Sharīʿah and SRI Portfolio Performance in the UK: Effect of Oil Price Decline

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Abstract

In accordance with decline in oil price and portfolio performance, this study attempts to examine the effect of oil price on Sharīʿah *portfolio performance, which Socially Responsible Investment (SRI) portfolio is also constructed as a comparison. This study is different from other empirical studies which use stock index as proxy for stock market returns since this study constructs its own* Sharīʿah *and SRI portfolio investment in the UK taking the companies included in FTSE 100 from 2008 up to 2015.*

This study shows that the decline in oil price has higher impact on Sharīʿah *portfolio compared to SRI portfolio, which is shown by lower value of Sharpe's ratio and Treynor ratio. On the other hand,* Sharīʿah *portfolio has higher beta and Jensen's alpha compared to SRI portfolio. It provides insight to the regulatory body and scholars to reconsider the* Sharīʿah *screening criteria in order for* Sharīʿah *portfolio to be able to have better performance and more sustainable in the long run in order to be able to overcome different type of crisis.*

Keywords: oil price, portfolio, Sharīʿah, SRI, performance

Introduction

2014 was marked as a crisis for countries whose economy depends highly on energy sector, especially oil commodities since there has been a sharp decline starting on June 2014, which continued until early 2015 (Bloomberg, 2016). The oil price has been successfully rebounded on February and May 2015 although it decreased again in June 2015 until the present days. One of countries that was affected by the decline in oil price is United Kingdom since oil and gas sector plays

an important role in the UK's economy. Oil and gas contributes to 70% of energy needed by the UK for running the electricity, heating, and all the energy-based activities, without neglecting the high supply chain in the oil and gas companies itself ranging from the reservoirs, wells, facilities, marine and subsea, and support services which provides employment for 400 thousand people in the UK (HMG, 2013; EY, 2016). Considering that the decline in oil price affected the revenue of oil and gas companies, it would be reflected in companies' share price and decreased investors' portfolio.

Regarding with the portfolio investment, the development of Islamic finance has introduced the requirements for Islamic portfolio, which is called as Sharī'ah screening criteria established by scholars in each country. The screening criteria determines stocks which categorized as Sharī'ah-compliant stocks that investors who consider about Sharī'ah-compliance can invest in those stocks. The screening criteria consists of two different requirements, which are qualitative and quantitative criteria. As for the Sharī'ah-compliance qualitative criteria, oil and gas companies do not contrast with the Sharī'ah qualitative criteria which make those companies can be included in Islamic portfolio as long as they also fulfil the Sharī'ah quantitative criteria.

Other than the oil and gas companies which are directly affected by the changes in oil price, companies which heavily rely on oil and gas such as transportation and distribution companies might be indirectly affected by oil price changes. Some of these companies which might be included in Islamic portfolio will have an effect on the Islamic portfolio performance.

In accordance with decline in oil price and portfolio performance, this study attempts to examine the effect of oil price on Sharī'ah portfolio performance. In order to be able to provide better view regarding the Sharī'ah portfolio performance, Socially Responsible Investment (SRI) portfolio is also constructed as a comparison. This study is different from other empirical studies which use stock index as proxy for stock market returns since this study constructs its own Sharī'ah and SRI portfolio investment in the UK taking the companies included in FTSE 100 from 2008 up to 2015. After constructing the first portfolio in 2007, the portfolio composition is evaluated annually to obtain portfolio which fulfils requirement of Sharī'ah screening criteria and SRI criteria. Having the portfolio composition for every year, portfolio performance is examined using risk-adjusted performance, which are Sharpe ratio, Treynor ratio, and Jensen's alpha. In addition, macroeconomic variables, including oil price, are examined in order to provide information regarding their effects on portfolio performance.

Literature Review

This study attempts to evaluate the effect of oil price on capital market performance, specifically stock returns, which many previous empirical studies have conducted and they found different findings whether there is an effect or not and whether the effect is positive or negative. Studies conducted by Ajmi, *et al*. (2014) in MENA countries from 2007 until 2012, Narayan and Gupta (2015) for US stock markets in 150 years, Huang, *et al*. (2015) in China, Demirer, *et al*. (2015) in Gulf Arab countries, and Xu (2015) in the UK find that there is relationship between oil price changes and stock market returns whether the relationship is linear or nonlinear. In different sample and time frame, Park and Ratti (2007) used data from the US and 13 European countries from January 1986 until December 2005 finds that there is positive response of real stock return to an oil price. Using Norwegian data conducted with VAR methodology, Bjornland (2008) finds that there is positive effect of oil price on stock market. In addition, using US data with different approach, Tsai (2015) and Salisu and Oloko (2015) find that US stock returns respond positively to the changes in oil price and there is bidirectional between oil and stock markets. Using data from China and employing Extreme Value Theory, Chen and Lv (2015) finds that there is positive dependence among Chinese stock market, world oil price, and global economy cycle.

On the other hand, using data from Canada, Germany, US, and UK, Jimenez-Rodriguez (2014) find that there is negative response for real stock returns due to the oil price changes. In addition, Richard and Philip (2015) and Kang, *et al*. (2015) also find that there is negative relationship between oil price changes and stock market return in Nigeria and US economy.

Other than existence of relationship and the direction of the relationship between oil price changes and stock market return, other studies find mixed effects or there is no relationship of those two economic activities. Using data from China, India, and Russia, Fang and You (2015) find that the relationship is mixed in those three countries since those markets are partially integrated with other stock markets and oil price changes. Looking at the industry level in China, Zhu, et al. (2015) find that the result is different for different industries in different time period due to the structural breaks and asymmetric effects of oil price changes. Using different point of view, that is market condition, Jammazi and Nguyen (2015) find that the effect of oil price changes is different in bull and bear market condition which suggests that stock market in bear period is less affected by oil price changes than in bull period.

The similar result is also found by Liao, et al. (2016), which suggests that there is no significant effect in bear period, while only decrease in oil price that increases stock market return. On the other hand, studies by Siddiqui and Seth (2015), Bastianin, et al. (2015), Ghosh and Kanjilal (2016) and Reboredo and Ugolini (2016) suggest that there is no relationship between oil price changes and stock market return using different sample and time period for the observation. The empirical studies suggest that the findings regarding the relationship between oil price changes and stock market returns are different based on the countries, time period, industry, and market condition whether it is in bear or bull period.

Data and Methodology

This study employs data from companies listed in London Stock Exchange and included in FTSE 100, which the data consists of monthly adjusted stock prices, annual UK interbank 1-month as proxy for risk-free rate of return, monthly FTSE 100 price index as the market return. In addition, some data stated in income statement and balance are also generated from Datastream, while data for annual interest income and expense are taken from Bloomberg.

The first portfolio construction employs monthly stock price from January 1997 up to December 2007, which is the starting period of the portfolio investment. As for the Sharīʿah portfolio optimization, the constraints are constructed from information in income statement and balance sheet, while there is no quantitative constraints for SRI portfolio construction. Both portfolio compositions are evaluated annually using information from balance sheet and income statement, also from the end of the year stock price from 2008 up to 2015 to examine the portfolio performance.

Islamic and SRI Screening Criteria

Before constructing the portfolio, the first step to do is to select companies that fulfil criteria of Sharīʿah qualitative screening, which consists of prohibiting companies involved in money-lending transactions, production, distribution, and/or profiting from alcohol, pork meat and non-halal meat, tobacco, gambling, weapons, music, entertainment, hotels, and airlines which serve alcohol on their premises. Having this set of Sharīʿah-compliant companies, their historical risk and return from 1997 until 2007 are simulated annually using Markowitz portfolio theory combining with some constraints related to Sharīʿah quantitative screening consisting of liquidity ratio, interest ratio, debt ratio, and non-permissible ratio to have the optimum group of stocks which could be invested as a set of portfolio. The objective of annual simulation is to obtain the optimum portfolio due to there might be a

change in financial condition of the companies, which is used as base in the Sharīʿah quantitative screening, and cause the companies to be no longer Sharīʿah-compliant companies.

Along with the construction of Sharīʿah portfolio, it has been mentioned that Socially Responsible Investment (SRI) is also constructed using the similar process with Sharīʿah portfolio with difference in the screening criteria since SRI has its own criteria of qualitative screening and it does not have quantitative criteria. The investment criteria for SRI is divided into positive and negative, which the positive screening is that companies with strong labour relations and workplace conditions, concern about sustainability, employment diversity, renewable energy, biotechnology, community involvement, involved in recycling, waste reduction, and environmental clean-up. As for the negative screening, investors must not invest in companies involving in tobacco, alcohol, gambling, defence/weapons, marketing scandals, human rights violation, animal testing, irresponsible foreign operations, antitrust violations, consumer fraud, development of genetic engineering for agricultural applications, interest-based financial institutions, and pork producers. The stocks composing SRI portfolio might be different from Sharīʿah portfolio since SRI portfolio does not allow companies that is not responsible to the environment such as oil and gas companies, due to their exploration which might damage the environment, to be included in SRI portfolio resulting in different portfolio performance.

Portfolio Optimization

Mean-variance portfolio optimization was introduced by Markowitz (1952), which explained that investor would choose portfolio with highest mean or expected return and the lowest variance. The objective of this optimization is to have minimum variance with certain value of expected return. Equations 1 to 4 provides the objective and constraints for the portfolio optimization:

$$Min\ Variance = \sum_{i=1}^{n} \sum_{j=1}^{n} X_i X_j \sigma_{ij} \tag{1}$$

Subject to:

$$Expected\ return = \sum_{i=1}^{n} X_i \mu_i = targeted \tag{1}$$

$$\sum_{i=1}^{n} X_i = 1 \tag{3}$$

$$X_i \geq 0, \qquad i = 1, 2, 3, \dots, n \tag{4}$$

where X_i is weight of asset i, μ_i is the return of asset i, and σ_{ij} is covariance between asset i and asset j.

This study extends the constraints regarding Sharīʿah-compliance to be imposed in the portfolio optimization by following the extension developed by Derigs & Marzban (2009). Equation 5 to 9 provides the additional constraints which are imposed in the portfolio optimization:

$$r_i(g) \leq T(g), \qquad r_i = financial\ ratio, \quad T = permissible\ threshold \qquad (5)$$
$$X_i = 0 \text{ if } r_i(g) > T(g) \qquad (6)$$
$$z_i = \begin{cases} 1\ if\ it\ is\ compliant \\ 0\ otherwise \end{cases} \qquad (7)$$

Thus, the additional constraints are:
$$X_i \leq z_i, \qquad\qquad i = 1, 2, 3, \dots, n \qquad (8)$$
$$r_i(g).z_i \leq T(g), \quad i = 1, 2, 3, \dots, n \qquad (9)$$

The additional constraints being imposed in the Sharīʿah portfolio are related with financial ratios that need to be fulfilled by companies to be categorized as Sharīʿah-compliant companies. Equation 10 to 14 provides the formula and the threshold value of the financial ratios:

$$Liquidity\ ratio = \frac{Cash + Account\ receivables}{Total\ assets} = 50\% \qquad (10)$$
$$Interest\ ratio\ (1) = \frac{Cash\ \&\ short-term\ investment}{Total\ assets} = 33\% \qquad (11)$$
$$Interest\ ratio\ (2) = \frac{Total\ interest\ expense}{Total\ revenue} = 5\% \qquad (12)$$
$$Debt\ ratio = \frac{Total\ debt}{Total\ assets} = 33\% \qquad (13)$$
$$Non-permissible\ income\ ratio = \frac{Total\ interest\ income}{Total\ revenue} = 5\% \qquad (14)$$

Having the constraints and value of expected return being set, many portfolios can be constructed to develop minimum-variance set line. The upper part of the minimum-variance set is called as efficient frontier which all portfolios lie in this line have higher expected return with the same risk compared to portfolios in bottom part of the minimum-variance set line. In order to obtain the optimal portfolio, indifference curve which provides the information regarding investors' risk appetite is drawn. The tangency point between both curves is the optimal portfolio which the performance will be evaluated.

Portfolio Performance

Obtaining the optimum portfolio for each year from 2008 up to 2015, the performance of portfolio is evaluated annually using risk-adjusted return portfolio

performance measurements such as Sharpe's ratio, Treynor ratio, and Jensen's alpha (Bodie *et al.*, 2011). Sharpe's ratio indicates that portfolio with higher Sharpe's ratio has higher excess return by having the same risk, Treynor ratio indicates that portfolio with higher Treynor ratio has higher excess return by having the same systematic risk, and Jensen's alpha indicates that portfolio with positive Jensen's alpha generates abnormal return compared to return calculated using Capital Asset Pricing Model (CAPM) assuming that CAPM holds. The market return is using the return of FTSE 100 price index and the risk-free rate of return is using the UK interbank 1-month. Equation 15 to 19 provides the formula of the ratios:

$$Sharpe's\ ratio = \frac{r_p - r_f}{\sigma_p} \tag{3.16}$$

$$Treynor\ ratio = \frac{r_p - r_f}{\beta_p} \tag{3.17}$$

$$Jensen's\ alpha = \alpha_p = r_p - \left[r_f + \beta_p(r_m - r_f)\right] \tag{3.18}$$

$$\beta_p = \frac{\sigma_{i,M}}{\sigma_M^2} \tag{3.19}$$

where r_p is the return of portfolio, r_f is risk-free rate of return, σ_p is standard deviation of portfolio return, β_p is systematic risk (beta) of portfolio, $\sigma_{i,M}$ is covariance between return of asset *i* and market, and σ_M^2 is variance of market return.

Time-series Analysis

Having obtained both SRI and Sharī'ah portfolios performance for five years, the existence of oil price effect can be examined by doing time series regression analysis for each portfolio. The time series regression utilizes crude oil price as the independent variable together with other macroeconomic variables as control variables and portfolio performance as dependent variable to examine the effect and relationship between oil price and portfolio performance. This study expects that there is significant difference in portfolio performance before and after the oil price decline, also oil price decline has significant effect on both portfolios' performance.

Table 1 provides the variables used in this regression analysis in order to examine the effect of macroeconomic variables on the return of portfolio:

Table -1: Macroeconomic Variables

Variable	Definition	Calculation
rshar	Sharī'ah portfolio return	$rshar = \sum_{i=1}^{n} X_i \mu_i$
rsri	SRI portfolio return	$rsri = \sum_{i=1}^{n} X_i \mu_i$
dInd	Change in Industrial production index	$dInd_t = Ind_t - Ind_{t-1}$
dExch	Change in Exchange rate (£/\$)	$dExch_t = Exch_t - Exch_{t-1}$
dUnemp	Change in Unemployment rate	$dUnemp_t = (Unemp_t - Unemp_{t-1})/100$
dTerm	Change in Term structure	$dTerm_t = \dfrac{(LTGB_t - Tbill_t) - (LTGB_{t-1} - Tbill_{t-1})}{12x100}$
dInflation	Change in Inflation	$dInflation_t = \dfrac{(CPI_t - CPI_{t-1})}{CPI_{t-1}} - \dfrac{(CPI_{t-1} - CPI_{t-2})}{CPI_{t-2}}$
dM1	Change in Money supply	$dM1_t = \ln(M1)_t - \ln(M1)_{t-1}$
dOil	Change in Crude oil price	$dOil_t = \ln(Oil)_t - \ln(Oil)_{t-1}$

Results and Discussion

Sharī'ah and SRI Screening Criteria

In this section, this study begins by explaining the sample selection for portfolio construction. From 101 companies included in FTSE 100, there will be only 15 stocks selected to be constructed as the portfolio. The first screening is employing qualitative screening for each Sharī'ah and SRI set of stocks based on FTSE Sharī'ah Global Equity Index Series Ground Rules and FTSE4Good Index Inclusion Criteria, which companies classified as having risk of level 3 for environmental management are excluded. The next screening is related with data availability, which companies who do not have stock price data from January 1997 are excluded resulting that there are 21 and 50 stocks for each Sharī'ah and SRI are selected. The last step is by dividing the stocks for Sharī'ah portfolio into three parts based on their capitalisation and select 5 stocks from each part. As for stocks to construct SRI portfolio, companies which are classified as risk level 1 are selected first followed by companies in risk level 2. Table 2 provides the list of companies included to construct the portfolios:

Table-2: List of Stocks

	Sharī'ah Stocks			SRI Stocks	
No	Company Name	Code	No	Company Name	Code
1	Weir Group	WEIR	1	Ashtead Group	AHT
2	GKN	GKN	2	Babcock International	BAB
3	Meggitt	MGGT	3	Bunzl	BNZL
4	Bunzl	BNZL	4	Sage Group	SGE
5	Persimmon	PSN	5	G4S	GFS
6	Shire	SHP	6	ITV	ITV
7	Capita	CPI	7	Capita	CPI
8	Tullow Oil	TLW	8	WPP	WPP
9	Antofagasta	ANTO	9	Vodafone Group	VOD
10	Smith & Nephew	SN.	10	IMI	IMI
11	Royal Dutch Shell B	RDSB	11	Travis Perkins	TPK
12	Astrazeneca	AZN	12	Barratt Developments	BDEV
13	BG Group	BG.	13	Weir Group	WEIR
14	Anglo American	AAL	14	GKN	GKN
15	Rio Tinto	RIO	15	Persimmon	PSN

Portfolio Optimization and Composition

The portfolio is constructed by calculating the expected return and covariance matrix based on the historical stock prices, which the first portfolio is constructed using historical data from January 1997 up to December 2007. Having the expected return and covariance matrix of the data, also the constraints being imposed, minimum-variance set can be developed. The next step is to develop indifference curve which depicts the utility function of the investors.

$$U = E(r_p) - 0.5A\sigma_p^2 \tag{12}$$

where U is the utility value, E(rp) is expected return of portfolio, A is risk aversion parameter, and σ_p^2 is variance of portfolio. This study employs risk aversion parameter of 6 for both portfolios, which the value is determined after series of simulations to obtain optimum value of 6.

Having the efficient frontier and indifference curve, the tangency point is obtained which reflects the optimum portfolio. After constructing the first portfolio

at the end of 2007, the portfolio is evaluated annually since the financial ratios of the companies included in the first portfolio might change due to changes in the operational activities of the companies. Having the same procedure to construct the portfolio, Table 3 provides the information regarding portfolio composition from end of 2007 to end of 2015.

Table-3: Annual Portfolio Composition

SHARĪ'AH	2007	2008	2009	2010	2011	2012	2013	2014
WEIR	13.14%		1.92%	7.70%	7.20%		4.04%	1.37%
BNZL			5.69%		4.90%	12.23%	12.02%	16.43%
PSN	8.11%	9.58%	2.10%		21.49%	4.88%	5.02%	6.49%
SHP	19.32%		18.40%	16.99%		19.51%	20.71%	21.59%
TLW						13.53%	8.92%	
ANTO				20.10%	13.35%		6.59%	6.60%
SN.			13.69%	9.40%	7.57%	9.48%	7.28%	11.20%
AZN	2.18%	21.19%	4.95%	4.53%	7.27%	12.51%	8.76%	16.73%
BG.	57.26%	68.68%	51.02%	41.27%	38.22%	26.44%	26.65%	19.60%
AAL		0.55%						
RIO			2.23%			1.42%		
SRI	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
AHT	2.92%	2.23%	3.23%	3.85%	4.17%	6.03%	5.82%	4.20%
BAB	23.35%	26.07%	25.39%	19.31%	20.54%	24.12%	22.96%	18.26%
BNZL	11.30%	14.91%	10.70%	6.23%	9.60%	11.82%	14.41%	20.76%
GFS	11.43%	9.69%	12.71%	13.56%	13.29%	10.97%	8.74%	10.86%
CPI	28.98%	36.07%	34.28%	31.21%	28.38%	29.53%	27.19%	22.18%
VOD	14.51%	11.02%	9.69%	10.78%	10.63%	7.92%	12.28%	15.62%
WEIR	1.13%			15.05%	13.39%	8.31%	4.82%	2.17%
PSN	6.36%		3.99%			1.30%	3.79%	5.95%

Table 3 shows the portfolio composition for both Sharī'ah and SRI portfolio for every year, which provides information that Sharī'ah portfolio is more dynamic regarding with companies selected based on mean-variance portfolio optimization. Sharī'ah portfolio begins with only 5 companies included in the portfolio, but the number of companies increases to 7 companies at the end of year 2014. On the other hand, SRI portfolio has relatively stable number of companies between 6, 7, 8 companies for every year. In addition, Figure 1 and 2 depicts more clear portfolio composition and its changes from year to year.

Figure-1: Portfolio Composition – Sharī'ah
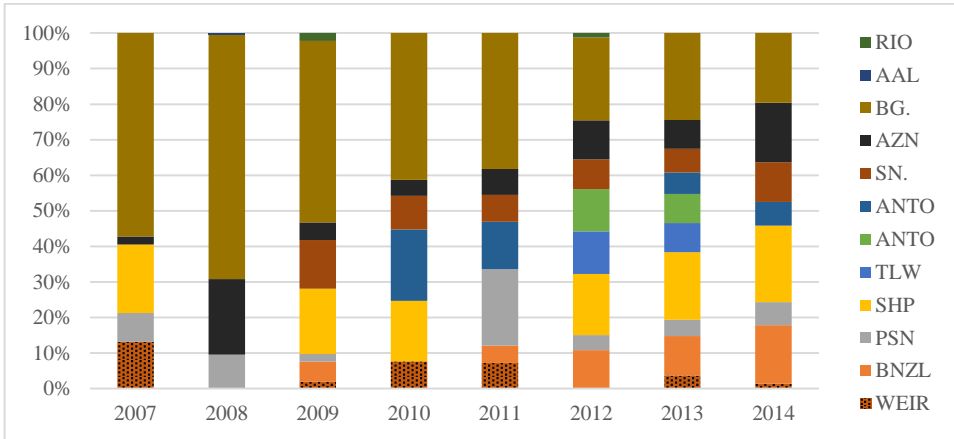
Figure 1 shows that the proportion of BG Group (BG.) decreases from year to year, while the proportion of Astrazeneca (AZN) and Bunzl (BNZL) increases from year to year. Other companies experience different type of pattern, such as Shire (SHP) has relatively stable proportion from year to year.

Figure-2: Portfolio Composition – SRI
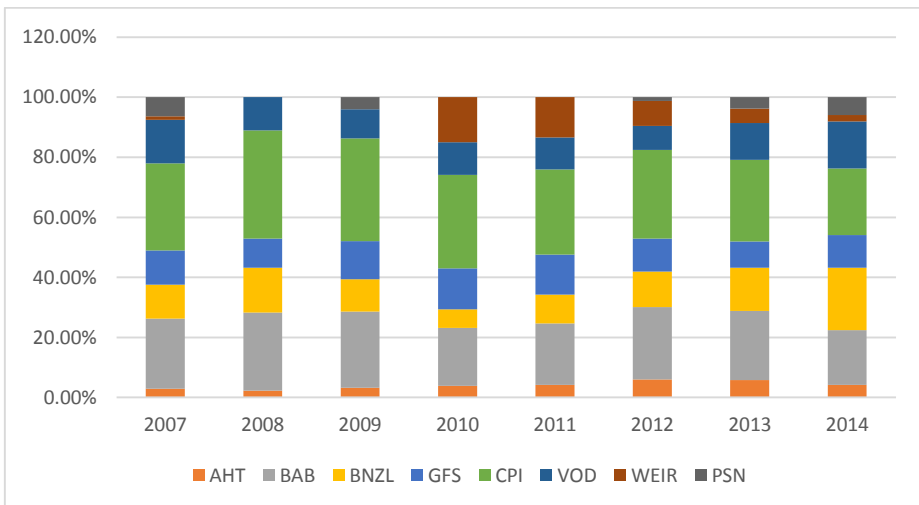
Figure 2 provides information that SRI portfolio is dominated by Babcock International (BAB) and Capita (CPI) from 2007 to 2014. The smallest proportion is Ashtead Group (AHT) accounted for around 2-4% every year.

Portfolio Performance Evaluation

Having the portfolio composition for Sharī'ah and SRI from 2007 to 2014, the portfolio performance could be examined a year after the first investment and the years after that is 2008 until 2015. Figure 3 depicts that the movement of return for Sharī'ah and SRI portfolio relatively align to each other although it has different direction for certain times such as in the late 2009, early 2013, and late 2014. Considering the monthly return of both portfolio, portfolio performance such as portfolio beta, Sharpe's ratio, Treynor ratio, and Jensen's alpha are calculated and provided in Table 4.

Figure-3: Sharī'ah and SRI Portfolio Monthly Returns
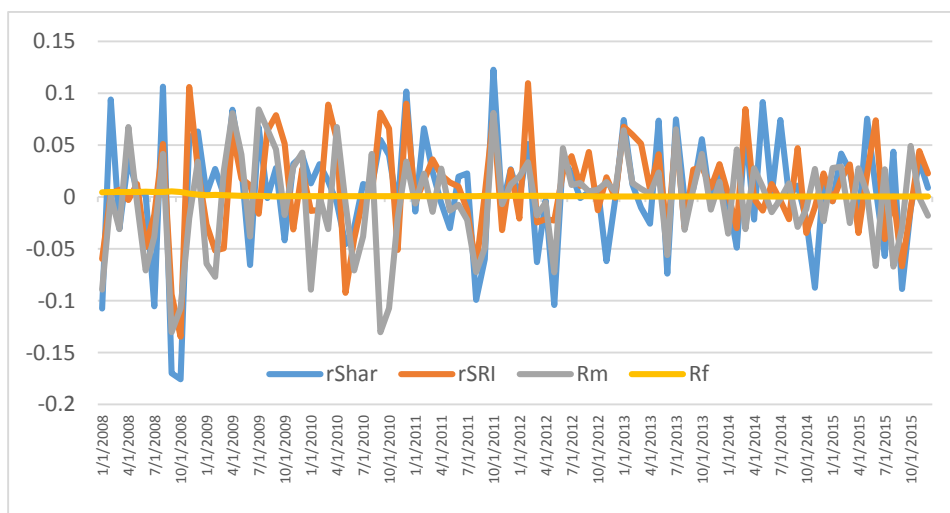
Table 4 provides the portfolio beta, expected return, standard deviation, Sharpe's ratio, Treynor ratio, and Jensen's alpha for both portfolios and from 2008 to 2015. Portfolio beta for Sharī'ah and SRI portfolio in 2014 and 2015 is negative indicating that both portfolio have negative and different direction from market portfolio or FTSE 100 price index. In addition, the expected return of both portfolios have negative value in 2008. In order to have clear view regarding the performance of both portfolio, Figure 4 to 7 depict the movement of both portfolio performances.

Table-4: Portfolio Performance

Sharī'ah	2008	2009	2010	2011	2012	2013	2014	2015
Beta	1.3666	0.4500	0.6089	1.3117	1.2621	1.1672	-0.8625	-0.1758
Expected return	-0.0185	0.0170	0.0157	0.0053	-0.0093	0.0174	0.0065	0.0044
Standard Deviation	0.0991	0.0417	0.0391	0.0572	0.0450	0.0462	0.0515	0.0457
Sharpe's Ratio	-0.2291	0.3918	0.3890	0.0824	-0.2171	0.3677	0.1190	0.0873
Treynor Ratio	-0.0166	0.0363	0.0250	0.0036	-0.0077	0.0146	-0.0071	-0.0227
Jensen's Alpha	0.0228	0.0085	0.0104	0.0108	-0.0156	0.0036	0.0041	0.0033
SRI	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Beta	0.7712	0.3958	0.9028	0.7616	0.7084	0.8433	-0.8239	-0.3777
Expected return	-0.0125	0.0115	0.0144	0.0073	0.0119	0.0263	0.0047	0.0046
Standard Deviation	0.0647	0.0462	0.0608	0.0362	0.0393	0.0343	0.0339	0.0392
Sharpe's Ratio	-0.2578	0.2346	0.2296	0.1855	0.2899	0.7569	0.1270	0.1071
Treynor Ratio	-0.0216	0.0274	0.0155	0.0088	0.0161	0.0307	-0.0052	-0.0111
Jensen's Alpha	0.0090	0.0039	0.0068	0.0102	0.0081	0.0163	0.0024	0.0027

Figure 4 shows that Sharī'ah portfolio always has higher portfolio compared to SRI portfolio although it has lower beta in 2010 and 2014, which indicates that in those years the Sharī'ah portfolio has lower correlation with market portfolio compared to SRI portfolio.

Regarding with the next portfolio performance, Figure 6 depicts the movement of Treynor ratio for both portfolio, which shows that Sharī'ah portfolio has better performance in 2008, 2009, and 2010. On the other hand, the performance is lower compared to SRI portfolio from 2011 to 2015. This performance indicates that Sharī'ah portfolio has lower excess return by having the same systematic risk with SRI portfolio.

The last portfolio performance is by calculating Jensen's alpha for both portfolio, which is depicted in Figure 7. Figure 7 shows that Sharī'ah portfolio has higher abnormal return compared to SRI portfolio in 2008 up to 2011 and 2014 to 2015, but Sharī'ah portfolio has lower Jensen's alpha in 2012 and 2013. It indicates that Sharī'ah portfolio is able to generate higher abnormal return compared to SRI portfolio.

In overall, Sharīʿah portfolio performs better in some years and has lower performance in other years. The next section discusses the effect of macroeconomic variables in return of portfolio.

Effect of Macroeconomic Variables

The effect of macroeconomic variables in return of portfolio is examined by developing multiple regression using Arbitrage Pricing Theory (APT) with ordinary least square procedure by imposing different macroeconomic variables to examine the appropriate variables which have significant effect on portfolio return (Brooks, 2002). Table 5 provides the regression result for both portfolio and macroeconomic variables which have effect on each portfolio return.

Figure-4: Sharīʿah and SRI Portfolio Beta
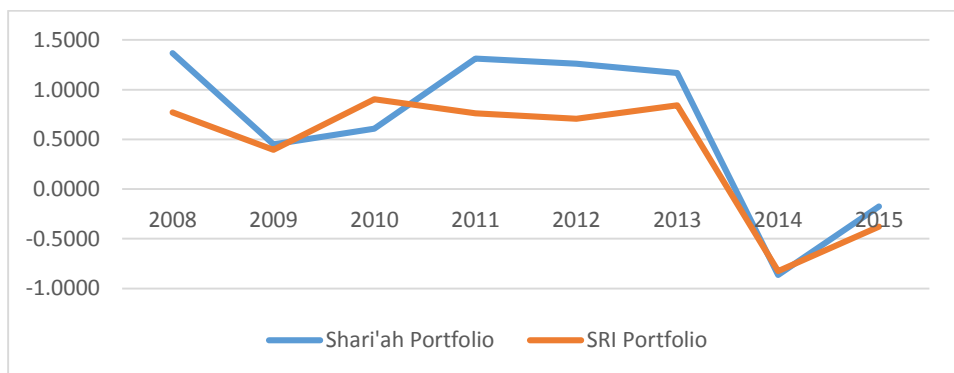
Figure 5 depicts the Sharpe's ratio movement for Sharīʿah and SRI portfolio from 2008 to 2015, which shows that Sharīʿah portfolio has better performance in 2008, 2009, and 2010 and experience lower performance compared to SRI portfolio from 2011 onwards. It indicates that Sharīʿah portfolio has higher excess return given the same risk with SRI portfolio. Figure 5 also shows that Sharīʿah portfolio has negative Sharpe's ratio in 2008 and 2012.

Figure-5: Sharī'ah and SRI Portfolio Sharpe's Ratio
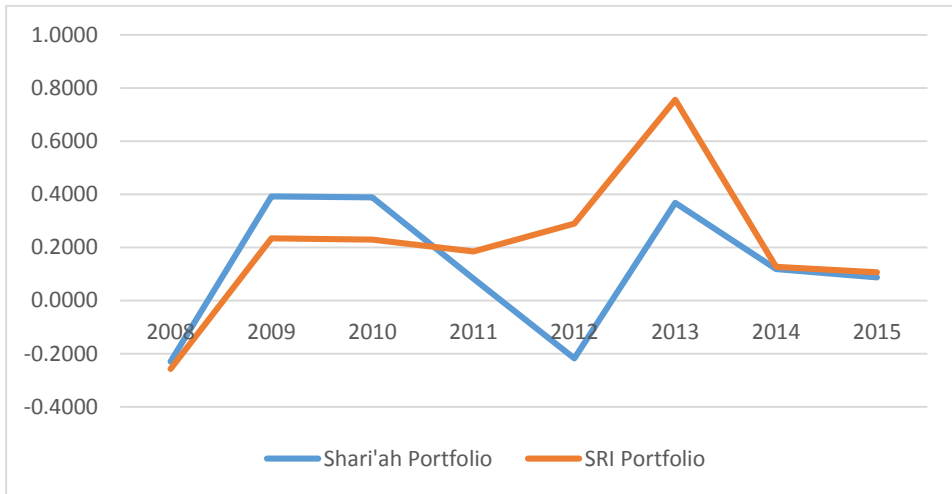
Figure-6: Sharī'ah and SRI Portfolio Treynor Ratio
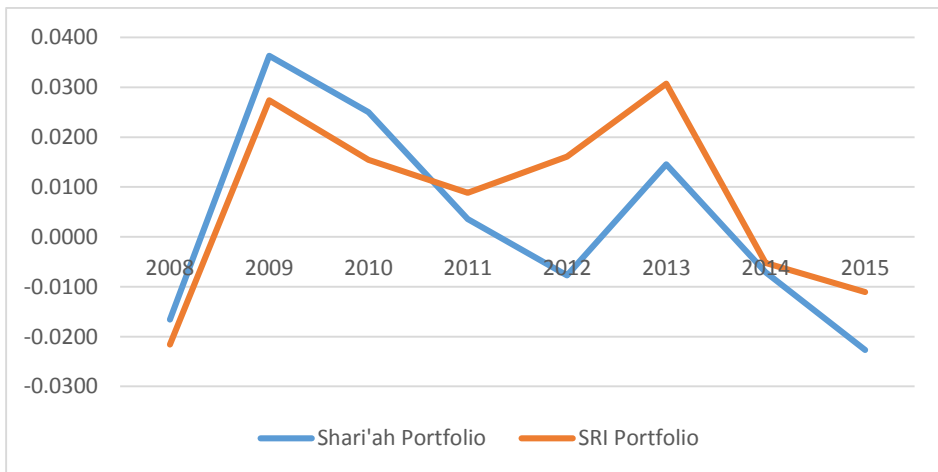
Figure-7: Sharīʿah and SRI Portfolio Jensen's Alpha
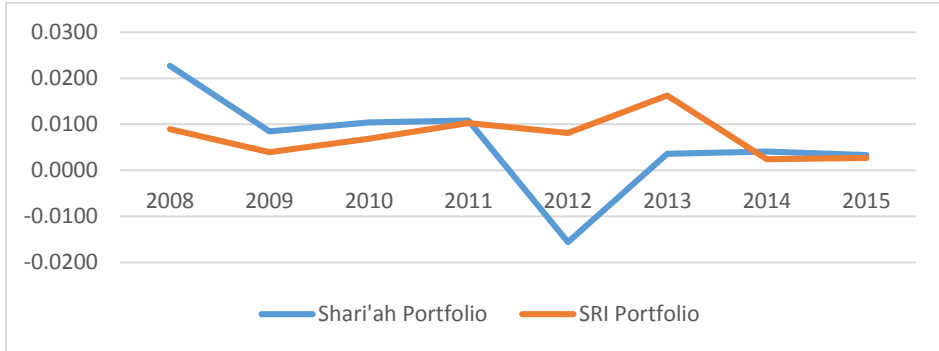
Table-5: Regression Results

Dependent variable	Sharīʿah portfolio return	SRI portfolio return
Constant	0.0081	0.0090**
dOil	0.1507***	0.0991**
dInd	-0.8694	
dM1	-0.6682*	
R-squared	0.1376	0.0472
Adj R-squared	0.1095	0.0371
Prob(F-stat)	0.0034	0.0334
Durbin-Watson stat	2.4960	2.1623

Note: ***, **, * show significant in 1%, 5%, and 10% respectively

The regression result shows that return of Sharīʿah portfolio is affected by change in crude oil price at time *t* and change in money supply at time *t*, while return of SRI portfolio is only affected by change in crude oil price at time *t*. The effect of change in oil price for both portfolio is positive indicating that higher oil price leads to higher portfolio return, while lower oil price leads to lower portfolio return. As for the effect of change in money supply, it has negative effect meaning that higher amount of money supply leads to lower Sharīʿah portfolio return and otherwise.

Discussion

Relating portfolio performance with the decline in oil price in 2014 and 2015, the result shows that Sharīʿah portfolio has negative portfolio beta in 2014 and 2015

meaning that Sharī'ah portfolio in this study moves in the different direction from market portfolio. It could be a positive signal that holding Sharī'ah portfolio could give unexpected good return which is supported by higher abnormal return generated by Sharī'ah portfolio in 2014 and 2015 shown in Figure 7.

Looking at the Sharpe's ratio and Treynor ratio, Sharī'ah portfolio has lower performance for both ratios compared to SRI portfolio in 2014 and 2015 when there is decline in oil price. It could be because Sharī'ah portfolio contains companies in oil and gas sector, while SRI portfolio does not allow oil and gas companies to be included in its portfolio due to the issue with environmental sustainability. The effect of oil price is further supported by the regression result, which shows that change in crude oil price has higher and more significant effect on Sharī'ah portfolio return indicated by higher coefficient and higher probability of significant compared to the effect on SRI portfolio return.

To compare the performance of Sharī'ah portfolio in different type of crisis, the portfolio performance in 2008 and 2009, shown in Figure 5 to 7, when there is global financial crisis shows that this portfolio performs better than SRI portfolio which could be due to the stocks composed the portfolio where Sharī'ah portfolio does not allow financial services to be included in the portfolio selection.

Conclusion

Relating Islamic portfolio with sustainability, it is perceived that Islamic finance is more prone to financial crisis than conventional finance due to the basic prohibition of *ribā* and *gharar* in the Islamic financial activity also prohibition of derivatives' products (Smolo & Mirakhor, 2010; Moeljadi, 2012). As a result, when financial crisis is caused by financial service companies, Islamic portfolio, that excludes these companies from portfolio selection, might result in better performance compared to other portfolios. On the other hand, different type of crisis might have different effect on the Islamic portfolio performance.

This study shows that the decline in oil price has higher impact on Sharī'ah portfolio compared to SRI portfolio, which is shown by lower value of Sharpe's ratio and Treynor ratio indicating that Sharī'ah portfolio has lower excess return by having the same risk with SRI portfolio. On the other hand, the portfolio beta and Jensen's alpha of Sharī'ah portfolio indicates that Sharī'ah portfolio has higher probability in generating higher abnormal return meaning that the portfolio works in less efficient manner due to the ability to speculate and generate higher abnormal return.

It implies that different type of crisis has different effect on Sharīʿah portfolio return, which decline in oil price has negative effect compared to financial crisis in 2008. It could be due to the stock selection in Sharīʿah portfolio which does not allow financial service companies, while it allows oil and gas companies to be included in Sharīʿah portfolio. On the other hand, SRI portfolio, which considers about environmental and sustainability, has better performance in facing oil price decline compared to global financial crisis which could be due to stock selection to be included in SRI portfolio.

It provides insight to the regulatory body and scholars to reconsider the Sharīʿah screening criteria in order for Sharīʿah portfolio to be able to have better performance and more sustainable in the long run in order to be able to overcome different type of crisis.

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Appendix-1: Expected Return and Covariance for Sharīʿah Stocks

Covariance	WEIR	GKN	MGGT	BNZL	PSN	SHP	CPI	TLW	ANTO	SN.	RDSB	AZN	BG.	AAL	RIO
WEIR	0.0079	0.0038	0.0040	0.0027	0.0039	0.0018	0.0009	0.0021	0.0025	0.0014	0.0024	0.0002	0.0004	0.0036	0.0028
GKN	0.0038	0.0080	0.0036	0.0028	0.0023	0.0015	0.0011	0.0009	0.0022	0.0014	0.0022	0.0003	0.0003	0.0031	0.0023
MGGT	0.0040	0.0036	0.0087	0.0029	0.0029	0.0005	0.0009	0.0024	0.0026	0.0013	0.0017	0.0015	0.0014	0.0031	0.0022
BNZL	0.0027	0.0028	0.0029	0.0052	0.0021	0.0007	0.0008	0.0011	0.0016	0.0020	0.0012	0.0012	0.0006	0.0029	0.0019
PSN	0.0039	0.0023	0.0029	0.0021	0.0098	0.0003	0.0012	0.0009	0.0028	0.0012	0.0017	0.0001	0.0010	0.0042	0.0027
SHP	0.0018	0.0015	0.0005	0.0007	0.0003	0.0108	0.0016	0.0008	0.0003	0.0010	0.0012	-0.0011	0.0004	0.0020	0.0004
CPI	0.0009	0.0011	0.0009	0.0008	0.0012	0.0016	0.0108	0.0042	0.0007	0.0017	0.0010	0.0003	-0.0002	0.0010	0.0013
TLW	0.0021	0.0009	0.0024	0.0011	0.0009	0.0008	0.0042	0.0152	0.0030	0.0013	0.0007	-0.0007	0.0013	0.0028	0.0025
ANTO	0.0025	0.0022	0.0026	0.0016	0.0028	0.0003	0.0007	0.0030	0.0096	0.0013	0.0022	0.0009	0.0007	0.0053	0.0041
SN.	0.0014	0.0014	0.0013	0.0020	0.0012	0.0010	0.0017	0.0013	0.0013	0.0060	0.0009	0.0009	0.0006	0.0023	0.0014
RDSB	0.0024	0.0022	0.0017	0.0012	0.0017	0.0012	0.0010	0.0007	0.0022	0.0009	0.0044	0.0007	0.0018	0.0032	0.0032
AZN	0.0002	0.0003	0.0015	0.0012	0.0001	-0.0011	0.0003	-0.0007	0.0009	0.0009	0.0007	0.0056	0.0012	0.0004	0.0005
BG.	0.0004	0.0003	0.0014	0.0006	0.0010	0.0004	-0.0002	0.0013	0.0007	0.0006	0.0018	0.0012	0.0049	0.0020	0.0028
AAL	0.0036	0.0031	0.0031	0.0029	0.0042	0.0020	0.0010	0.0028	0.0053	0.0023	0.0032	0.0004	0.0020	0.0115	0.0074
RIO	0.0028	0.0023	0.0022	0.0019	0.0027	0.0004	0.0013	0.0025	0.0041	0.0014	0.0032	0.0005	0.0028	0.0074	0.0091
Expected return	0.0136	0.0059	0.0152	0.0119	0.0137	0.0179	0.0236	0.0222	0.0227	0.0115	0.0064	0.0046	0.0212	0.0154	0.0181

Appendix-2: Expected Return and Covariance for SRI Stocks

Covariance	AHT	BAB	BNZL	SGE	GFS	ITV	CPI	WPP	VOD	IMI	TPK	BDEV	WEIR	GKN	PSN
AHT	0.0399	0.0039	0.0014	0.0036	0.0008	0.0070	-0.0015	0.0049	0.0018	0.0037	0.0006	0.0041	0.0046	0.0026	0.0049
BAB	0.0039	0.0112	0.0017	0.0027	0.0017	0.0043	-0.0009	0.0025	0.0005	0.0024	0.0024	0.0023	0.0032	0.0031	0.0027
BNZL	0.0014	0.0017	0.0052	0.0018	0.0017	0.0016	0.0008	0.0018	0.0004	0.0026	0.0023	0.0032	0.0027	0.0028	0.0021
SGE	0.0036	0.0027	0.0018	0.0166	0.0034	0.0064	0.0042	0.0071	0.0044	0.0014	0.0018	0.0017	0.0009	0.0029	0.0022
GFS	0.0008	0.0017	0.0017	0.0034	0.0080	0.0019	0.0015	0.0040	0.0011	0.0011	0.0014	0.0012	0.0009	0.0012	0.0013
ITV	0.0070	0.0043	0.0016	0.0064	0.0019	0.0121	0.0027	0.0065	0.0025	0.0033	0.0026	0.0034	0.0040	0.0042	0.0020
CPI	-0.0015	-0.0009	0.0008	0.0042	0.0015	0.0027	0.0108	0.0058	0.0019	0.0003	0.0015	0.0016	0.0009	0.0011	0.0012
WPP	0.0049	0.0025	0.0018	0.0071	0.0040	0.0065	0.0058	0.0104	0.0031	0.0023	0.0024	0.0028	0.0028	0.0037	0.0029
VOD	0.0018	0.0005	0.0004	0.0044	0.0011	0.0025	0.0019	0.0031	0.0076	0.0001	-0.0009	-0.0015	0.0006	0.0005	-0.0013
IMI	0.0037	0.0024	0.0026	0.0014	0.0011	0.0033	0.0003	0.0023	0.0001	0.0072	0.0030	0.0037	0.0039	0.0041	0.0024
TPK	0.0006	0.0024	0.0023	0.0018	0.0014	0.0026	0.0015	0.0024	-0.0009	0.0030	0.0075	0.0054	0.0023	0.0031	0.0038
BDEV	0.0041	0.0023	0.0032	0.0017	0.0012	0.0034	0.0016	0.0028	-0.0015	0.0037	0.0054	0.0121	0.0044	0.0030	0.0084
WEIR	0.0046	0.0032	0.0027	0.0009	0.0009	0.0040	0.0009	0.0028	0.0006	0.0039	0.0023	0.0044	0.0079	0.0038	0.0039
GKN	0.0026	0.0031	0.0028	0.0029	0.0012	0.0042	0.0011	0.0037	0.0005	0.0041	0.0031	0.0030	0.0038	0.0080	0.0023
PSN	0.0049	0.0027	0.0021	0.0022	0.0013	0.0020	0.0012	0.0029	-0.0013	0.0024	0.0038	0.0084	0.0039	0.0023	0.0098
Expected return	0.0171	0.0212	0.0119	0.0184	0.0154	0.0011	0.0236	0.0125	0.0135	0.0037	0.0102	0.0097	0.0136	0.0059	0.0137

Appendix-3: Descriptive Statistics for Sharī'ah Stocks

	AAL	ANTO	AZN	BG.	BNZL	GKN	CPI	MGGT	PSN	RDSB	RIO	SHP	SN.	TLW	WEIR
Mean	0.003	0.014	0.007	0.013	0.012	0.009	0.017	0.012	0.015	0.004	0.010	0.018	0.010	0.011	0.012
Median	0.007	0.012	0.000	0.013	0.012	0.001	0.015	0.010	0.006	0.010	0.003	0.018	0.008	0.011	0.014
Maximum	0.472	0.474	0.227	0.394	0.305	0.853	0.588	0.465	0.331	0.215	0.298	0.428	0.333	0.480	0.297
Minimum	-0.37	-0.35	-0.21	-0.22	-0.16	-0.38	-0.32	-0.37	-0.34	-0.22	-0.42	-0.36	-0.17	-0.34	-0.42
Std. Dev.	0.112	0.107	0.069	0.077	0.065	0.110	0.088	0.096	0.105	0.065	0.103	0.096	0.072	0.123	0.097
Skewness	0.06	0.32	0.30	0.39	0.35	1.75	1.29	0.05	0.01	-0.17	-0.13	0.05	0.48	0.22	-0.47
Kurtosis	4.964	4.479	3.827	5.825	4.398	17.497	12.087	5.806	3.824	3.794	4.352	5.163	4.355	3.999	5.186
Jarque-Bera	36.63	24.63	9.96	81.11	23.19	2103.92	843.98	74.56	6.43	7.09	17.91	44.35	26.06	11.35	53.48
Probability	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.00	0.00	0.00	0.00
Sum	0.666	3.287	1.498	3.003	2.690	1.996	3.876	2.629	3.367	0.796	2.305	4.072	2.380	2.444	2.726
Sum Sq. Dev.	2.814	2.609	1.061	1.335	0.966	2.753	1.763	2.084	2.508	0.967	2.401	2.065	1.188	3.413	2.145
Observations	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227

Appendix-4: Correlation between Sharī'ah Stocks

	AAL	ANTO	AZN	BG.	BNZL	GKN	CPI	MGGT	PSN	RDSB	RIO	SHP	SN.	TLW	WEIR
AAL	1.000	0.611	0.067	0.407	0.320	0.416	0.154	0.389	0.263	0.509	0.674	0.251	0.217	0.336	0.466
ANTO	0.611	1.000	0.088	0.291	0.253	0.343	0.113	0.361	0.284	0.442	0.558	0.111	0.183	0.301	0.442
AZN	0.067	0.088	1.000	0.149	0.193	0.111	0.044	0.209	0.004	0.206	0.060	-0.028	0.136	-0.026	0.072
BG.	0.407	0.291	0.149	1.000	0.212	0.163	0.109	0.251	0.158	0.457	0.442	0.148	0.130	0.378	0.263
BNZL	0.320	0.253	0.193	0.212	1.000	0.382	0.190	0.435	0.304	0.332	0.237	0.183	0.372	0.150	0.383
GKN	0.416	0.343	0.111	0.163	0.382	1.000	0.156	0.537	0.389	0.311	0.377	0.194	0.261	0.142	0.495
CPI	0.154	0.113	0.044	0.109	0.190	0.156	1.000	0.149	0.169	0.199	0.119	0.184	0.200	0.314	0.150
MGGT	0.389	0.361	0.209	0.251	0.435	0.537	0.149	1.000	0.331	0.320	0.270	0.167	0.262	0.208	0.487
PSN	0.263	0.284	0.004	0.158	0.304	0.389	0.169	0.331	1.000	0.166	0.275	0.076	0.273	0.095	0.357
RDSB	0.509	0.442	0.206	0.457	0.332	0.311	0.199	0.320	0.166	1.000	0.447	0.280	0.151	0.215	0.424
RIO	0.674	0.558	0.060	0.442	0.237	0.377	0.119	0.270	0.275	0.447	1.000	0.061	0.197	0.253	0.459
SHP	0.251	0.111	-0.028	0.148	0.183	0.194	0.184	0.167	0.076	0.280	0.061	1.000	0.165	0.130	0.211
SN.	0.217	0.183	0.136	0.130	0.372	0.261	0.200	0.262	0.273	0.151	0.197	0.165	1.000	0.072	0.189
TLW	0.336	0.301	-0.026	0.378	0.150	0.142	0.314	0.208	0.095	0.215	0.253	0.130	0.072	1.000	0.310
WEIR	0.466	0.442	0.072	0.263	0.383	0.495	0.150	0.487	0.357	0.424	0.459	0.211	0.189	0.310	1.000

Appendix-5: Descriptive Statistics for SRI Stocks

	AHT	BAB	BDEV	BNZL	CPI	GFS	GKN	IMI	ITV	PSN	SGE	TPK	VOD	WEIR	WPP
Mean	0.026	0.016	0.017	0.012	0.017	0.010	0.009	0.008	0.009	0.015	0.016	0.013	0.009	0.012	0.012
Median	0.032	0.015	0.003	0.012	0.015	0.006	0.001	0.006	0.005	0.006	0.007	0.004	0.012	0.014	0.010
Maximum	1.096	0.312	0.724	0.305	0.588	0.293	0.853	0.360	0.641	0.331	0.744	0.689	0.282	0.297	0.394
Minimum	-0.75	-0.29	-0.68	-0.16	-0.32	-0.28	-0.38	-0.29	-0.40	-0.34	-0.23	-0.46	-0.24	-0.42	-0.28
Std. Dev.	0.180	0.091	0.150	0.065	0.088	0.080	0.110	0.091	0.115	0.105	0.107	0.112	0.075	0.097	0.091
Skewness	0.95	0.19	0.52	0.35	1.29	-0.28	1.75	0.10	0.61	0.01	1.67	1.16	-0.11	-0.47	0.25
Kurtosis	10.665	3.880	8.479	4.398	12.087	5.112	17.497	4.940	7.368	3.824	12.638	10.958	3.936	5.186	4.881
Jarque-Bera	589.52	8.71	294.35	23.19	843.98	45.18	2103.92	35.94	194.47	6.43	984.00	649.83	8.76	53.48	35.89
Probability	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.01	0.00	0.00
Sum	5.871	3.743	3.834	2.690	3.876	2.168	1.996	1.814	1.955	3.367	3.531	3.002	2.045	2.726	2.768
Sum Sq. Dev.	7.287	1.887	5.104	0.966	1.763	1.445	2.753	1.873	2.971	2.508	2.573	2.840	1.279	2.145	1.869
Observations	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227

Appendix-6: Correlation between SRI Stocks

	AHT	BAB	BDEV	BNZL	CPI	GFS	GKN	IMI	ITV	PSN	SGE	TPK	VOD	WEIR	WPP
AHT	1.0000	0.2444	0.2957	0.1631	0.0235	0.0766	0.3185	0.3665	0.3775	0.2937	0.2261	0.2813	0.1469	0.3347	0.3323
BAB	0.2444	1.0000	0.1583	0.2681	0.0218	0.2081	0.2828	0.2976	0.3361	0.2064	0.2432	0.2613	0.1364	0.3439	0.2715
BDEV	0.2957	0.1583	1.0000	0.3101	0.1676	0.1496	0.4986	0.4517	0.4076	0.7209	0.1764	0.6842	-0.0020	0.3275	0.3686
BNZL	0.1631	0.2681	0.3101	1.0000	0.1901	0.3020	0.3823	0.4017	0.2516	0.3037	0.2455	0.3487	0.1761	0.3827	0.3480
CPI	0.0235	0.0218	0.1676	0.1901	1.0000	0.1684	0.1558	0.1159	0.2443	0.1693	0.3297	0.2078	0.2252	0.1498	0.5143
GFS	0.0766	0.2081	0.1496	0.3020	0.1684	1.0000	0.1283	0.1588	0.1966	0.1264	0.2737	0.1757	0.1930	0.1324	0.4076
GKN	0.3185	0.2828	0.4986	0.3823	0.1558	0.1283	1.0000	0.6235	0.5667	0.3894	0.2945	0.6385	0.1571	0.4951	0.5152
IMI	0.3665	0.2976	0.4517	0.4017	0.1159	0.1588	0.6235	1.0000	0.4606	0.3515	0.2219	0.5327	0.1113	0.5898	0.4244
ITV	0.3775	0.3361	0.4076	0.2516	0.2443	0.1966	0.5667	0.4606	1.0000	0.2728	0.4100	0.4652	0.2822	0.3667	0.5957
PSN	0.2937	0.2064	0.7209	0.3037	0.1693	0.1264	0.3894	0.3515	0.2728	1.0000	0.2285	0.5665	-0.0379	0.3566	0.3603
SGE	0.2261	0.2432	0.1764	0.2455	0.3297	0.2737	0.2945	0.2219	0.4100	0.2285	1.0000	0.2445	0.4113	0.1841	0.5429
TPK	0.2813	0.2613	0.6842	0.3487	0.2078	0.1757	0.6385	0.5327	0.4652	0.5665	0.2445	1.0000	0.0829	0.4219	0.4561
VOD	0.1469	0.1364	-0.0020	0.1761	0.2252	0.1930	0.1571	0.1113	0.2822	-0.0379	0.4113	0.0829	1.0000	0.1242	0.3801
WEIR	0.3347	0.3439	0.3275	0.3827	0.1498	0.1324	0.4951	0.5898	0.3667	0.3566	0.1841	0.4219	0.1242	1.0000	0.3885
WPP	0.3323	0.2715	0.3686	0.3480	0.5143	0.4076	0.5152	0.4244	0.5957	0.3603	0.5429	0.4561	0.3801	0.3885	1.0000

Appendix-7: Descriptive Statistics for Macroeconomic Variables

Variables	DEXCH	DIND	DM1	DOIL	DUNEMP	INFLATION	LTGB	RSHAR	RSRI
Mean	-0.0027	-0.0009	0.0050	-0.0048	0.0000	-0.0003	0.0024	0.0048	0.0085
Median	-0.0030	0.0000	0.0054	0.0043	0.0000	0.0021	0.0022	0.0078	0.0080
Maximum	0.0881	0.0284	0.1046	0.2632	0.0441	0.0100	0.0043	0.1228	0.1099
Minimum	-0.0933	-0.0325	-0.0264	-0.3463	-0.0417	-0.2237	0.0011	-0.1757	-0.1346
Std. Dev.	0.0278	0.0102	0.0141	0.0991	0.0186	0.0233	0.0008	0.0554	0.0452
Skewness	-0.3199	-0.4489	3.5886	-0.3482	0.2746	-9.2916	0.4004	-0.7169	-0.1809
Kurtosis	4.4509	4.3077	27.6099	4.2867	2.7676	89.5330	2.1073	4.0834	3.3080
Jarque-Bera	10.0587	10.0640	2628.6440	8.5628	1.4226	31333.1800	5.7526	12.9180	0.9031
Probability	0.0065	0.0065	0.0000	0.0138	0.4910	0.0000	0.0563	0.0016	0.6366
Sum	-0.2578	-0.0851	0.4757	-0.4608	-0.0031	-0.0266	0.2278	0.4625	0.8189
Sum Sq. Dev.	0.0733	0.0099	0.0188	0.9328	0.0328	0.0517	0.0001	0.2918	0.1941
Observations	96	96	96	96	96	96	96	96	96

Appendix-8: Correlation between Macroeconomic Variables

	DEXCH	DIND	DM1	DOIL	DUNEMP	INFLATION	LTGB	RSHAR	RSRI
DEXCH	1.0000	0.0596	-0.1517	0.6272	-0.0899	0.0329	-0.0610	0.1337	0.1601
DIND	0.0596	1.0000	-0.0085	0.1045	-0.4004	0.0615	-0.0984	-0.1309	0.0183
DM1	-0.1517	-0.0085	1.0000	-0.2188	-0.1107	-0.0960	-0.0078	-0.2271	-0.1281
DOIL	0.6272	0.1045	-0.2188	1.0000	-0.0036	0.0848	0.1433	0.2898	0.2173
DUNEMP	-0.0899	-0.4004	-0.1107	-0.0036	1.0000	0.2355	0.4514	0.0210	-0.0676
INFLATION	0.0329	0.0615	-0.0960	0.0848	0.2355	1.0000	0.0505	0.0334	0.0311
LTGB	-0.0610	-0.0984	-0.0078	0.1433	0.4514	0.0505	1.0000	-0.0349	-0.1251
RSHAR	0.1337	-0.1309	-0.2271	0.2898	0.0210	0.0334	-0.0349	1.0000	0.6393
RSRI	0.1601	0.0183	-0.1281	0.2173	-0.0676	0.0311	-0.1251	0.6393	1.0000