SYARIAH AND CONVENTIONAL STOCKS: A COMPARATIVE STUDY USING STOCHASTIC DOMINANCE**

Agus Saur Utomo[1,*] and Mamduh M Hanafi[2]

Abstract

This study compares the performance of Syariah stocks to that of Conventional stocks in the non-crisis, crisis, and overall periods, using the Stochastic Dominance approach of Davidson and Duclos (2000). A sample of Indonesian stocks from *Daftar Efek Syariah* (DES) and Malaysian stocks from *Senarai Sekuriti Patuh Syariah* (SSPS) were screened to obtain pure Syariah stocks. The study covers a 10-year-period for Indonesia and a 12-year-period for Malaysia. The study found that Indonesia's Syariah stocks stochastically dominate Indonesia's Conventional stocks in overall and non-crisis periods. However, during the crisis period, the performance of Indonesia's Syariah stocks decreased so that the performance of Syariah stocks was equal to that of Indonesia's Conventional stocks. In this period, the return of Indonesia's Syariah stocks decreased significantly. For Malaysia, it was found that the performance of Malaysia's Syariah stocks was equal to that of Malaysia's Conventional stocks in the overall period. However, in the global crisis period, Malaysia's Syariah stocks stochastically dominated that of Malaysia's Conventional stocks. The results of this study have implications for investors in general and Syariah investors in particular. Investing in Syariah stocks maintains two objectives: compliance to Syariah and earning a competitive return. Investors, in general, can also diversify their portfolios better and increase their *expected wealth* and/or expected *utilities*.

Keywords: Syariah stock, Conventional stock, and *Stochastic Dominance*

[1] * Mr. Agus Saur Utomo (corresponding author) is currently working as a lecturer in the Faculty of Economics, Universitas Muhammadiyah Purworejo, Indonesia. He obtained a Master of Science in Management from Universitas Gadjah Mada, Indonesia. Email: agussaur@umpwr.ac.id.

[2] Professor Mamduh Mahmadah Hanafi is currently working as a lecturer in the Faculty of Economics and Business, Universitas Gadjah Mada, Indonesia. He obtained a PhD in Finance from University of Rhode Island, USA.

**This article was presented in the International Conference on Banking, Accounting, Management and Economics (ICOBAME), Semarang, Center Java, Indonesia: December,17,2020

1. INTRODUCTION

Islamic finance has been growing significantly over the last decade. McKinsey Management Consulting Firm reports that Islamic finance has become a new power in the global financial market (Hassan and Girard,2011). *Global Islamic Financial* (2016) reports that in 2016, the total asset of Islamic finance reached US$1.8 trillion. This significant growth has attracted researchers to further investigate various aspects of Islamic finance. This paper will investigate the comparative performance between Islamic finance and conventional finance. Temper (1991) and Sauer (1997) showed that ethical investment does not perform better than Conventional investment. Regular monitoring and the small-scale nature of most ethical finance seem to be the reasons for this finding. Comparative studies between Syariah and Conventional investments show mixed findings. Focussing on the Malaysian market, Abdullah et al. (2007) reported that Syariah stocks underperformed compared to Conventional stocks. However, McGowan and Junaina (2010) reported that Syariah stocks performed better than Conventional stocks. Ho et al. (2014) found that in a crisis period, Syariah stock indices performed better than Conventional indices; however, in the non-crisis period, these indices did not show significant performance differences. Consistent with Ho et al. (2014), Al-Khazali et al. (2014) found that Syariah indices perform better than Conventional indices when the global economy deteriorates. Mwamba et al. (2016) reported that in a financial crisis, the probability to obtain positive returns is larger for Syariah stocks than for Conventional stocks. Boo et al. (2016) compared the performance of Syariah managed funds with that of Conventional funds and found that Syariah funds performed better than Conventional funds during a crisis period. Aarif et al. (2021) found that the Syariah index dominates the Conventional index in Bangladesh.

Most research comparing the performance of Syariah vs Conventional stocks uses parametric methodology, which relies on *Mean-Variance* (MV) analysis and the *Capital Asset Pricing Model* (CAPM). Lean et al. (2010) argued that MV is not an appropriate methodology if the distribution of returns is not normal, or the investor utility function is not quadratic. Hadar and Russell (1969) employed the *Stochastic Dominance* (SD) approach which is more flexible on the assumption of a normal distribution and the investor utility function. Elton et al. (2014) argued that *Stochastic Dominance* does not require the assumption of a normal distribution, however, it does require more complex analysis. Most previous studies on the comparative performance between Syariah and Conventional stocks use Islamic and Conventional indices as the samples. However, Syariah and Conventional indices share a significant proportion

of the same stocks, resulting in a non-independent sample.

This paper attempts to compare the performance of Syariah stocks with that of Conventional stocks using the *Stochastic Dominance* (SD) approach and a purer sample. The findings show that in Indonesia, the performance of Syariah stocks is better than that of Conventional stocks. Syariah stocks perform better in the bull period, however, in the bear period, the performance of Syariah stocks declines to the level of that for Conventional stocks. In Malaysia, the performance of Syariah stocks is not significantly different from that of Conventional stocks for the overall period. However, in the bear period, Syariah stocks perform better than Conventional stocks. The paper is organized as follows. A literature review and the research methodology are presented in the next section, followed by the empirical findings, and finally the conclusion.

2. LITERATURE REVIEW

2.1. Syariah Investment

Al-Khazali et al. (2014) defined Syariah investment as an ethical investment following Islamic principles and law. An investor who wishes to have Syariah investment will choose companies which conduct activities consistent with Syariah principles. Elfakhani et al. (2005) argued that a company will be categorized as Syariah compliant if the company satisfies both quantitative and qualitative Syariah requirements. Quantitative screening is based on the company's financial report. Ho et al. (2014) stated that the *Syariah Advisory Board* (SAB) is the highest authority providing guidance and regulations for investment that are consistent with Syariah principles. Ho et al. (2014) showed that stocks can not be categorized as Syariah stocks if the company does not comply with certain requirements, for example the ratio of debt to equity must be less than 33%, the ratio of accounts receivable to equity must be less than 49%, the ratio of cash and interest-based securities to equity must be less than 33%, and income from activities that are not consistent with Syariah must be less than 5%.

Indonesia and Malaysia employ different criteria to define Syariah investment in quantitative screening. In Malaysia, a stock will be categorized as Syariah compliant if the stock satisfies the following requirements: cash placed in non-halal financial institutions is less than 33%, total interest-based debt to total debt is less than 33%, revenue from hotels and resorts, stock trading, stock brokerage, non-halal rent, and non-halal activities is less than 20%, and non-halal revenue is less than 5%. In Indonesia, the Syariah criteria are as follows: interest-based debt is less than 45% of total debt, and non-halal revenue is less than 10%.

2.2 Stochastic Dominance

Stochastic dominance (SD), developed by Hadar and Russel (1969), Hanoch and Levy (1969), and

Whitemore (1970), refers to the relation between two distributions, for example, whether a distribution function dominates another distribution function. SD incorporates all stock return distributions, not only information from the *mean* and *variance* (Lean et al., 2010). According to Strong (2003), SD can be used as a technique to form portfolios, and help to evaluate them. Strong (2003) argues that SD is efficient if a portfolio is dominated by other portfolios.

Porter and Gaumnitz (1972) show three forms of Stochastic Dominance: First-order Dominance (FSD), Second-order Dominance (SSD), and Third-order Dominance (TSD). The principles of FSD, SSD, and TSD are as follows:

a. Probability function f(x) is said to dominate probability function g(x) at FSD if and only if $F_1(R) < G_1(R)$ for all values of R∈ [a, b] with a strict inequality of at least one value of R∈ [a, b].
b. Probability function f(x) is said to dominate probability function g(x) at SSD if and only if $F_2(R) < G_2(R)$ for all values of R∈ [a, b] with a strict inequality of at least one value from R∈ [a, b].
c. Probability function f(x) is said to dominate probability function g(x) at TSD if and only if $F_3(R) < G_3(R)$ for all values of R∈ [a, b] with a strict inequality of at least one value from R∈ [a, b], and $F_2(b) < G_2(b)$; where R varies continuously on the closed interval [a, b], $F_n(R) = \int_a^R F_{n-1}(x)dx$ and Fo(R) = f(x).

Empirical tests using SD have been carried out by McFadden (1989), Kaur et al. (1994), Anderson (1996), Davidson and Duclos (2000), Barret and Donald (2003), and Linton et al. (2005). In general, there are three types of SD tests: Kolmogorov Smirnov (*KS tets)*, t-test, and integral test. Tse and Zhang (2004) and Lean et al. (2008) showed that Davidon and Duclos (2000) test is the most powerful SD test with a large sample.

3. METHODOLOGY

Daily data were collected from the Indonesian and Malaysian stock markets, over a period of 10 years for Indonesia, and 12 years for Malaysia. The Indonesian sample was considered from May 2007 as the first time Indonesia announced its List of Indonesian Syariah-Compliant Securities or *Daftar Efek Syariah* (DES). Similarly, the Malaysian sample started in May 2005 as this matches the initial period of releasing the List of Malaysian Syariah-Compliant Securities or *Senarai Sekuriti Patuh Syariah* (SSPS).

The List of Syariah-Compliant Securities or Islamic Index was not used as the sample of Syariah stocks as its constituents may be changed periodically by the *Syariah Advisory Board* (SAB). The List of Syariah-Compliant Securities for both Indonesia and Malaysia ws screened to obtain a sample of pure Syariah Stock. The sample of Syariah stocks was composed of the stocks which have never been removed from the

List of Syariah-Compliant Securities for the full duration of the sample period (10-years for Indonesia and 12-years for Malaysia). Meanwhile, the sample for Conventional stocks consists of stocks which have never been included in the List of Syariah-Compliant Securities for the full duration of the research period. Each period was split into three sub-periods to capture changes in economic structure during crisis and non-crisis periods. Parametric analysis using Sharpe, Treynor ratio, and Jensen Alpha was performed to compare the performance of the Syariah and Conventional stocks. Robustness checks were also performed by forming portfolios of different firm sizes, the Book to Market (B/M) beta, and dividend policy.

The *Stochastic Dominance* (SD) tests follow Davidson and Duclos (DD) (2000) model. Wong et al. (2008) showed that:

Ho = h and $H_j\,(x) = \int_a^x H_{j-1}\,(t)dt$ (1)

where h = f, g; H = F, G; and j = 1,2,3

Portfolio Y dominates Z at FSD if, and only if $F_1(x) \leq G_1(x)$. Portfolio Y dominates Z at SSD if, and only if $F_2(x) \leq G_2(x)$. Portfolio Y dominates Z at TSD if, and only if $F_3(x) \leq G_3(x)$ for all x and the strict inequality holds for at least one value of x.

Davidson and Duclos (2000) introduced an inferential statistical test for *Stochastic Dominance* (SD). For two portfolios Y and X, with CDF F and G, *DD statistic* or $T_j(x)$ for a grid of pre-selected points $x_1, x_2 \ldots x_k$ at order j is calculated with the formula:

$T_j(x)=\frac{\hat{F}j(x)-\hat{G}j(x)}{\sqrt{\hat{V}j(x)}}$ j=1,2,3. (2)

where

$\hat{V}_j(x) = \hat{V}_Y^j + \hat{V}_Z^j(x) - 2\hat{V}_{YZ}^j(x)$ (3)

$\hat{H}_{j\,(x)} = \frac{1}{N(j-1)!}\sum_{i=1}^{N}(x-h_i)^{j-i}$,
H= F, G; h = y,z (4)

$\hat{V}_H^j(x) = \frac{1}{N}\left[\frac{1}{N((j-1)!^2}\sum_{i=1}^{N}(x - h_i)^{2(j-1)} - \hat{H}_j\,(x)^2\right]$ (5)

$\hat{V}_{YZ}^j(x) = \frac{1}{N}\left[\frac{1}{N((j-1)!^2}\sum_{i=1}^{N}(x - y_i)^{(j-1)}\ (x-z_i)^{(j-1)} - \hat{F}_j\,(x)^2\,\hat{G}_j(x)\right]$ (6)

Fj and Gj are defined in Eq. (1).

Based on Davidson and Duclos (2000), if $\hat{D}_s^j(x)$ is the return distribution of Syariah stocks and $\hat{D}_k^j(x)$ is the return distribution for Conventional stocks, then $\hat{D}_s^j(x) \leq \hat{D}_k^j(x)$ shows that Syariah stocks dominate the Conventional stocks. Following Bishop et al. (1992), hypothesis tests of SD in Davidson Duclos statistics are:

$Ho: \hat{D}_s^j(x) = \hat{D}_k^j(x)$
$H_a: \hat{D}_s^j(x) \neq \hat{D}_k^j(x)$
$H_{a1}: \hat{D}_s^j(x) \leq \hat{D}_k^j(x)$
$H_{a2}: \hat{D}_s^j(x) \geq \hat{D}_k^j(x)$

The DD *statistic* to test the

difference between the Syariah and Conventional stocks is:

$$T_j(x)= \frac{\hat{D}_s^j(x)-\hat{D}_k^j(x)}{\sqrt{var\hat{D}_s^j(x)+var\hat{D}_k^j(x)-2cov\hat{D}_s^j(x),\hat{D}_s^j(x)}} \quad j=1,2,3. \qquad (7)$$

The Tj(x) distribution follows *Studentized Maximum Modulus* (SMM). Tj(x) will be compared with the critical value of $M_{\infty,\alpha}^k$ which is tabulated by Stoline and Ury (1979). Wong et al. (2008) recommend a procedure for the decision as follows:

If $\left|T_{j(x_i)}\right| < M_{\infty,\alpha}^k$ for i=1,…k, then Ho is accepted.

If $T_{j(x_i)} < M_{\infty,\alpha}^k$ for all i and - $T_{j(x_i)} > M_{\infty,\alpha}^k$ for some i, then H_{a1} is accepted.

If - $T_{j(x_i)} < M_{\infty,\alpha}^k$ for all i and $T_{j(x_i)} > M_{\infty,\alpha}^k$ for some i, then H_{a2} is accepted.

If $T_{j(x_i)} > M_{\infty,\alpha}^k$ for some i and - $T_{j(x_i)} > M_{\infty,\alpha}^k$ for some i, then H_a is accepted.

The existence of FSD (SSD, TSD) implies that the *expected wealth* (*utilities*) of investors is always higher when holding the dominant stocks than when holding dominated stocks. Consequently, dominated stocks should not be chosen. Investors exhibit non-satiation (more is preferred to less) under first-order SD (FSD); non-satiation and risk aversion under second-order SD (SSD); and non-satiation, risk aversion, and decreasing absolute risk aversion (DARA) under third-order SD (TSD). A hierarchical relationship exists in SD which means FSD implies SSD, which in turn implies TSD (Levy,1992). However, the converse is not true. Thus, only the lowest dominance order of SD is reported in practice.

4. FINDINGS AND DISCUSSION

Tables 1 and 2 show the descriptive statistics for the Syariah and conventional stocks. There appears to be large variation of stock returns in both Indonesia and Malaysia. Sub-periods seem to be able to capture changes in returns under different economic conditions. Firm size and book to market ratio (B/M) appear to have a relationship with returns. In Malaysia, firm size has a negative relationship with returns, while B/M has a positive relationship. This finding is in accordance with Fama and French (1992), who showed that stocks with small size and high B/M ratio have higher returns as compensation for higher risk. Unfortunately, in Indonesia, firm size and B/M have inconsistent relationships with returns in each sub-period. Meanwhile, the Beta does appear to have a negative relationship with returns in Indonesia. On the contrary, it has a positive relationship with returns in Malaysia, although not in all sub-periods. The difference in the dividend policy seems to affect the return. In the overall period (2005-2016), companies that regularly pay dividends have higher returns than companies which never pay

dividends. However, in the crisis sub-period, companies that never pay dividends have higher returns.

The normality test for pre-crisis, crisis, and post-crisis periods, refers to *Shapiro Wilks* (SW) as the data is less than 2000, while in the overall period it refers to *Kolmogorov Smirnov* (KS). Normality tests using *Shapiro Wilks* and *Kolmogorov Smirnov* techniques in tables 1 and 2 show that almost all of the returns do not follow a normal distribution. There are only four portfolios in the pre-crisis period, which follow a normal distribution. This finding is consistent with Porter and Gaumnitz (1972). This finding seems to suggest that the use of parametric tests for stock returns is not appropriate.

Results for parametric tests using Sharpe, Treynor ratio, and Jensen Alpha, are reported in tables 3 and 4. Beta is used as a proxy for systematic risk and is also reported in the tables. Table 3 shows the results for Indonesia. The Sharpe for the entire Syariah stocks is significantly higher than for the entire Conventional stocks in the overall, pre-crisis, and post-crisis periods. However, the Treynor and Jensen Alpha are not significantly different. Meanwhile, in the crisis sub-period, the Sharpe, Treynor, and Jensen Alpha, of the whole Syariah stocks are not statistically different in the pairwise analysis. When firm size, B/M, beta, and dividend policy are considered in the comparison, it seems that only Small-Cap and High-B/M portfolios have the same performance as the whole stock portfolio. In the crisis sub-period, the Big-Cap, Low-B/M and High-Beta of the Conventional portfolios have higher Sharpe values than their counterparts even though Treynor and Jensen Alpha are not significantly different. It is noticed that Jensen Alpha gives a lower value than the Sharpe and Treynor ratio in the overall period. This may be because Indonesia has a relatively lower beta representing lower sensitivity to the market.

Table 4 shows the results of the parametric tests in Malaysia. The Sharpe, Treynor ratio, and Jensen Alpha of the whole Syariah stocks are not different from their counterparts in the overall and post-crisis periods. However, in the crisis sub-period, the Treynor for the whole Syariah stocks is significantly higher than for the whole Conventional stocks, although this is not supported by the Sharpe and Jensen Alpha. When firm size, B/M, beta, and dividend policy are considered in the portfolios, the comparison results change. In the overall period, the Sharpe values of the Big-Cap and Low B/M Syariah portfolios were significantly higher than their counterparts. While in the crisis sub-period, only the Small-Cap Syariah portfolio had significantly higher vlues than its pairwise camparison.

In general, the results of the parametric tests using the Sharpe, Treynor, and Jensen Alpha analyses seems mixed and does not indicate any consistent dominance of Syariah stocks over their Conventional counterparts or vice versa. This confirms that parametric tests can be

Table 1 Descriptive Statistics for Syariah and Conventional Stocks in Indonesia.

	Overall period (2007-2016)	Pre-crisis period (2007-2008)	Crisis Period (2008-2009)	Post-crisis period (2009-2016)
Panel A: Syariah Stocks Portfolio				
Mean	0,0028	0,005	0,0025	0,0026
Median	0,0015	0,0044	0,0021	0,0014
Standard dev.	0,0201	0,0176	0,0198	0,0203
SW (*p value*)		0,1772	<0.0100	<0.0001
KS (*p value*)	<0,0100	>0,1500	>0,1500	<0,0100
Panel B: Conventional Stocks Portfolio				
Mean	0,0054	0,0037	0,0026	0,0059
Median	0,0012	0,0021	0,0032	0,001
Standard dev.	0,0752	0,0173	0,0209	0,082
SW (*p value*)		0,0583	0,004	<0,0001
KS (*p value*)	<0,0100	>0,1500	>0,1500	<0,0100
Panel C: Big-Cap Syariah Portfolio				
Mean	0,0027	0,0034	-0,0005	0,003
Median	0,0011	0,0035	-0,0009	0,0011
Standard dev.	0,0307	0,0171	0,0216	0,0325
SW (*p value*)		<0,032	<0,0001	<0,0001
KS (*p value*)	<0,010	<0,0056	<0,010	<0,010
Panel D: Small-Cap Syariah Portfolio				
Mean	0,0029	0,0066	0,0054	0,0022
Median	0,0011	0,0075	0,0049	0,0008
Standard dev.	0,0224	0,0253	0,025	0,0217
SW (*p value*)		0,7316	0,0016	<0,0001
KS (*p value*)	<0,010	>0,1500	0,0627	<0,010
Panel E: High- B/M Syariah Portfolio				
Mean	0,0026	0,0067	0,0037	0,0022
Median	0,001	0,0057	1,90E-03	0,0008
Standard dev.	0,0226	0,0244	0,023	0,0224
SW (*p value*)		0,8425	<0,0001	<0,0001
KS (*p value*)	<0,010	>0,1500	>0,1500	<0,010
Panel F: Low- B/M Syariah Portfolio				
Mean	0,003	0,0031	0,001	0,0032
Median	0,0014	0,002	9,00E-04	0,0014

Table 1 (Continued)

	Overall period (2007-2016)	Pre-crisis period (2007-2008)	Crisis Period (2008-2009)	Post-crisis period (2009-2016)
Standard dev.	0,0318	0,0171	0,0228	0,0336
SW (*p value*)		0,0014	0,0113	<0,0001
KS (*p value*)	<0,010	<0,010	0,1247	<0,010
Panel G: High- Beta Syariah Portfolio				
Mean	0,0012	0,0029	-0,0009	0,0014
Median	0,0007	0,0039	-0,0005	0,0005
Standard dev.	0,0202	0,0222	0,0351	0,0173
SW (*p value*)		<0,0001	<0,0001	<0,0001
KS (*p value*)	<0,010	<0,010	<0,010	<0,010
Panel H: Low -Beta Syariah Portfolio				
Mean	0,0032	0,0053	0,0035	0,003
Median	0,0014	0,0046	0,0029	0,0012
Standard dev.	0,0254	0,0197	0,0187	0,0265
SW (*p value*)		0,6914	0,0315	<0,0001
KS (*p value*)	<0,010	>0,1500	>0,1500	<0,010
Panel I: Dividend-Payment Syariah Portfolio				
Mean	0,003	0,004	0,002	0,004
Median	0,0012	0,003	-0,001	0,002
Standard dev.	0,0324	0,017	0,021	0,035
SW (*p value*)		0,303	<0,0001	<0,002
KS (*p value*)	<0,0001	0,2	<0,009	<0,001
Panel J: No Dividend-Payment Syariah Portfolio				
Mean	0,0023	0,004	0,005	0,002
Median	0,0004	0,003	-0,002	0,001
Standard dev.	0,0205	0,028	0,038	0,017
SW (*p value*)		<0,002	0,12	<0,001
KS (*p value*)	<0,0001	0,2	<0,009	0,038

Note: Observations split into four periods: overall period (2007-2016), pre-crisis period (2007-2008), crisis period (2008-2009), and post-crisis period (2009-2016). Normality test follows the *Shapiro Wilks test* (SW) for small samples and *Kolmogorov Smirnov test* (KS) for large samples. *p-value* < α shows that data are not normally distributed, while *p-value* > α shows that the data are normally distributed.

Table 2 Descriptive Statistics for Syariah and Conventional Stocks in Malaysia.

	Overall period (2005-2016)	Pre-crisis period (2005-2008)	Crisis Period (2008-2009)	Post-crisis period (2009-2016)
Panel A: Syariah Stocks Portfolio				
Mean	0,0008	0,0008	0,0001	0,0009
Median	0,0006	0,0004	-0,0008	0,0006
Standard dev.	0,0117	0,0144	0,0166	0,0095
SW (*p value*)		<0,0001	<0,0001	<0,0001
KS (*p value*)	<0,0100	<0,0001	0,0167	<0,0100
Panel B: Conventional Stocks Portfolio				
Mean	0,0007	0,0011	-0,001	0,0008
Median	0,0006	0,0013	-0,0019	0,0007
Standard dev.	0,0121	0,0133	0,0156	0,0111
SW (*p value*)		<0,0001	<0,0001	<0,0001
KS (*p value*)	<0,0001	<0,0001	<0,0100	<0,0100
Panel C: Big-Cap Syariah Portfolio				
Mean	0,0007	0,0006	-0,0009	0,0009
Median	0,0007	0,0007	-0,0009	0,0009
Standard dev.	0,0087	0,0104	0,0122	0,0072
SW (*p value*)		<0,0001	<0,0001	<0,0001
KS (*p value*)	<0,0100	<0,0100	<0,0100	<0,0100
Panel D: Small-Cap Syariah Portfolio				
Mean	0,0016	0,001	0,0006	0,0019
Median	0,0002	0,0001	-0,0006	0,0002
Standard dev.	0,0364	0,0178	0,0218	0,0426
SW (*p value*)		<0,0001	<0,0001	<0,0001
KS (*p value*)	<0,0100	<0,0100	<0,0100	<0,0100
Panel E: High- B/M Syariah Portfolio				
Mean	0,0014	0,0007	0,0002	0,0019
Median	1,00E-04	2,00E-04	-0,0013	0,0003
Standard dev.	0,0376	0,0155	0,0196	0,0447
SW (*p value*)		<0,0001	<0,0001	<0,0001
KS (*p value*)	<0,0100	<0,0100	<0,0100	<0,0100
Panel F: Low- B/M Syariah Portfolio				
Mean	0,0008	0,001	-0,0008	0,001
Median	7,00E-04	0,0007	-0,0014	0,0009
Standard dev.	0,0101	0,0127	0,0142	0,0081

Table 2 (Continued)

	Overall period (2005-2016)	Pre-crisis period (2005-2008)	Crisis Period (2008-2009)	Post-crisis period (2009-2016)
SW (*p value*)		<0,0001	<0,0001	<0,0001
KS (*p value*)	<0,0100	<0,0100	<0,0100	<0,0100
Panel G: High- Beta Syariah Portfolio				
Mean	0,0007	0,0009	-0,0012	0,0009
Median	0,0004	1,00E-04	-0,002	0,0007
Standard dev.	0,0157	0,0199	0,0229	0,0124
SW (*p value*)		<0,0001	<0,0001	<0,0001
KS (*p value*)	<0,0100	<0,0100	<0,0100	<0,0100
Panel H: Low -Beta Syariah Portfolio				
Mean	0,0009	0,0006	0,0014	0,0009
Median	0,0001	0,0003	-0,0009	0,0001
Standard dev.	0,011	0,0115	0,0172	0,0096
SW (*p value*)		<0,0001	0,0014	<0,0001
KS (*p value*)	<0,0100	<0,0100	<0,0100	<0,0100
Panel I: Dividend-Payment Syariah Portfolio				
Mean	0,0009	0,0029	-0,0009	0,0014
Median	0,0006	0,0039	-0,0005	0,0005
Standard dev.	0,0121	0,0222	0,0351	0,0173
SW (*p value*)		<0,0001	0,011	<0,0001
KS (*p value*)	<0,0001	<0,0001	0,2	0,013
Panel J: No Dividend-Payment Syariah Portfolio				
Mean	0,0008	0,0053	0,0035	0,003
Median	0	0,0046	0,0029	0,0012
Standard dev.	0,0187	0,0197	0,0187	0,0265
SW (*p value*)		<0,0001	<0,0001	<0,0001
KS (*p value*)	<0,0001	<0,0001	<0,0001	<0,0001

Note: Observations split into four periods: overall period (2005-2016), pre-crisis period (2007-2008), crisis period (2008-2009), and post-crisis period (2009-2016). Normality test follows the *Shapiro Wilks test* (SW) for small samples, and *Kolmogorov Smirnov test* (KS) for large samples. *p-value* < α shows that the data are not normally distributed, while *p- value* > α shows that the data are normally distributed.

Table 3 Results of the Comparison Between the Performance of Indonesian Syariah and Conventional Stocks Using a Parametric Method.

	Overall period (2007-2016)			Pre-crisis period (2007-2008)			Crisis period (2008-2009)			Post-crisis period (2009-2016)		
	Syariah	Conven	t	Syariah	Conven	t	Syariah	Conven	t	Syariah	Conven	t
Panel A. Whole Stocks Portfolio												
Sharpe	0,035	0,026	3,1***	0,057	0,022	3,2***	0,006	0,011	-0,622	0,038	0,029	3,1***
Treynor	0,014	0,007	0,755	0,005	0,004	0,117	-0,043	0,009	-1,296	-0,023	0,005	-0,955
Jensen	0,003	0,005	-1,112	0,004	0,003	0,945	0,004	0,004	-0,148	0,003	0,006	-1,138
Beta	0,632	0,787	-0,962	0,611	0,624	-0,111	0,608	0,654	-0,469	0,649	0,882	-0,858
Panel B. Big-Cap Portfolio												
Sharpe	0,034	0,026	2,50**	0,06	0,022	2,46**	-0,024	0,011	-4,6***	0,042	0,029	4,2***
Treynor	0,018	0,007	0,775	0,006	0,004	-0,423	-0,093	0,009	-1,3	-0,051	0,005	-1,04
Jensen	0,003	0,005	-1,099	0,002	0,003	-1,201	0,001	0,004	-1,74*	0,003	0,006	-0,992
Beta	0,775	0,787	-0,066	0,741	0,624	-0,247	0,744	0,654	-0,218	0,794	0,882	0,038
Panel C. Small-Cap Portfolio												
Sharpe	0,035	0,026	3,0***	0,055	0,022	2,27**	0,034	0,011	0,891	0,035	0,029	2,50**
Treynor	0,009	0,007	0,257	0,004	0,004	-0,425	0,007	0,009	-0,01	0,007	0,005	-0,09
Jensen	0,003	0,005	-1,01	0,006	0,003	0,223	0,006	0,004	0,411	0,002	0,006	-1,302
Beta	0,489	0,787	-1,697*	0,48	0,624	-1,372	0,472	0,654	-1,72*	0,503	0,882	-1,592
Panel D. High-B/M Portfolio												
Sharpe	0,033	0,026	2,06**	0,066	0,022	3,5***	0,014	0,011	-0,905	0,035	0,029	2,61**
Treynor	0,011	0,007	0,43	0,005	0,004	-0,304	0,01	0,009	0,421	0,007	0,005	-0,048
Jensen	0,003	0,005	-1,107	0,006	0,003	0,235	0,005	0,004	-0,28	0,002	0,006	-1,345
Beta	0,521	0,787	-1,512	0,523	0,624	-1,249	0,429	0,654	-2,0**	0,566	0,882	-1,223
Panel E. Low-B/M Portfolio												
Sharpe	0,036	0,026	3,6***	0,043	0,022	1,174	-0,007	0,011	-3 ***	0,043	0,029	4,5***
Treynor	0,018	0,007	0,689	0,005	0,004	-0,66	-0,1	0,009	-1,334	-0,052	0,005	-1,027
Jensen	0,003	0,005	-0,961	0,002	0,003	-1,182	0,002	0,004	-1,165	0,003	0,006	-0,887

Table 3 (Continued)

	Overall period (2007-2016)			Pre-crisis period (2007-2008)			Crisis period (2008-2009)			Post-crisis period (2009-2016)		
	Syariah	Conven	t	Syariah	Conven	t	Syariah	Conven	t	Syariah	Conven	t
Beta	0,723	0,787	-0,344	0,634	0,624	-0,75	0,727	0,654	-0,298	0,738	0,882	-0,267
Panel F. High-Beta Portfolio												
Sharpe	0,029	0,026	0,821	0,072	0,022	1,717	-0,032	0,011	-3,0**	0,036	0,029	1,87*
Treynor	0,001	0,007	-1,742*	0,002	0,004	-1,359	-0,002	0,009	-2,2**	0,001	0,005	-1,717*
Jensen	0,001	0,005	-1,837*	0,001	0,003	-1,657	0,001	0,004	-1,49	0,001	0,006	-1,852*
Beta	1,211	0,787	2,49**	1,134	0,624	1.936*	1,27	0,654	2,30**	1,198	0,882	2,39**
Panel G. Low -Beta Portfolio												
Sharpe	0,037	0,026	3,3***	0,051	0,022	2,62**	0,017	0,011	-1,108	0,038	0,029	3,8***
Treynor	0,022	0,007	1,341	0,006	0,004	-0,174	-0,054	0,009	-1,136	-0,035	0,005	-1,082
Jensen	0,003	0,005	-0,78	0,005	0,003	-0,29	0,004	0,004	-0,375	0,003	0,006	-0,958
Beta	0,489	0,787	-1,76*	0,54	0,624	-1,335	0,432	0,654	-2,1**	0,505	0,882	-1,641
Panel H: Dividend-Payment Portfolio												
Sharpe	0,086	0,05	0,51	0,174	0,128	1,308	0,043	0,104	1,956*	0,087	0,052	-1,321
Treynor	0,005	0,009	1,382	0,005	0,004	0,735	0,002	0,004	-0,444	0,005	0,008	-0,799
Jensen	0,003	0,01	-1,043	0,002	0,002	0,289	0,002	0,005	-0,468	0,003	0,011	-1,51
Beta	0,677	1,123	-1,022	0,634	0,668	-0,199	0,678	0,779	-0,06	0,685	1,374	-0,63
Panel I: No Dividend-Payment Portfolio												
Sharpe	0,102	0,041	2,02**	0,117	0,153	0,924	0,112	0,064	-0,009	0,106	0,038	2,7***
Treynor	0,005	0,005	-1,022	0,006	0,008	-0,403	0,013	0,003	-1,99**	0,004	0,005	-0,056
Jensen	0,002	0,003	-1,022	0,003	0,004	-0,506	0,005	0,003	0,896	0,002	0,003	-0,563
Beta	0,48	0,658	-1,051	0,585	0,74	-0,501	0,347	0,558	-1,028	0,53	0,689	-0,57

Note: Sharpe ratio denoted by $SR = \left(R_{i,t} - R_{f,t}\right)/\sigma R_{i,t}$, Tryenor index denoted by $TI = \left(R_{i,t} - R_{f,t}\right)/\beta_i$, and Jensen *Alpha* denoted by $\alpha = R_{i,t} - \left[R_{f,t} + \beta_i\left(R_{M,t} - R_{f,t}\right)\right]$. Market return is proxied by the *Jakarta Stock Composite Index* return. Risk-free is proxied by the *Bank Indonesia* rate (0.00019). *, **, *** show statistical significance at 10%, 5%, and 1% respectively.

Table 4 Results of the Comparison Between the Performance of Malaysian Syariah and Conventional Stocks Using a Parametric Method

	Overall period (2005-2016)			Pre-crisis period (2005-2008)			Crisis period (2008-2009)			Post-crisis period (2009-2016)		
	Syariah	Conven	t	Syariah	Conven	t	Syariah	Conven	t	Syariah	Conven	t
Panel A. Whole Stocks Portfolio												
Sharpe	0,021	0,019	-0,494	0,017	0,03	1,827*	-0,03	-0,04	-1,3	0,031	0,028	-0,952
Treynor	0,0008	0,0006	-1,282	0,000	0,0002	-0,454	0,004	-0,002	-2,0*	0,002	0,001	-0,75
Jensen	0,0004	0,0004	-0,307	-0,00	0,0003	1,498	0,002	0,001	-1,379	0,0005	0,0004	-0,316
Beta	1,033	1,056	0,235	1,324	1,305	-0,133	0,909	0,997	0,766	0,933	0,929	-0,059
Panel B. Big-Cap Portfolio												
Sharpe	0,027	0,019	2,23**	0,02	0,03	-1,038	-0,03	-0,043	-1,665	0,041	0,028	2,9***
Treynor	0,001	0,001	1,272	0,001	0,001	0,167	-0,001	-0,002	0,827	0,002	0,001	1,562
Jensen	0,001	0,001	-0,009	-0,001	0,001	-1,522	0,001	0,001	-0,336	0,001	0,001	0,755
Beta	0,878	1,056	-1,95*	1,06	1,305	-1,762*	0,816	0,997	-1,665	0,798	0,929	-1,596
Panel C. Small-Cap Portfolio												
Sharpe	0,017	0,019	0,554	0,021	0,03	-1,104	-0,021	-0,043	1,353	0,98	0,028	-1,4
Treynor	0,003	0,001	1,211	0,001	0,001	0,995	0,021	-0,002	1,465	0,023	0,001	-1,076
Jensen	0,002	0,001	1,161	0,001	0,001	-0,468	0,002	0,001	1,827*	-0,001	0,001	0,981
Beta	1,115	1,056	0,554	1,448	1,305	0,885	1,001	0,997	0,028	0,002	0,929	0,499
Panel D. High-B/M Portfolio												
Sharpe	0,016	0,019	-1,191	0,016	0,03	-1,89*	-0,026	-0,043	1,027	0,024	0,028	-0,875
Treynor	0,002	0,001	1,098	0,001	0,001	0,328	0,021	-0,002	1,412	-0,001	0,001	-0,941
Jensen	0,002	0,001	0,971	-0,001	0,001	-1,981*	0,002	0,001	1,279	0,002	0,001	0,97
Beta	1,033	1,056	-0,221	1,322	1,305	0,114	0,925	0,997	-0,552	0,919	0,929	-0,085
Panel E. Low-B/M Portfolio												
Sharpe	0,028	0,019	2,59*	0,026	0,03	-0,419	-0,031	-0,043	0,841	0,039	0,028	2,6***
Treynor	0,001	0,001	1,543	0,001	0,001	0,465	-0,001	-0,002	0,685	0,002	0,001	1,561
Jensen	0,001	0,001	0,539	0,001	0,001	-0,316	0,001	0,001	0,12	0,001	0,001	0,83

Table 4 (Continued)

	Overall period (2005-2016)			Pre-crisis period (2005-2008)			Crisis period (2008-2009)			Post-crisis period (2009-2016)		
	Syariah	Conven	t	Syariah	Conven	t	Syariah	Conven	t	Syariah	Conven	t
Beta	0,961	1,056	-0,919	1,219	1,305	-0,55	0,893	0,997	-0,836	0,836	0,929	-1,112
Panel F. High-Beta Portfolio												
Sharpe	0,017	0,019	-0,709	0,018	0,03	-1,193	-0,054	-0,043	-0,781	0,029	0,028	0,184
Treynor	0,001	0,001	-1,376	0,001	0,001	0,195	-0,001	-0,002	0,31	0,001	0,001	-1,187
Jensen	0,001	0,001	-0,416	-0,001	0,001	-1,519	0,001	0,001	0,284	0,001	0,001	0,002
Beta	1,386	1,056	4***	1,773	1,305	3,27***	1,277	0,997	2,27**	1,204	0,929	4***
Panel G. Low -Beta Portfolio												
Sharpe	0,025	0,019	1,504	0,016	0,03	-1,555	0,006	-0,043	3,3***	0,033	0,028	1,058
Treynor	0,002	0,001	2,5**	0,001	0,001	0,49	0,009	-0,002	2,021*	0,002	0,001	1,8*
Jensen	0,001	0,001	1,004	0,001	0,001	-0,93	0,003	0,001	1,605	0,001	0,001	0,62
Beta	0,646	1,056	-5***	0,83	1,305	-3,5***	0,505	0,997	-5***	0,635	0,929	-4***
Panel H: Dividen-Payment Portfolio												
Sharpe	0,064	0,046	-0,968	0,043	0,065	-1,245	0,044	-0,084	1,137	0,085	0,069	0,695
Treynor	0,001	0,001	-1,128	0,001	0,001	-0,16	0,001	-0,002	1,347	0,001	0,001	1,049
Jensen	0,001	0,001	-1,431	0,001	0,001	-0,62	0,003	0,001	1,432	0,001	0,001	1,263
Beta	0,951	0,988	0,01	1,178	1,145	0,379	0,888	0,879	0,052	0,854	0,959	-0,788
Panel I: No Dividen-Payment Portfolio												
Sharpe	0,038	0,037	-1,049	0,045	0,076	-0,121	-0,001	-0,051	1,569	0,046	0,04	0,064
Treynor	0,001	0,001	-0,588	0,001	0,001	0,5	-0,001	-0,002	1,554	0,001	0,002	0,695
Jensen	0,001	0,001	0,339	0,001	0,001	-0,598	0,002	0,001	0,916	0,001	0,001	-0,386
Beta	1,057	1,146	0,299	1,44	1,287	0,408	0,943	1,169	-0,783	0,885	1,031	-0,774

Note: Sharpe ratio denoted by $SR = \left(R_{i,t} - R_{f,t}\right)/\sigma R_{i,t}$, Tryenor index denoted by $TI = \left(R_{i,t} - R_{f,t}\right)/\beta_i$, and Jensen *Alpha* denoted by $\alpha = R_{i,t} - \left[R_{f,t} + \beta_i\left(R_{M,t} - R_{f,t}\right)\right]$. Market return is proxied by the *Kuala Lumpur Stock Composite Index* return. Risk-free is proxied by the Malaysia T Bill rate (0.00008). *, **, *** show statistical significance at 10%, 5%, and 1% respectively.

misleading. Thus, it is better to rely on the Stochastic Dominance (SD) approach.

Tables 5,6,7, and 8 report results of *Stochastic Dominance* (SD) tests using Davidson and Duclos (2000) model. Table 5 shows the results using the Indonesian data. The table shows that Syariah stocks dominate the *Jakarta Stock Composite Index* (JSCI) for the overall, and crisis periods, while there is no domination between the two stocks during the non-crisis period. Conventional stocks also dominate the JCSI in the overall, crisis, and non-crisis periods. These results suggest that Syariah and Conventional stocks have at least the same performance as market. These findings also suggest that stock screening using Syariah principles does not seem to reduce potential diversification.

Table 7 shows the SD test between the Syariah and Conventional stocks in Indonesia. For the overall period (2007-2016), Syariah stocks dominate the Conventional stocks at first order (FSD). In the non-crisis periods, Syariah stocks also dominate the Conventional stocks, but in the third-order (TSD). However, in the crisis period, the performance of Syariah stocks is not different from that of the Conventional stocks. This result seems to suggest that in the long run, Syariah stocks outperform Conventional stocks. In Indonesia, Syariah stocks outperform Conventional stocks in bull period, but have the same performance to that of Conventional stocks in bear period. This finding is consistent with that of the Sharpe ratio.

According to Falk and Levy (1989), and Jarrow (1986), FSD (*First-order Stochastic Dominance*) offers an arbitrage opportunity for investors and increases *expected wealth* and *expected utilities* if they shift from holding the dominated stock to the dominating one. However, Wong et al. (2008) argue that from a statistical stand-point, the existence of FSD does not necessarily offer arbitrage mathematically. Arbitrage can only be exploited if FSD exists in a 'complete' market. In an efficient market with rational investors, the existence of FSD will not persist long. The existence of FSD for Syariah stocks will not last forever. This situation is observed in figure 1, in which line Tj1 is not always below the *horizontal* (negative) line. The pattern of the Tj1 line indicates that Syariah stocks do not always dominate Conventional stocks for each probability. This result indicates that investors are not guaranteed to have arbitrage opportunities.

The FSD (*First-order Stochastic Dominance*) of the Syariah stocks over Conventional stocks and JSCI shows that investors of non-satiation could improve their *expected wealth* by changing their JSCI or Conventional portfolios with a Syariah portfolio between the years of 2007 to 2016. The increase of investors' *expected wealth* shows that investors can increase their portfolio returns without increasing risk. The TSD (*Third-order Stochastic*

Table 5 Comparative Tests of the *Jakarta Stock Composite Index* (JSCI) With Syariah Stocks and Conventional Stocks for Indonesia.

	Overall period (2007-2016)		Pre-crisis period (2007-2008)		Crisis period (2008-2009)		Post-crisis period (2009-2016)	
	Tj	Decision	Tj	Decision	Tj	Decision	Tj	Decision
Panel A. Indonesia's Syariah Stocks Portfolio								
FSD	3,61**	$\widehat{D}_s^j(x) \leq \widehat{D}_{IHSG}^j(x)$	1,86	$\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$	-2,78	$\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$	-2,82	$\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$
SSD	-2,733	$\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$	2,476	$\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$	-2,705	$\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$	-2,81	$\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$
TSD	-3,13*	$\widehat{D}_s^j(x) \leq \widehat{D}_{IHSG}^j(x)$	2,354	$\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$	-3,5**	$\widehat{D}_s^j(x) \leq \widehat{D}_{IHSG}^j(x)$	-3,0	$\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$
Panel B. Indonesia's Conventional Stocks Portfolio								
FSD	-4***	$\widehat{D}_k^j(x) \leq \widehat{D}_{IHSG}^j(x)$	-2,872	$\widehat{D}_k^j(x) = \widehat{D}_{IHSG}^j(x)$	-3,14*	$\widehat{D}_k^j(x) \leq \widehat{D}_{IHSG}^j(x)$	-3*	$\widehat{D}_k^j(x) \leq \widehat{D}_{IHSG}^j(x)$
SSD	-2,62	$\widehat{D}_k^j(x) = \widehat{D}_{IHSG}^j(x)$	-2,871	$\widehat{D}_k^j(x) = \widehat{D}_{IHSG}^j(x)$	-2,914	$\widehat{D}_k^j(x) = \widehat{D}_{IHSG}^j(x)$	-2,60	$\widehat{D}_k^j(x) = \widehat{D}_{IHSG}^j(x)$
TSD	-3,14*	$\widehat{D}_k^j(x) \leq \widehat{D}_{IHSG}^j(x)$	-4***	$\widehat{D}_k^j(x) \leq \widehat{D}_{IHSG}^j(x)$	-3,4**	$\widehat{D}_k^j(x) \leq \widehat{D}_{IHSG}^j(x)$	-3,1*	$\widehat{D}_k^j(x) \leq \widehat{D}_{IHSG}^j(x)$

This table presents the results of the *Stochastic Dominance* (SD) test of Davidson and Duclos (2000) between the JSCI and the Syariah and Conventional stocks. Tj is the *DD statistic* denoted with $T_{j(x)} = \widehat{D}_{s(k)}^j(x) - \widehat{D}_{IHSG}^j(x) / \sqrt{var\widehat{D}_{s(k)}^j(x) + var\widehat{D}_{IHSG}^j(x) - 2cov\widehat{D}_{s(k)}^j(x), \widehat{D}_{IHSG}^j(x)}$. FSD is the *First-order Stochastic Dominance*, SSD is the *Second-order Stochastic Dominance,* TSD is the *Third-order Stochastic Dominance.* $\widehat{D}_s^j(x) \leq \widehat{D}_{IHSG}^j(x)$ means that Syariah stocks outperform *JSCI*. $\widehat{D}_k^j(x) \leq \widehat{D}_{IHSG}^j(x)$ means that conventional stocks outperform JSCI. $\widehat{D}_s^j(x) = \widehat{D}_{IHSG}^j(x)$ means that Syariah stocks perform same as JSCI. $\widehat{D}_k^j(x) = \widehat{D}_{IHSG}^j(x)$ means that Conventional stocks perform same as JSCI. *, **, and *** mean significance at 10%, 5%, and 1%, respectively.

Table 6. Comparative tests of the *Kuala Lumpur Composite Index (*KLCI) with the Syariah stocks and Conventional stocks for Malaysia

	Overall period (2005-2016)		Pre-crisis period (2005-2008)		Crisis period (2008-2009)		Post-crisis period (2009-2016)	
	Tj	Decision	Tj	Decision	Tj	Decision	Tj	Decision
Panel A. Malaysia's Syariah Stocks Portfolio								
FSD	-2,0	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$	-1,73	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$	-2,31	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$	-2,2	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$
SSD	2,277	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$	2,726	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$	-2,05	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$	1,992	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$
TSD	2,558	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$	2,495	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$	2,669	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$	2,681	$\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$
Panel B. Malaysia's Conventional Stocks Portfolio								
FSD	-1,8	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$	-1,76	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$	-2,54	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$	-2,189	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$
SSD	2,31	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$	2,35	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$	3,20*	$\widehat{D}_k^j(x) \geq \widehat{D}_{KLCI}^j(x)$	2,024	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$
TSD	2,55	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$	2,51	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$	2,763	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$	2,684	$\widehat{D}_k^j(x) = \widehat{D}_{KLCI}^j(x)$

Table 6 presents the results of the *Stochastic Dominance* (SD) test of Davidson and Duclos (2000) between the KLCI and the Syariah and Conventional stocks. Tj is the *DD statistic* denoted with $T_{j(x)} = \widehat{D}_{s(k)}^j(x) - \widehat{D}_{KLCI}^j(x) / \sqrt{var\widehat{D}_{s(k)}^j(x) + var\widehat{D}_{KLCI}^j(x) - 2cov\widehat{D}_{s(k)}^j(x), \widehat{D}_{KLCI}^j(x)}$. FSD is the *First-order Stochastic Dominance*, SSD is the *Second-order Stochastic Dominance,* and TSD is the *Third-order Stochastic Dominance.* $\widehat{D}_s^j(x) \leq \widehat{D}_{KLCI}^j(x)$ means that the Syariah stocks outperform the *KLCI*. $\widehat{D}_k^j(x) \geq \widehat{D}_{KLCI}^j(x)$ means that Conventional stocks outperform the KLCI. $\widehat{D}_s^j(x) = \widehat{D}_{KLCI}^j(x)$ means that Syariah stocks perform same asthe KLCI. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 7 Comparative Tests of Syariah Stocks and Conventional Stocks for Indonesia

	Overall period (2007-2016)		Pre-crisis period (2007-2008)		Crisis period (2008-2009)		Post-crisis period (2009-2016)	
	Tj	Decision	Tj	Decision	Tj	Decision	Tj	Decision
Panel A. Whole Stocks Portfolio								
FSD	-3,3**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-3,027	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,462	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,992	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	-2,16	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,784	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,542	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,995	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	-3,2*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-3,3**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-2,953	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,04*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$
Panel B. Big-Cap Portfolio								
FSD	2,34	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,196	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,909	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,037	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	3,3**	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	-2,942	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,501	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,405	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,616	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,633	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,24*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	2,507	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
Panel C. Small-Cap Portfolio								
FSD	-2,2	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,057	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,481	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,134	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	-1,6	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,051	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,761	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,277	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,7	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,753	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-4***	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	2,571	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
Panel D. High-B/M Portfolio								
FSD	-2,01	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,353	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,125	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,822	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	2,13	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,281	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,296	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,631	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,602	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,188	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,476	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,455	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
Panel E. Low-B/M Portfolio								
FSD	-2,069	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,331	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,615	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,176	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	2,857	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,734	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,688	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,003	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,374	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,535	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,1*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	2,699	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
Panel F. High-Beta Portfolio								
FSD	1,768	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,498	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,121	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,645	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	3,229*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	2,471	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,046*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	3,005	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,641	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,3**	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	3,115*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	2,523	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$

Table 7 (Continued)

	Overall period (2007-2016)		Pre-crisis period (2007-2008)		Crisis period (2008-2009)		Post-crisis period (2009-2016)	
	Tj	Decision	Tj	Decision	Tj	Decision	Tj	Decision
Panel G. Low -Beta Portfolio								
FSD	-3,4**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-2,866	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,869	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$
SSD	-2,48	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,44	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,5**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-2,433	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	-3,4**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-3,2*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-3,20*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-3,5**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$
Panel H: Dividend-Payment Portfolio								
FSD	2,571	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,129	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,583	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,2**	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$
SSD	-3,0*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-3,5**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-1,992	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,88	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	-2,54	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,897	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,655	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,3**	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$
Panel I: No Dividend-Payment Portfolio								
FSD	-1,983	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,519	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,905	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,991	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	2,673	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,1*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	2,68	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,954	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,542	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,899	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,64	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,627	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$

This table presents the *Stochastic Dominance* (SD) test of Davidson and Duclos (2000) between the Syariah and Conventional stocks. Tj is the *DD statistic* denoted with $T_{j(x)} = \widehat{D}_s^j(x) - \widehat{D}_k^j(x) / \sqrt{var\widehat{D}_s^j(x) + var\widehat{D}_k^j(x) - 2cov\widehat{D}_s^j(x), \widehat{D}_k^j(x)}$. FSD is *First-order Stochastic Dominance*, SSD is *Second-order Stochastic Dominance,* and TSD is *Third-order Stochastic Dominance*
$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$ means that Syariah stocks outperform Conventional stocks. $\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$ means Conventional stocks outperform Syariah stocks. $\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$ means that Syariah stocks perform the same as Conventional stocks. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Table 8 Comparative Tests of Syariah Stocks and Conventional Stocks for Malaysia

	Overall period (2005-2016)		Pre-crisis period (2005-2008)		Crisis period (2008-2009)		Post-crisis period (2009-2016)	
	Tj	Decision	Tj	Decision	Tj	Decision	Tj	Decision
Panel A. Whole Stocks Portfolio								
FSD	-2,593	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,585	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,609	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,772	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	2,261	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,18*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	-2,169	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,084	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,571	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,914	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,14*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	2,607	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
Panel B. Big-Cap Portfolio								
FSD	-2,34	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,761	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,31	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,3**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$
SSD	-3,06*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-2,194	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,07*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-2,805	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	-2,649	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,543	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,94	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,97	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
Panel C. Small-Cap Portfolio								
FSD	1,833	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,884	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,844	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,781	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	2,777	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,05*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	1,678	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,827	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,415	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,636	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,732	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,421	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
Panel D. High-B/M Portfolio								
FSD	2,062	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,002	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,922	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,948	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	2,937	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,19*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	-1,585	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,807	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,396	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,786	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,8	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,411	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
Panel E. Low-B/M Portfolio								
FSD	-3,24*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	3,3**	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	-2,725	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,5**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$
SSD	-2,981	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,081	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,015	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,469	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	-3,08*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-2,805	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,07*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	-3,3**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$
Panel F. High-Beta Portfolio								
FSD	1,781	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,716	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,105	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,868	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	3,06*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	3,16*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	3,22*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	2,775	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,515	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,741	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,859	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,446	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$

Table 8 (Continued)

	Overall period (2005-2016)		Pre-crisis period (2005-2008)		Crisis period (2008-2009)		Post-crisis period (2009-2016)	
	Tj	Decision	Tj	Decision	Tj	Decision	Tj	Decision
Panel G. Low -Beta Portfolio								
FSD	-2,608	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,094	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,764	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	2,266	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,741	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,539	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,713	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,468	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,709	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,4**	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	2,316	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
Panel H: Dividend-Payment Portfolio								
FSD	-2,43	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,473	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-1,951	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,761	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	-1,193	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,19*	$\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$	-1,931	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,155	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	-2,344	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,709	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,745	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,08*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$
Panel I: No Dividend-Payment Portfolio								
FSD	2,171	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,887	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,818	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	1,926	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
SSD	2,985	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	3,015	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-2,296	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,817	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$
TSD	2,868	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	2,731	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$	-3,08*	$\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$	2,424	$\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$

This table presents the results of the *Stochastic Dominance* (SD) test of Davidson and Duclos (2000) between the Syariah and Conventional stocks. Tj is the *DD statistic* denoted with $T_{j(x)} = \widehat{D}_s^j(x) - \widehat{D}_k^j(x) / \sqrt{var\widehat{D}_s^j(x) + var\widehat{D}_k^j(x) - 2cov\widehat{D}_s^j(x), \widehat{D}_k^j(x)}$. FSD is *First-order Stochastic Dominance*, SSD is *Second-order Stochastic Dominance,* and TSD is *Third-order Stochastic Dominance.* $\widehat{D}_s^j(x) \leq \widehat{D}_k^j(x)$ means that Syariah stocks outperform Conventional stocks. $\widehat{D}_s^j(x) \geq \widehat{D}_k^j(x)$ means Conventional stocks outperform Syariah stocks. $\widehat{D}_s^j(x) = \widehat{D}_k^j(x)$ means that Syariah stocks perform the same as Conventional stocks. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

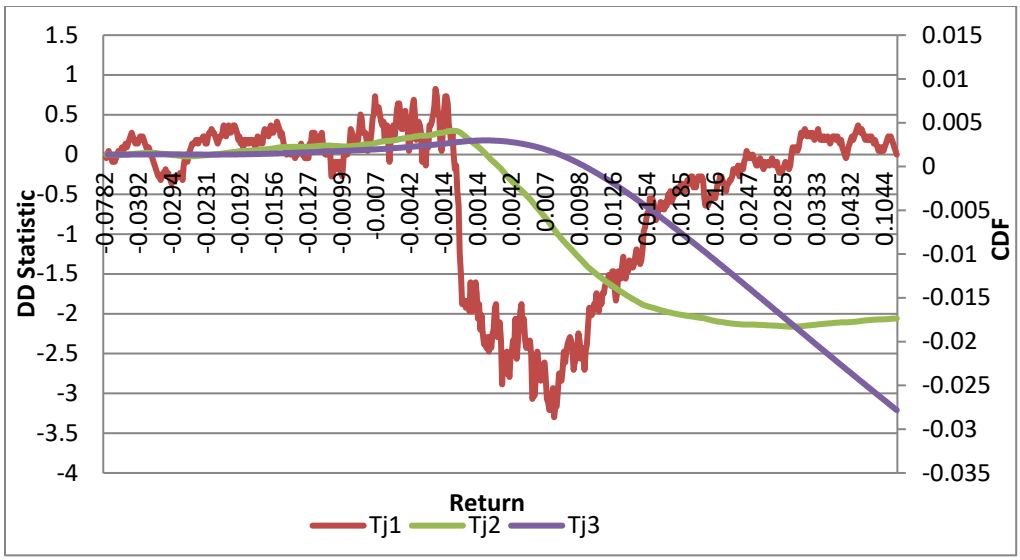

Figure 1 Statistics of DD and CDF of Syariah and Conventional Stocks in Indonesia.

This figure shows the *Davidson Duclos* (*DD statistic*) and *Cumulative Distribution Function* (CDF) of Syariah and Conventional stocks for the overall period. The negative value for the DD *statistic* indicates that Syariah stocks outperform Conventional stocks. Tj1 is a DD *statistic* of order 1, Tj2 is a DD *statistic* of order 2, and Tj3 is a DD *statistic* of order 3. The critical points for *Studentized Maximum Modulus* (SMM) at k 10 for significance levels of 10%, 5%, and 1%, are 3,043, 3,254, and 3,691 respectively.

Dominance) of Syariah stocks over Conventional stocks shows that investors of non-satiation, risk averters, and DARA, can increase their *expected utilities* even though they can not increase their *expected wealth*. The increase of investors' *expected utilities* indicates that they have opportunities to increase the probability of getting high returns if they shift their JSCI or Conventional portfolios to Syariah portfolios in non-crisis periods.

Figure 1 enforces the indication that Syariah stocks dominate Conventional stocks in the non-crisis periods, but do not dominate in the crisis periods. The line Tj1 shows the pattern of FSD domination of Syariah stocks over Conventional stocks for the period of 2007-2016. The line Tj1 is below the *horizontal* line (negative) indicating that the Syariah stocks dominate the Conventional stocks. If the line Tj1 is above the *horizontal* line (positive) then the Conventional stocks are dominating the Syariah stocks. The line Tj1 is observed to move below *horizontal* line, crossing the critical point in the *Studentized Maximum Modulus* (SMM) table when the value of the return is positive. When the return is negative (indication of crisis period), the line

Tj1 increases and decreases at the *horizontal* line, but it never reaches the critical point in the SMM table. Figure 1 also shows that the line Tj1 is not always below the *horizontal* line. This pattern suggests that Syariah stocks do not always dominate conventional stocks at each probability for the period of 2007-2016.

When firm size, B/M, beta, and dividend policy, are considered in the portfolios, it seems that the Syariah portfolio does not consistently dominate the Conventional portfolio during the overall period. The Syariah portfolios that pay dividends and have low-B/M are the only Syariah portfolios to dominate the Conventional portfolios, even Big-Cap and High-Beta Conventional portfolios dominate their counterpart. Likewise, during the crisis sub-period, not all portfolios do not dominate each other. Interestingly, Low-Beta Syariah portfolios consistently dominate their counterparts in all periods. This finding shows that the Low-Beta Syariah portfolio has the best performance compared to other portfolios.

Table 6 shows the SD test for the *Kuala Lumpur Composite Index (*KLCI). The test shows that across all periods, the Syariah stocks do not perform any differently from the KLCI. This result shows that screening using Syariah principles does not seem to decrease the performance of portfolio.

Table 8 shows the SD test for Syariah and Conventional stocks in Malaysia. For the overall period (2005-2016), Syariah and Conventional stocks do not dominate each other. For the non-crisis period, we find inconsistent findings. In the pre-crisis sub-period (2005-2008), Conventional stocks dominate Syariah stocks at the second order, but in the post-crisis sub-period, the two portfolios do not dominate each other. In the crisis sub-period (2008-2009), Syariah stocks dominate Conventional stocks in the third-order. This result indicates that in the long run, Syariah stocks have the same performance as Conventional stocks. However, in the crisis period, Syariah stocks outperform Conventional stocks. This finding is slightly different from that of Ho et al. (2014), who found that Syariah stocks outperform Conventional stocks in the long run and in crisis periods. Nonetheless, the findings of this study are consistent with those of Al-Khazali et al. (2014), Ashraf and Muhamad (2014), Mwamba et al. (2016), and Ho et al. (2019). The findings are also consistent with parametric tests, especially the Sharpe and Treynor ratios.

Figure 2 confirms that the Syariah stocks and Conventional stocks have the same performance for the full study period 2005-2016. The line Tj1 increases and decreases at the *horizontal* line with similar amplitude when the return is positive and negative, but never touches the critical point in the SMM table. The lines Tj2 and Tj3 also fluctuate for each return and cumulative probability, but never cross critical points in the SMM table.

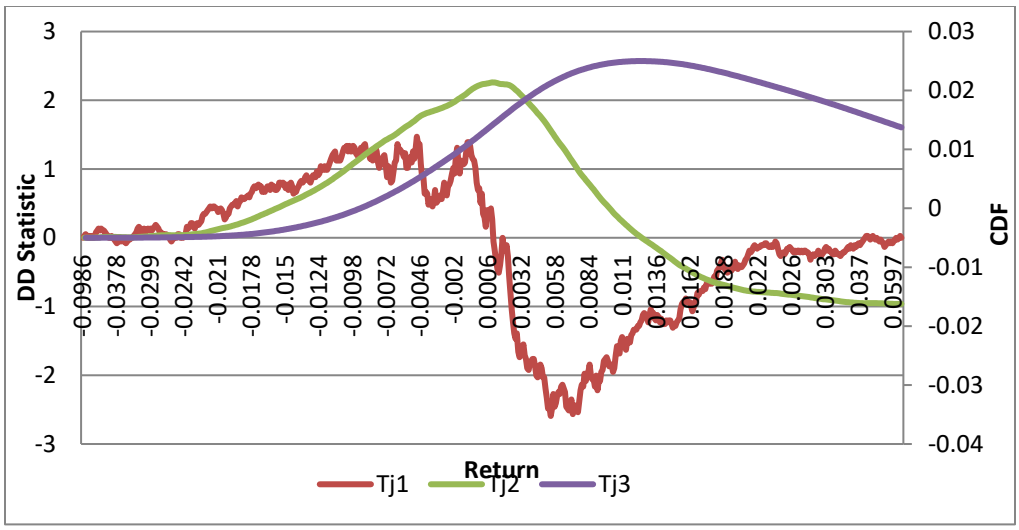

Figure 2 Statistics of DD and CDF of Syariah and Conventional Stocks in Malaysia.

This figure shows the *Davidson Duclos* (*DD statistic*) and *Cumulative Distribution Function* (CDF) of the Syariah and Conventional stocks for the overall period. A negative value for the DD *statistic* shows that Syariah stocks are outperforming Conventional stocks. Tj1 is the DD *statistic* of order 1, Tj2 is the DD *statistic* of order 2, and Tj3 is the DD *statistic* of order 3. The critical points for the *Studentized Maximum Modulus* (SMM) at k10 for significance levels of 10%, 5%, and 1%, are 3,043, 3,254, and 3,691 respectively.

The SD tests for Malaysian stock performance based on firm size, B/M, beta, and dividend policy, shows varying findings. Interestingly, the dominance of the Syariah portfolios during the crisis sub-period only occurrs in the Big-Cap, Low-B/M, and Low-Beta portfolios, and those that did not pay dividends. This finding may be because Syariah stocks with low returns and without dividend payments have low Betas and therefore do not fluctuate too much when a crisis occurs.

5. CONCLUSION

Islamic investment has unique characteristics as it considers not only the risk and return of an asset but also being Syariah compliant. Screening assets raises the general perception that Syariah investment will underperform Conventional investment and the market. This study measured the performance of Syariah and Conventional stocks, comparing their performance during overall, pre-crisis, crisis, and post-crisis periods. For pairwise comparison, both the

pure Syariah and Conventional stocks of Indonesia and Malaysia were selected. It was found that stocks' return distributions in both Indonesia and Malaysia were not normally distributed. As the returns were not normally distributed, it is considered that relying on MV and CAPM approaches might be misleading. Consequently, the *Stochastic Dominance* (SD) approach was used, as it is free from the assumption of a normal distribution. Parametric tests of the Sharpe, Treynor ratio, and Jensen Alpha were used as comparisons.

Based on the pure Syariah and Conventional samples, it was found that Syariah stocks in Indonesia dominated the JSCI for almost all study periods, while in Malaysia, Syariah and KLCI stocks did not show significant differences. These findings prove that screening using Syariah principles does not reduce diversification potential. The SD tests also show that Syariah stocks dominate Conventional stocks in Indonesia for the overall period at first order; this suggests that non-satiated investors could increase their expected wealth as well as their expected utilities by shifting their investment from Conventional stocks to Syariah stocks during the period 2007-2016. The existence of a third-order SD relationship was also found during the non-crisis sub-period; this suggests that non-satiated, risk averting, and DARA investors can maximize their expected utilities, but not their expected wealth by switching from Syariah stocks to Conventional stocks in the normal period. During the crisis period, Indonesian Syariah and Conventional stocks do not dominate each other. In other words, the performance of Syariah stocks is equal to that of Conventional Stocks during the crisis sub-period.

For Malaysia, Syariah stocks dominate Conventional stocks in the crisis sub-period. However, in the pre-crisis sub-period, Conventional stocks dominate Syariah stocks. Malaysian Syariah stocks dominate conventional stocks in the third-order, whereas Conventional stocks dominate Syariah stocks in the second order. However, for the overall period and post-crisis period, Syariah stocks and Conventional stocks do not dominate each other.

Firm size, B/M, Beta, and dividend policy, affect the results of the comparison test for Syariah stocks against Conventional stocks. Investors in Indonesia can choose low beta Syariah stocks to get the best portfolio. Meanwhile, during a crisis, investors in Malaysia can choose Syariah stocks that have low returns, low betas, and that do not pay dividends, in order to obtain the best portfolio.

This study, therefore, concludes that using the *Stochastic Dominance* (SD) approach and a pure sample, Indonesian Syariah stocks outperform Conventional stocks in bull and long run periods. However, in the bear period, Syariah stocks and Conventional stocks do not show any significant differences in performance. On the contrary

Malaysian Syariah stocks and Conventional stocks have the same performance for the long run period. However, in the crisis period, Syariah stocks outperform conventional stocks.

The findings of this study have implications for investors in general and Syariah investors in particular. Investing in Syariah stocks maintains two objectives: compliance to Syariah and earning a competitive return. Syariah investors have an opportunity to recieve higher returns in the bull market (Indonesia) and bear market (Malaysia). General investors can also diversify their portfolios better and increase their *expected wealth* and/or *expected utilities* by shifting their investment to the dominant asset.

This study utilized only the Davidson and Duclos (2000) model with a *Studentized Maximum Modulus* (SMM) table to provide the critical values. Further research should employ *Stochastic Dominance* of the Barret and Donald (2003) model or Schmid Trede (1998) model as a comparison. Use of the *Studentized Maximum Modulus* (SMM) table for critical values with the Davidson and Duclos (2000) model is criticized by Bai et al. (2012) and Al Khazali et al. (2014). In future research it is suggested to use a simulation approach to generate critical values for the DD *statistics*. The data used in this study are from only two countries. Future research could use data from a wider variety of countries.

REFERENCES

Aarif, M.B.H., Rafiq, M.R.I. and Wahid, A.N.M., 2021, Do 'Shariah' indices surpass conventional indices? A study on Dhaka Stock Exchange, *International Journal of Islamic and Middle Eastern Finance and Management*,14, 94-113.

Abdullah, F., Hassan, T. and Mohamed, S., 2007, Investigation of performance of Malaysian Islamic unit fund trusts, comparison with conventional unit trust fund, *Managerial Finance*, 33, 142–153.

Al-Khazali, O., Lean, H.H. and Samet, A., 2014, Do Islamic stock indexes outperform conventional stock indexes? A stochastic dominance approach, *Pacific-Basin Finance Journal*, 28, 29-46.

Anderson, G.,1996, Nonparamtrric test of stochastic dominance in income distribution, *Econometrica*, 64,1183-1193.

Ashraf, D. and Muhammad, N., 2014, Matching perception with the reality- Performance of Islamic equity investments*, Pacific-Basin Finance Journal,* 28, 175–189.

Bai, Z., Li, H., Liu, H., Wong, M.K., 2012, Test statistic for Prospect and Markowitz Stochastic Dominance with Applications, Econometric Journal, 14 (2), 278-303.

Barrett, G.F., and Donald, S.G., 2003, Consistent tests for stochastic

dominance, *Econometrica*, 71, 71-104.

Bishop, J.A., Formly, J.P. and Thistle, P.D., 1992, Convergence of the South and Non-South income distributions, *American Economic Review*, 82, 262–272.

Boo, Y.L., Ee, M.S., Li, B. and Rashid, M., 2016, Islamic or conventional mutual funds: Who has the upper hand? Evidence from Malaysia, *Pacific-Basin Finance Journal*, 42, 183-192.

Davidson, R. and Duclos, J.V., 2000, Statistical inference for stochastic dominance and for the measurement of poverty and inequality, *Econometrica*, 68, 1435-1464.

Elfakhani, S., Hassan, K. and Sidani, Y., 2005, Comparative performance of Islamic versus secular mutual funds, *12th Economic Research Forum Conference in Cairo*, Egypt.

Elton., E.J., Gruber, M.J., Brown, S.J. and Goetzmann, W.N., 2014, *Modern Portfolio Theory and Investment Analysis*, John Wiley and Sons.

Fama, E.F. and French, K.R., 1992, The Cross Section of Expected Stock Returns, *The Journal of Finance*, 47, 427-465.

Falk, H. and Levy, H., 1989, Market reaction to quarterly earning's announcement: a stochastic dominance-based test of market efficiency, *Management Science*, 35, 425-446.

Hadar, J. and Russell, W.R., 1969, Rules for ordering uncertain prospects*, American Economic Review*, 49, 25-34.

Hanoch, G. and Levy, H., 1969, The efficiency analysis of choices involving risk, *Review of Economic Studies,* 36, 335–346.

Hassan, M.K. and Girard, E., 2011, Faith-based ethical investing: The case of dow jones Islamic indexes, *Islamic Economic Studies*, 17, 1-31.

Ho, C.S.F., Rahman, N.A.A., Yusuf, N.H.M. and Zamzamin, Z., 2014, Performance of global Islamic versus conventional share indices: International evidence, *Pacific-Basin Finance Journal*, 28, 110-121.

Ho, C.S.F. and Mohd-Raff, N.E.N., 2019, External and internal determinants of performances of Shariah and non-Shariah compliant firms, *International Journal of Islamic and Middle Eastern Finance and Management*, 12, 236-253.

Jarrow, R.,1986, The relationship between arbitrage and first order stochastic dominance, *Journal of Finance*, 41,915-921.

Kaur, A., Rao, B.L., Singh, H., 1994, Testing for second-order stochastic dominance of two distribution, *Econometric Theory*, 10, 849-866

Lean, H.H., Wong, W.K., & Zhang, X. ,2008, The sizes and powers of some stochastic dominance tests: A Monte Carlo study for correlated and heteroskedastic distributions, *Math. Comput. Simul*., 79, 30-48.

Lean, H.H., Lien, D. and Wong, W.K., 2010, Futures versus stocks: a stochastic dominance study in Malaysian markets, *Advance in Investment Analysis and Portfolio Management*., 4, 49–80.

Levy, H., 1992, Stochastic Dominance and Expected Utility: Survey and analysis, *Management Sciences*, 38,555-593.

Linton, O., Maasoumi, E., Whang, Y.J., 2005, Consistent testing for stochastic dominance under general sampling schemes, *Review of Economic Studies*, 72, 735-765.

McFadden, D.,1989, Testing for Stochastic Dominance. In: Fomby, T., (Eds.), Studies in the Economics of Uncertainty, *Springer Verlag*, New York, 113-132.

McGowan, C. and Junaina, M., 2010, The theoretical impact of the listing of Syariah approved stocks on stock price and trading volume, *International Business & Economics Research Journal*, 9(3), 11-19.

Mwamba, J.W.M., Hammoudeh, S. and Gupta, R., 2016, Financial tail risks in conventional and Islamic stock market: A comparative analysis, *Pacific-Basin Finance Journal*, 42, 60-82.

Temper, J., 1991, The cost of social criteria, *Pensions and Investment*, May 13, 34.

Sauer, D.A., 1997, The Impact of social responsibility screens of investment performance: evidence from domini 400 social index and domini equity mutual fund, *Review Finance Economic*, 6, 137-149.

Schmid, F. and Trede, M., 1998, A kolmogorov-type test for second-order stochastic dominance, *Statistic and Probability Letters*, 37, 183-193.

Stoline, M.R. and Ury, H.K., 1979, Tables of the studentized maximum modulus distribution and application to multiple comparisons among means, *Technometrics,* 21, 87-93.

Strong, R.A., 2003, *Portfolio Construction, Management and Protection*, Thomson South-Western, 3ed.

Temper, J., 1991, The cost of social criteria, *Pensions and Investment*, May 13, 34.

Tse, Y.K. and Zhang, X., 2004, A Monte Carlo investigation of some tests for stochastic dominance, *Journal of Statistical Computation and Simulation*, 74, 361–378.

Whitmore, G.A., 1970, Third-Degree Stochastic Dominance, *American Economic Review*, 60, 457-459.

Wong, W.K., Phoon, K.F. and Lean, H.H., 2008, Stochastic dominance analysis of Asian hedge funds, *Pacific-Basin Finance Journal*, 16, 204–223.