASED ON SIZE AND BOOK-TO-MARKET EQUITY OF EACH COUNTRY IN 2005–2017 (IN %)

Size Quintile	Book-to-market Equity Quintile											
	Low	2	3	4	High	Mean	Low	2	3	4	High	Mean
	<b>Indonesia</b>						<b>Malaysia</b>					
<b>Small</b>	0,001	-0,019	-0,015	-0,011	0,008	-0,007	-0,087	-0,038	-0,020	-0,010	0,007	-0,030
<b>2</b>	-0,018	-0,008	0,017	0,004	0,028	0,005	-0,049	-0,024	-0,015	0,006	-0,004	-0,017
<b>3</b>	-0,074	-0,014	-0,029	0,004	-0,009	-0,024	-0,032	-0,021	-0,004	-0,007	0,007	-0,011
<b>4</b>	-0,023	-0,054	-0,013	0,018	-0,013	-0,017	-0,023	-0,020	0,001	0,001	-0,007	-0,010
<b>Big</b>	-0,018	0,015	-0,037	0,003	-0,001	-0,008	-0,007	0,024	-0,001	0,025	-0,018	0,000
<b>Mean</b>	-0,026	-0,016	-0,015	0,004	0,003		-0,040	-0,026	-0,008	0,003	-0,003	
	<b>Singapore</b>						<b>Thailand</b>					
<b>Small</b>	0,006	-0,019	0,055	0,012	0,073	0,025	-0,076	-0,025	0,001	0,017	0,017	-0,013
<b>2</b>	-0,061	-0,026	0,011	-0,005	0,048	-0,007	-0,097	0,002	-0,001	0,011	0,009	-0,015
<b>3</b>	-0,071	-0,025	-0,048	0,001	0,009	-0,027	-0,079	-0,006	0,010	0,025	0,031	-0,004
<b>4</b>	-0,059	-0,052	-0,014	-0,021	0,002	-0,029	-0,001	-0,005	0,030	0,024	-0,012	0,007
<b>Big</b>	0,001	-0,009	0,034	0,007	NA	0,008	0,031	0,014	-0,014	0,005	0,018	0,011
<b>Mean</b>	-0,037	-0,026	0,008	-0,001	0,033		-0,044	-0,004	0,005	0,016	0,013	

Note: this table shows an average of excess return in each portfolio constructed based on its size (small–big) and book-to-market equity (low–high) from a full period sample.

TABLE III  
INTERCEPT FROM REGRESSION RESULTS

Size Quintile	Book-to-market Equity Quintile									
	Low	2	3	4	High	Low	2	3	4	High
	<b>Indonesia</b>					<b>Malaysia</b>				
<b>Small</b>	0,00013	-0,00003	0,00002	0,00004	0,00026	-0,0006*	-0,00022	-0,0001	0,000003	0,00015
<b>2</b>	-0,00006	0,00006	0,00035	0,00029	0,0004*	-0,00015	-0,00004	-0,00003	0,0002*	0,00003
<b>3</b>	-0,001*	-0,00002	-0,0001	0,00020	0,00013	-0,00013	-0,00006	0,00005	0,000001	0,0001
<b>4</b>	-0,0001	-0,0004*	0,00001	0,0003	0,00001	-0,0001*	-0,00012	0,00008	0,00004	-0,00007
<b>Big</b>	-0,0002	0,00025	-0,0002	0,0003	0,00023	0,00002	0,00032	0,00001	0,00016	-0,00037
	<b>Singapore</b>					<b>Thailand</b>				
<b>Small</b>	0,00019	-0,0002	0,00048	0,000003	0,0005*	-0,001*	-0,00014	0,00006	0,00016	0,00016
<b>2</b>	-0,00028	-0,0002	0,00003	-0,0002	0,00024	-0,001*	0,00011	0,00002	0,00010	0,00006
<b>3</b>	-0,001*	-0,00022	-0,0005*	-0,0001	-0,0001	-0,001*	0,00001	0,00012	0,0002*	0,00025
<b>4</b>	-0,001*	-0,001*	-0,0002	-0,0003*	-0,0002	0,00002	-0,00005	0,0003*	0,0002	-0,00031
<b>Big</b>	0,0001	-0,00004	0,00033	-0,00003	0,0004	0,0003*	0,00013	-0,0002	-0,00026	-0,0001

Note: this table shows intercept estimated from each portfolio that constructs based its size (small–big) and book-to-market equity (low–high). \*shows that intercept distinguishable from zero at 5% significance level. The significance of other factors (Market, SMB, and HML) available and can be provided by the author based on a request.

Methodology. The sample period of this research runs from June 2005 until December 2017 to capture the whole picture of the performance of those markets the 13 year period, including pre-crisis period, and post-crisis period. The pre-crisis period sample that is being used in this research runs from June 30th, 2005 until August 6th, 2008 while post-crisis period runs from April 2nd, 2009 until December 31st, 2017 which is consistent with another study by Wang [25]. Firms with specific characteristics are eliminated from this research. The filtering characteristic are: (1) firms with negative book-to-market value, (2) firms with incomplete data, and (3) firms with negative debt-to-asset.

### B. Research Model

Research model that is being used in this paper is the Fama-French Three Factor Asset Pricing Model as the number of Islamic stock in the countries that are being studied in this paper is still limited [1]. The Fama-French Five Factor Asset Pricing model is not ideal to be used as this model required a huge number of stocks to make the component of each portfolio sufficient [26]. We also use this FF3F model, which was developed by using conventional stock data, because the use of this model to study Islamic Stock is more prevalent [17], [22], [27].

$$R_{it} - RF_t = a + b[RM_t - RF_t] + SMB_t + HML_t + e_t \quad (1)$$

with  $R_{it}$  represents the return of portfolio  $i$  on  $t$  period while  $RF_t$  represents the return of risk-free asset at period  $t$  as a dependent variable. On the other hand,  $RM_t$  represents the return of a market portfolio.  $SMB$  is the difference between a simple average of small market capitalization portfolio return and a simple average of big market capitalization portfolio return.  $HML$  is the difference between a simple average of return from high book-to-market equity portfolio and a simple average of return from low book-to-market equity portfolio.

All data that has been acquired is later estimated using Ordinary Least Squared and the estimated intercept will be tested using GRS Test that was introduced by Gibbons, Ross, dan Shanken (1989) to conclude whether there is no detected mispricing and whether the market is efficient.

### C. Constructing Variable

Firstly, market capitalization median is used to divide stock into two group, big (B) and small (S), while book-to-market divides stock into three groups, low or L (bottom 30%), medium or M (between 40%–70%), and high or H (top 70%). An intersection of each group forms 6 portfolios namely S/L, S/M, S/H, B/L, B/M, and B/H. These portfolios are later used to construct SMB, HML, and market return as in Fama and French [1]. Also, for the dependent variable, 25 value-weighted portfolio is formed using the same methods but a different cutting point from two and three cutting point into five cutting points each for market capitalization and book-to-market. This constructing process is repeated every June each year to get a new different portfolio component each year.

## IV. RESULTS

Based on Table I, the distribution of Islamic stock based on Size-B/M tends to spread equally in Indonesia. Contrarily for Malaysia, Singapore, and Thailand that Islamic stock characteristic centralized on S/H and B/L portfolios. Moreover, Sharia-screening eliminated stock and makes B/H portfolios have no component in several years. Table II shows that size effect is not universal as it is only seen in 10 out of 20 Book-to-market quintiles, while the value effect is more universal since it found in 17 out of 20 size quintiles.

From Table III, we can see that in terms of number, portfolios that show significant alpha are numerous. In Indonesia and Malaysia, there are only 3 out of 25 portfolios that have a significant intercept, while in Singapore and Thailand significant intercepts are only found on 6 portfolios from each country. Table IV shows that FF3F is better in capturing variation in return on Islamic stock from Malaysia and Thailand compared to Indonesia and Singapore. This is consistent for the full-period sample, pre-crisis sample, and post-crisis sample.

In the full-period sample, Table V shows that intercept is found to be significant in Thailand Islamic stock market and marginally significant in Singapore and both in the form of negative abnormal return. Meanwhile, significant intercept is detected in Indonesia during the pre-crisis period in the form of positive abnormal return and Thailand during the post-crisis period in the form of negative abnormal return.

## V. DISCUSSION

From the result above, we know that Islamic stock in Malaysia, Singapore, and Thailand centralized on B/L and S/H portfolio, which are consistent Fama and French [29]. That could happen since big (small) market capitalization will make book-to-market equity tends to be low (high). However, this regularity is not found in Indonesia. Moreover, from the pattern of cross-sectional return, table 2 shows that size effect is not universal, which is consistent with Narrea et al. who found size effect to be weak in New Zealand [19]. This could be an evidence that the size effect can be universally found in every stock market. Meanwhile, the value effect is more universal, which is consistent with Fama and French [1] and Narrea et al. [19] whose studies focus on conventional stock and also consistent with Zaremba et al. who found return premium based on book-to-market equity to be consistent in Islamic stock in Middle Eastern countriesv [22].

As a whole, we can see from Table IV that FF3F is not very good in explaining the return of Islamic stocks in the four ASEAN countries compared to its ability to explain US conventional stock return. This is consistent with Hassan et al. where FF3F only captured less than half of the variation of US Islamic stock returns [17]. This could be mean that there is another risk factor that is being considered by Islamic stock investors that has not been taken into account. Moreover, it is even worse in the Indonesia and Singapore Islamic stock markets as the R2 average is less than 40% both in full-sample, pre-crisis and post-crisis period.

TABLE IV  
AVERAGE AND STANDARD DEVIATION OF  $R^2$  FROM REGRESSION RESULTS

Description	Indonesia			Malaysia			Singapore			Thailand		
	Full	Pre-Crisis	Post-Crisis	Full	Pre-Crisis	Post-Crisis	Full	Pre-Crisis	Post-Crisis	Full	Pre-Crisis	Post-Crisis
Average	37,5	36,2	38,7	64,7	65,4	66	35,4	35,1	32,8	55,6	57,2	57,1
Standard Deviation	0,12	0,21	0,11	0,18	0,14	0,18	0,18	0,18	0,19	0,14	0,15	0,14

Note: this table shows average and standard deviation of  $R^2$  from all portfolios constructed in each country. Full, pre-crisis, and post-crisis are the sample period that is being used in this study.

TABLE V  
GRS TEST RESULTS

Countries	Full Period			Pre-Crisis			Post-Crisis		
	Average $\alpha$	GRS-stat	Prob	Average $\alpha$	GRS-stat	Prob	Average $\alpha$	GRS-stat	Prob
<b>Indonesia</b>	.000056	1.3133	.13654	.000319	2.1950	.0008*	.000010	.94234	.54515
<b>Malaysia</b>	-.00004	1.3348	.12330	.000047	.94814	.53746	-.00003	1.1308	.29706
<b>Singapore</b>	-.00010	1.4215	.08370	-6.0e-06	1.0321	.42183	-.00010	1.0981	.33665
<b>Thailand</b>	-.00003	2.4526	.0001*	-.00007	1.0553	.39169	-.00006	2.2035	.0005*

Note: This table shows the result of GRS Test [28] on intercept that has been estimated earlier. Full, pre-crisis, and post-crisis are the sample period that is being used in this study. \*shows that intercept jointly distinguishable from zero at 5% significance level. Average shows the average of intercept from a country within a certain period. GRS Stat is the number show significance of intercept jointly and Prob. is the p-value from GRS-stat.

Table V shows that in the Indonesia Islamic stock market, mispricing is found only during the pre-crisis period. These could be seen as the Indonesia Islamic stock market getting better after the crisis, which is consistent with Arshad in which increase in efficiency in Indonesia may be caused by a better regulation from the Indonesia capital market authority that reform the market structural and financially to provide better information for investors, which will also lead to a more rational price formation [14]. On the other hand, the Thailand Islamic stock market lost its efficiency after the crisis. This is contrary with Sukpitak and Hengpunya who found that conventional stock in Thailand remains efficient after the crisis [30]. Thus, rather than assume that this inefficiency is caused by insufficient regulation, the mispricing may be caused by the investors who think the risk of Islamic stock in Thailand is still high and has not recovered after the crisis, so that they predict higher expected return compared to the actual return. Overall, the evidence in this study is in line with Kim dan Shamsuddin who found that crisis can affect each ASEAN country differently [16]. Table V also shows that inefficiency is driven by the post-crisis period.

Other studies related to this paper but using a different method is also being compared. In this paper, we found that Singapore, which is known as a developed market, is not necessarily better than emerging markets that are compared in this study. This is not consistent with Jawadi et al. who found that developed Islamic stock market is better in efficiency [15]. More than that, the full period results in this study contrast with Guidi and Gupta (2013) who found that the conventional stock market in Singapore and Thailand is more efficient compared to Malaysia and Indonesia. This may happen as the risk profile of Islamic stock is different from its conventional counterparts and also impacts its return [11], [22]. In the Malaysia Islamic stock market, Arshad [14] found that Malaysia was at its highest efficiency during 2005 and

after 2011 which is confirmed in this paper since we found no evidence of mispricing neither during the pre-crisis period nor the post-crisis period.

Although some of the results from this study is confirmed by other studies, we should note that  $R^2$  from the regression result is still low and left enough space for other risk factors that are still unknown and have to be taken into account, especially in Indonesia and Singapore. Therefore, there is still probability when that unknown risk factor is taken into account, a different result may show up. However, this result is still useful to give an initial picture about efficiency in these four ASEAN Countries. Moreover, some results are confirmed by other studies. Thus, it is fair to say that the result in this paper is valuable and useful to understand more about Islamic stock market efficiencies in Indonesia, Malaysia, Singapore, and Thailand.

## VI. CONCLUSION

This study was held to see how sharia-screening on the stock from the four founding fathers of ASEAN affect efficiency since the screening process will make Islamic stock market have a different risk and return profile. By using Fama-French Three Factor Asset Pricing Model and GRS-Test, this study detected significant mispricing in Thailand and marginally significant mispricing in Singapore which indicate that those two markets are inefficient. Meanwhile, this study found no evidence of mispricing in Indonesia and Malaysia, so that these Islamic stock markets are efficient. Moreover, this study also found that Financial Crisis 2008 only has a significant effect in Indonesia, which become effective after the crisis, and the Thailand Islamic Stock Market, which lost its efficiency after the crisis. The mispricing detected in this study came from an asset pricing model whose explanatory power is not sufficient, especially in Indonesia and Singapore. However, some of the results in this paper are consistent with previous studies and

still can be used by regulators and investors as a base to take some action.

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