Gold and Capital Market in Indonesia: A Preview on Strategy of Hedging and Diversification

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Submission date: 28-Jun-2019 06:59PM (UTC-0700)
Submission ID: 1147831314
File name: 7_630_Robiyanto_et_al.pdf (834.93K)
Word count: 4871
Character count: 25538

Robiyanto, R., Hadiyatno, D., Sudjinan, S., & Ernayani, R. (2019). Gold and capital market in Indonesia: A preview on strategy of hedging and diversification. *Journal of International Studies, 12*(2), 117-128. doi:10.14254/2071-8330.2019/12-2/7

Journal of International Studies

Scientific Papers

Gold and capital market in Indonesia: A preview on strategy of hedging and diversification

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Abstract. This study examines the establishment of a portfolio among sharia stocks represented by the Jakarta Islamic Index (JII) with gold (gold futures contracts). Gold price used in this research was the gold price in the international market which was in USD denomination and also converted into Rupiah (IDR), by considering commodity futures instruments in Indonesia using fixed rate or floating rate option. The data analysis technique used in this research was the dynamic portfolio formulation by using Dynamic Conditional Correlation – Generalized Autoregressive Conditional Heteroscedasticity (DCC-GARCH), so that the portfolio produced was an active portfolio and it could change its composition over time. The results of this study indicate that gold is able to provide hedging effectiveness as well as to reduce the volatility of sharia stocks included in the JII in the Indonesia Stock Exchange. This research is also able to prove that including gold instruments into a sharia-based stock portfolio can

Received:
December, 2018
1st Revision:
February, 2019
Accepted:
May, 2019

DOI:
10.14254/2071-8330.2019/12-2/7

improve portfolio performance. Unfortunately, such strategies could not be counted as a sharia-based investment strategy, although stocks used in this portfolios were sharia compliant since futures contract was not considered as a sharia compliant instrument as it can be considered as *haram* (prohibited) in Islam.

Keywords: DCC-GARCH, gold, Jakarta Islamic Index (JII), Indonesian capital market.

JEL Classification: G11

1. INTRODUCTION

For these recent years, the capital market in Indonesia (Indonesia Stock Exchange/IDX) has improved significantly in terms of stock market indicators such as composite stock price index (CSPI) and market capitalization. Along with this, the sharia stock market also grows in Indonesia. According to the Financial Service Authority (FSA, 2015), sharia stock market has developed during these two decades, since the launch of sharia mutual fund in 1997. Until 2017, the sharia capital market in Indonesia has produced various products and regulations related to the sharia capital market, and further, it has a special index of price consisting of chosen sharia stocks called Jakarta Islamic Index (JII). To see the rapid development of the capital market and sharia capital market in Indonesia, Table 1 presents the development of CSPI, JII, market capitalization in IDX and JII from 2011 to 2016.

According to Table 1, there was a rapid development of CSPI and JII observed from 2011 to 2016. During this period, CSPI recorded an increase of 38.59% while JII recorded a 29.25% increase. Meanwhile, based on the development of stock market price capitalization, stock market capitalization increased by IDR 2,226.32 trillion, or 63.11% during 2011-2016, while the sharia market in JII had the capitalization increase of IDR 610.21 trillion, or 42.82% during 2011- 2016.

Table 1

Development of CSPI, JII, Market Capitalization of IDX, and Stocks Capitalization of JII 2011 – 2016

Year	CSPI	Stock Capitalization (in Trillion Rupiahs (IDR))	JII	JII Stock Capitalization (in Trillion Rupiahs (IDR))
2011	3,821.99	3,527.29	537.03	1,424.98
2012	4,316.67	4,126.99	572.29	1,671.00
2013	4,274.18	4,219.02	585.11	1,672.10
2014	5,226.95	5,228.04	691.04	1,944.53
2015	4,593.01	4,872.70	603.35	1,737.29
2016	5,296.71	5,753.61	694.13	2,035.19

Source: Capital Market Statistic, published by FSA.

Sharia capital market, like the conventional one, is an important part of the financial system. Sharia capital market industry refers to sharia principles along with the Islam concept of prosperity distribution and improvement (FSA, 2018; Wahyudi, Nofendi, Robiyanto & Hersugondo, 2018). Sharia stocks, as an instrument of sharia capital market, although referring to sharia principles, still have some risks involved (for example, Robiyanto (2017) found that the sharia stocks in the JII tended to have the lowest risk

avoidance). Just like other instruments of investments, sharia stocks also tend to undergo a decrease in price when there is a wave at the financial market (Robiyanto, 2018a, 2018b). However, a decrease can be anticipated by creating a portfolio combining sharia stocks with gold instruments.

In relation to gold potential in portfolios with cross-assets like stock and gold, several studies showed that gold could be used as a value protector (Faubert, 2012; Hillier, Draper, & Faff, 2006; Hood & Malik, 2013; Robiyanto, Wahyudi, & Pangestuti, 2017a, 2017b) or as a diversifier asset (Ibrahim, 2010, 2012; Ibrahim & Baharom, 2012). Ratner and Klein (2008) even found that involving gold into a stock portfolio would increase the performance of the stock portfolio created internationally. This was also supported by Chua, Sick, and Woodward (1990) and also Hoang, Lean, and Wong (2015). Unfortunately, those studies did not review specifically the instruments of sharia capital market while in fact, sharia stocks have close relation with gold (Hussin, Muhammad, Razak, Tha, & Marwan, 2013).

A specific study discussing the creation of a portfolio with sharia capital market instruments such as sharia stock with gold is still hard to find in the context of Southeast Asia in general and Indonesia in particular (the researchers in Southeast Asia, especially Malaysia, tend to view gold as a value protector and a diversifier but not in terms of creating portfolio). While the research done by Robiyanto et al. (2017b) on the IDX discussed creating a portfolio by using the indicators of a conventional capital market.

For this reason, this research studies the creation of a portfolio of sharia stocks represented by the JII with gold (gold in the context of futures contract, not in its physical form). The gold price used in this research was the price at the international market using USD or converted to Rupiah (IDR), considering the commodity in Indonesia could use fixed rate or floating rate (Robiyanto et al., 2017b). The techniques of data analysis used in this research included the creation of a dynamic portfolio using Dynamic Conditional Correlation – Generalized Autoregressive Conditional Heteroscedasticity (DCC-GARCH), therefore, the product was expected to be an active one and its composition could change along the time. Performance of the portfolio was also measured. The measurement of performance could be done by means of using Sharpe Index, Treynor Ratio, Jensen Alpha, Adjusted Sharpe Index (ASI), Adjusted Jensen Alpha Index (AJI) and Sortino Ratio. Most of the previous similar research were using only Sharpe Index, Treynor Ratio, and Jensen Alpha. In fact, the Sharpe Index and Jensen Alpha have weaknesses, thus, they often need adjustments (Cvitanic, Lazrak & Wang, 2007; Kidd, 2011; Zulkafli, Ahmad & M., 2017).

2. METHODOLOGY

The data used in this study were the monthly closing data of the JII and CSPI in IDX, the price of gold in the international market (GOLD) and mid-rate of USD to Rupiah (USDIDR) during a period of May 2008 to July 2017. The data of the JII, GOLD, and USDIDR were obtained from Bloomberg. In order to calculate the return of the JII, the formula used was Return $JII_t = (JII_t - JII_{t-1})/JII_{t-1}$, with JII_t as the JII closing in t month andJII_{t-1} as the JII closing in t month-1. The data of the gold price in local currency (GOLDIDR) were resulted from converting the price of gold world price from USD (GOLD) to Rupiah following the USDIDR.

Meanwhile, to calculate the return of GOLD, the formula used was:

$$\text{Return } GOLD_t = (GOLD_t - GOLD_{t-1})/GOLD_{t-1},$$

with $GOLD_t$ as the closing of gold price in t month and $GOLD_{t-1}$ as the closing of gold price in t month-1. The free risk interest rate used was the interest rate of the Bank of Indonesia. The data were obtained from the Economic and Financial Statistic published by the Bank of Indonesia.

On the other hand, the creation of a dynamic portfolio was done by using the Dynamic Conditional Correlation – Generalized Autoregressive Conditional Heteroscedasticity (DCC-GARCH) method. This method has been used to make dynamic portfolio by several researchers such as Arouri, Lahiani, and Nguyen (2014), Kumar (2014) and Robiyanto et al. (2017b). This method was firstly introduced by Engle (2002) who was developing the model of DCC-GARCH from GARCH introduced by Bollerslev (1986). Then this model was applied to the making of the portfolio.

Through the DCC-GARCH model, Engle (2002) accommodates the time-varying conditional correlation matrix with a formula as follows:

$$P_t = (\text{diag}(Q_t))^{-1/2} Q_t (\text{diag}(Q_t))^{-1/2} \quad (1)$$

where $Q_t = (q_t^{ij} q_t^{ij})$ is the symmetrical positive definite matrix based on:

$$Q_t = (1 - \alpha - \beta)\, \bar{Q}\bar{Q} + \alpha \eta_{t-1} \eta'_{t-1} \eta'_{t-1} + \beta Q_{t-1} \quad (2)$$

In equation (1), α and β are the non-negative scalars like $\alpha + \beta < 1$, and $\bar{Q}\bar{Q}$ are the matrix (2X2) unconditional correlation from standard errors η_t. Conditional variants are determined along the process of GARCH (1,1). Engle (2002) argued that the specification of DCC did not find any obstacles in the model estimation.

After calculating the DCC, the next step was counting the optimal proportion and hedging ratio as suggested by Kroner and Ng (1998) with the following formula:

$$w_t^{Gs} = \frac{h_t^s - h_t^{sG}}{h_t^s - 2h_t^{sG} + h_t^G} \quad (3)$$

Where h_t^G, h_t^s and h_t^{sG} are the conditional volatility of gold return, the conditional volatility of JII return and the conditional covariance between the return of gold (both GOLD and GOLDIDR) and the return of JII in the period of t respectively.

Hedging effectiveness (HE) was calculated by applying the formula developed by Ku, Chen, and Chen (2007) and had been applied by Robiyanto et al. (2017b) as follows:

$$\text{HE} = \frac{Variance_{unhedged} - Variance_{hedged}}{Variance_{unhedged}} \quad (4)$$

Where $\text{Variance}_{\text{hedged}}$ is the variant return of stock portfolio (sharia stocks represented by JII)-gold and $\text{Variance}_{\text{unhedged}}$ is the variant return of stock portfolio (sharia stocks represented by JII). The higher the HE of the portfolio, the bigger the risk-decreasing of portfolio formed and it implied that investment strategies formed were the better hedging strategy (Ku et al., 2007; Robiyanto et al., 2017b).

The optimal hedge ratio was counted by using the following formula:

$$\beta_t^{Gs} = \frac{h_t^{sG}}{h_t^G} \quad (5)$$

Where β_t^{gs} is an optimal hedge ratio, h_t^G, and h_t^{sG} are the conditional volatility of return of gold (GOLD and GOLDIDR) and the conditional covariance between the return of gold (GOLD and GOLDIDR) and the return of sharia stock represented by JII in period t respectively.

The formula above had been adopted by several researchers such as Arouri et al. (2014), Kumar (2014) and Robiyanto et al. (2017b). To count the return of the portfolio, below is the formula used:

$$\text{Return of Portfolio}_t = \frac{value\ of\ portfolio\ t\ period - value\ of\ portfolio\ t-1\ period}{value\ of\ portfolio\ t-1\ period} \quad (6)$$

The measurement of the risk-adjusted return of portfolio performance formed was done by using Sharpe Ratio with the following formula (Sharpe, 1966):

$$\text{Sharpe Ratio} = \frac{average\ of\ Return\ of\ Portfolio - Free\ risk\ interest\ rate}{standard\ deviation\ of\ portfolio} \quad (7)$$

Also, the Treynor Ratio with this following formula (Treynor, 1965):

$$\text{Treynor Ratio} = \frac{average\ of\ Return\ of\ Portfolio - Free\ risk\ interest\ rate}{Beta\ Portfolio} \quad (8)$$

The Jensen Alpha (α_i) was counted by using the formula as follows (Jensen, 1967):

$$\propto = \left(R_{i,t} - RFR_t\right) - \beta\left(R_{m,t} - RFR_t\right) \quad (9)$$

where : $R_{i,t}$ - Return of the portfolio (represented by the return of index JII viewed on day t);

RFR_t - Free risk interest rate on day t;

$R_{m,t}$ - Return of the stock market (represented by the return of CSPI on day t).

The Adjusted Sharpe Index (ASI) was calculated by using this formula (Zulkafli et al., 2017):

$$ASI = SI \times \frac{no.of\ observations\ (N)}{no.of\ observations\ (N) + 0.75} \quad (10)$$

The Adjusted Jensen Alpha Index(AJI) was calculated as follows (Zulkafli et al., 2017):

$$AJI = \frac{Jensen\ Alpha}{Beta\ of\ Portfolio} \quad (11)$$

The Sortino Ratio (SoM) was calculated by using this formula (Sortino & Price, 1994):

$$SoM = \frac{R_i - RFR_t}{\delta} \quad (12)$$

where, δ is the downside deviation from the level of return of the stock market index on certain period counted using the following formula (Sortino & Price, 1994):

$$\delta = \frac{\sqrt{\sum(minR_p - MAR, O)^2}}{N-1} \quad (13)$$

where: δ - downside deviation;

R_p - return of portfolio (Index);

MAR - Minimum Acceptable Return = free risk interest rate;

N - the number of observations.

With conditions: If (R_p – MAR) has a negative sign,(R_p– MAR) is used;

If (R_p – MAR) has a positive sign, 0 is used.

3. EMPIRICAL RESULTS

Before analyzing the DCC-GARCH, a data stationary test was performed by using Augmented Dickery-Fuller (ADF) Test.

The results of the Augmented Dickery-Fuller (ADF) Test can be seen in Table 2.

Table 2

The Results of Augmented Dickery-Fuller (ADF) Test

Variable	ADF Test Statistic	Prob.
GOLDIDR	-11.4594	0.0000
GOLD	-11.4048	0.0000
JII	-7.9016	0.0000

Source: Bloomberg, processed.

Based on the analysis of the DCC-GARCH JII and GOLD and JII and GOLDIDR as seen in Figure 1 and Figure 2, it can be understood that the correlation between the JII and GOLD, and JII and GOLDIDR is dynamic and changing over the time. The highest correlation between the JII and GOLD is 0.6 in 2016, whilst the correlation with the negative sign is -0.4 happened in the fourth quarter of 2008 or when the global financial crisis happened.

This could happen because many investors considered gold as the safest asset or safe haven (Baur & Lucey, 2010; Baur & McDermott, 2009; Baur & McDermott, 2012; Ciner, Gurdgiev, & Lucey, 2012). However, different findings were found on the correlation between the JII and GOLDIDR where the highest correlation value is 0.6 and it happened in 2009 after the global financial crisis.

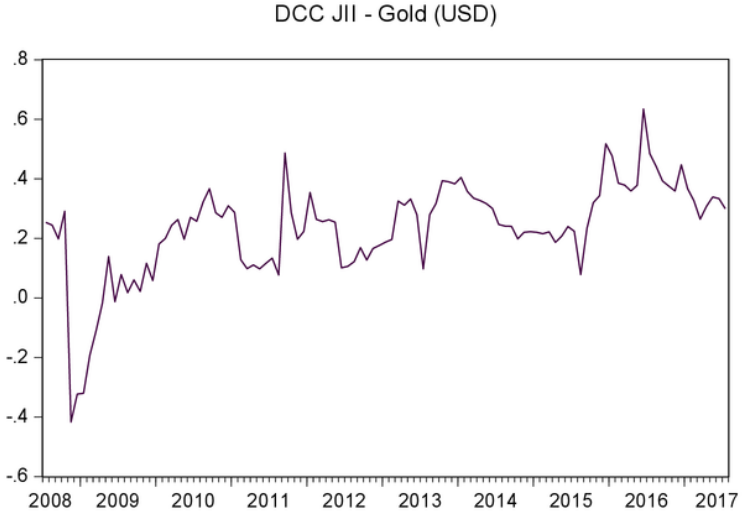

Figure 1. Dynamic Conditional Correlation between JII and GOLD

Source: Bloomberg, processed.

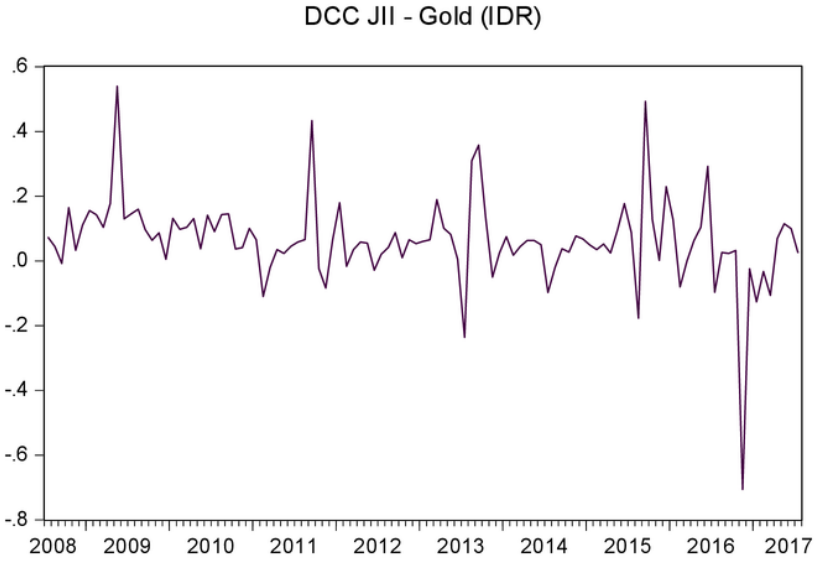

Figure 2. Dynamic Conditional Correlation between JII and GOLDIDR

Source: Bloomberg, processed.

This happened because during the time, the value of USD to IDR increased significantly, resulting in the gold price in IDR to increase as well, and it went along with turning direction from the stocks. Further, during the period, the USD currency exchange to IDR increased significantly, making the price of gold in IDR to increase significantly with the reversal of stocks. Contradictory, the value of the dynamic correlation between the JII with GOLDIDR with the negative sign happened in 2016, which meant that the increase of stock price at the capital market made the investors sell their gold for stocks. This was done because gold, as the instrument of investment in the calm period, did not give a proper return as stated by Herbst (1983).

According to the creation of portfolio using the DCC-GARCH and combination of the methods introduced by Kroner and Ng (1998) and Kroner and Sultan (1993), below is the quality of the dynamic portfolio as presented in Table 3, Figure 3 and Figure 4.

Table 3

Summary of Dynamic Portfolio Quality

Portfolio	Quality	GOLD	GOLDIDR
JII-GOLD	Average	50,52%	-
	Minimum	20,66%	-
	Maximum	95,37%	-
JII-GOLDIDR	Average	-	49,93%
	Minimum	-	20,06%
	Maximum	-	73,78%

Source: Bloomberg, processed.

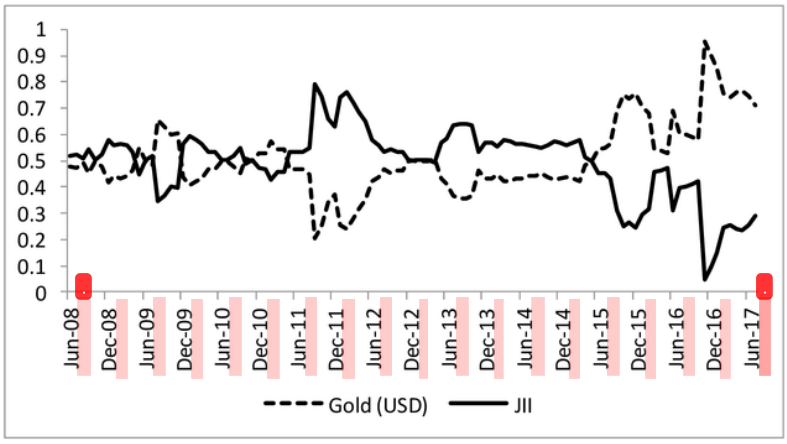

Figure 3. Time-Varying Portfolio Weight JII - GOLD

Source: Bloomberg, processed

The maximum quality of GOLD in portfolio JII-GOLD is 96.37%, while the maximum quality of GOLDIDR in portfolio JII-GOLDIDR is 73.78%. The average quality of GOLD in portfolio JII-GOLD is 50.52% while the average quality of GOLDIDR in portfolio JII-GOLDIDR is 49.93%. The minimum quality of GOLD in portfolio JII-GOLD is 20.66% and the minimum quality GOLDIDR in portfolio JII-GOLDIDR is 20.06%. This quality changed over time as seen in Figure 3 and Figure 4.

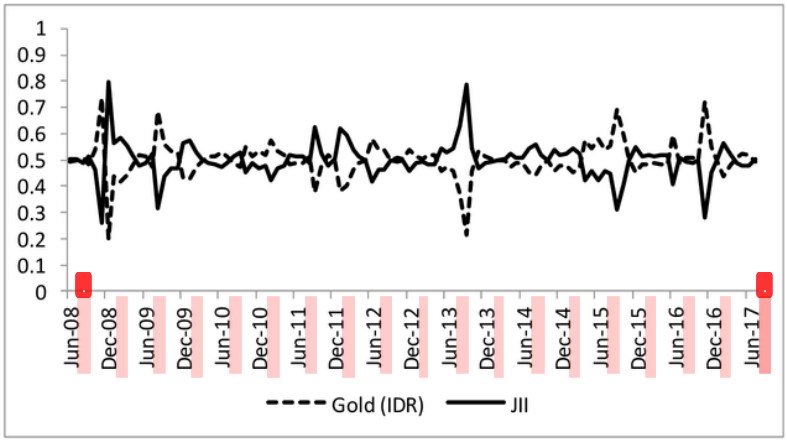

Figure 4. Time-Varying Portfolio Weight JII - GOLDIDR

Source: Bloomberg, processed

Table 4

The Result of Dynamic Portfolio Performance Assessment

	JII Unhedged	GOLD Unhedged	GOLDIDR Unhedged	JII-GOLD	JII-GOLDIDR
Optimal Hedge Ratio	-	-	-	0.2276	0.0700
Hedging Effectiveness	-	-	-	0.5295	0.5215
Average Return (%)	0.6045	0.4709	0.7993	0.5998	0.7506
Standard Deviation	0.0641	0.0541	0.0553	0.0440	0.0444
Variants	0.0041	0.0029	0.0031	0.0019	0.0020
Beta	0.2537	0.2480	-0.1212	0.2494	0.0692
Sharpe Index	0.0047	-0.0191	0.0407	0.0058	0.0398
Treynor Ratio	0.0012	-0.0042	-0.0186	0.0010	0.0255
Jensen Alpha	0.0038	0.0023	0.0092	0.0035	0.0035
Adjusted Sharpe Index	0.0047	-0.0190	0.0404	0.0058	0.0395
Adjusted Jensen Index	0.0151	0.0091	-0.0758	0.0142	0.0512
Sortino Ratio	0.0071	-0.0150	0.0465	0.0077	0.0478

Source: Bloomberg, processed

Table 4 presents various indicators related to the performance of a dynamic portfolio resulted. The hedging effectiveness of JII-GOLD is 52.95% which indicated that involving GOLD to sharia stocks of JII could reduce the risk of the portfolio to 52.95%. Similarly, this is also found in the JII-GOLDIDR portfolio. The hedging effectiveness of JII-GOLDIDR portfolio is 52.15% which indicated that involving GOLDIDR to sharia stocks of JII could reduce the risk of the portfolio to 52.15%.

The value of the optimal hedge ratio of JII-GOLD is 0.2276, while the value of the optimal hedge ratio of JII-GOLDIDR is 0.0700. The value of optimal hedge ratio of 0.2276 in JII-GOLD indicated that the investors or fund manager need to open the futures contract of gold-selling (with a fixed-rate scheme) with the value of futures contract of IDR 0.2276 for IDR 1 stock value owned. The same thing happened to the JII-GOLDIDR with a value of optimal hedge ratio of 0.0700, indicating that the investors or fund manager need to open the futures contract of gold-selling (with floating rate scheme) with the value of futures contract of IDR 0.0700 for IDR 1 stock value owned.

The dynamic portfolio of the JII-GOLDIDR is able to give a higher average of monthly return (0.7506%) compared to the JII-GOLD or unhedged JII portfolio which had a lower average of monthly return; 0.5998% for JII-GOLD and 0.6045% for JII. Besides, the dynamic portfolio formed, JII-GOLD and JII-GOLDIDR are able to reduce the systematical risk measured from the beta of JII from 0.2537 to 0.2494 (JII-GOLD) and 0.0692 (JII-GOLDIDR).

4. DISCUSSION AND CONCLUSION

Based on the performance assessment of the dynamic portfolio, formed by using the Sharpe Index, Treynor Ratio, Jensen Alpha, Adjusted Sharpe Index (ASI), Adjusted Jensen Alpha Index (AJI) and Sortino Ratio, the results show that one of the dynamic portfolios created, namely the JII-GOLDIDR portfolio, was able to produce higher Sharpe Index, Treynor Ratio, Adjusted Sharpe Index (ASI), Adjusted Jensen Alpha Index (AJI) and Sortino Ratio compared to the unhedged portfolio and JII-GOLD portfolio. In addition, the JII-GOLDIDR was able to give higher Sharpe Index and Adjusted Sharpe Index (ASI) than the unhedged portfolio. Generally, this shows that involving gold to portfolios of sharia stock included in the JII was able to improve the performance of those stock portfolios. These findings

support Robiyanto et al. (2017b) who found that precious metals (including gold) could improve portfolios' performance in Malaysia.

The results of this study give empirical pieces of evidence that either gold with USD denomination (representing the fixed rate of the gold futures contract) or gold converted to IDR (representing the floating rate of the gold futures contract) is able to give hedge effectiveness on sharia stocks by reducing the risks significantly. Further, putting gold into sharia stocks portfolios will decrease the volatility of those portfolios. This research also proves that involving gold to sharia stocks portfolios can improve the performance of sharia stocks portfolios. The findings showed that gold could function both as a hedging (because it produced the effectiveness of hedging) and a diversifier instrument for the sharia stocks (because it was able to improve the performance of portfolios)

The investors and fund managers need to arrange the strategy for allotment and stock trading which changes over time. The investors or fund managers in the sharia capital market in Indonesia are suggested to include gold in the form of a futures contract to the portfolios. They need to adjust their composition of portfolios with the ones suggested by this research. Unfortunately, this strategy could not be counted as a sharia-based investment strategy, although the stocks used in this portfolios were sharia compliance since the futures contract was not considered as a sharia compliance instrument. The main reason was that the futures contract has been considered as *haram* (prohibited) in Islam.

Future researchers interested in the same field can use other instruments of futures contract such as Gold Rollover Contract in Jakarta Futures Exchange, which has a potential as a hedging.

ACKNOWLEDGMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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