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FORMULATION OF A DYNAMIC PORTFOLIO WITH STOCKS AND FIXED-INCOME INSTRUMENTS IN THE INDONESIAN CAPITAL MARKET

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Abstract. *This research creates a crossed asset portfolio formulation dynamically with stocks and fixed-income instruments. This dynamic portfolio formulation did not require normally distributed data and accommodated the correlation among class assets which kept changing across time. This was based on the existing assumptions in the modern portfolio theory which were rarely found in the real world, for example, when stock return was normally distributed, the correlation among securities would be constant at all times. The data used in this research were LQ45 Index as a stock market proxy, S&P Indonesia Corporate Bond Index (representing the corporate bond market) and S&P Indonesia Government Bond Index data (representing the government bond market) during the period of June 4th, 2007 to April 11th, 2016. This research found that the dynamic portfolio of stock with either government or corporate bonds was able to reduce the level of risk significantly despite producing a lower rate of return, compared to the ones specifically invested in the stock market. Investors who believe in the principles of prudent investment may use this dynamic approach in shaping the portfolio with stocks and fixed-income instruments.*

Keywords: *DCC-GARCH, LQ45 Index, S&P Indonesia Corporate Bond Index, S&P Indonesia Government Bond Index, Indonesia Stock Exchange, Dynamic Portfolio.*

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1. Introduction

The article entitled "Portfolio Selection" written by Markowitz (1952) and refined by Markowitz (1959) has become a cornerstone for the modern portfolio theory known today (Fabozzi, Gupta, & Markowitz, 2002). Unfortunately, the assumptions used in the theory are not likely to be found in the real world, for example, an assumption mentioning that stock returns are normally distributed. Chion, Veliz, and Carlos (2008) and Canedo and Cruz (2013) openly criticized it, and this criticism was also supported by many studies which found that stock returns are not likely to be normally distributed in a variety of stock markets. It was also found by research such as Aparicio and Estrada (1997), Canedo and Cruz (2013), Chion et al. (2008), Kamath, Chakornpipat, and Chatrath (1998), Rachev, Stoyanov, Biglova, and Fabozzi (2004), and Richardson and Smith (1993). Another assumption which is often criticized is the assumption mentioning that the correlation among securities is constant at all times (Eimer, 2011; Ogata, 2012; Robiyanto, 2018a, 2018c; Robiyanto, Wahyudi, & Pangestuti, 2017). This assumption also underlies the calculation method of portfolio in a simpler approach to the Single Index Model introduced by Sharpe (1964). In fact, the correlation between assets will tend to change along with the current time and market conditions (Katzke, 2013; Zinecker, Balcerzak, Faldzinski, Pietrzak, & Meluzin, 2016).

Although these modern portfolio theory assumptions are widely criticized and they are almost never found in the real world, there is still a lot of research on the establishment of portfolio in Indonesia done by using the assumptions of this theory, such as the research by Abdilah and Rahayu (2015), Anggraini (2013), Astuti and Sugiharto (2005), Eko (2008), Hamdani, Murhadi, and Sutejo (2015), Kewal (2014), Mirah and Wijaya (2013), Natalia (2014), Paramitasari and Mulyono (2015), Sartono and Zulaihati (1998), Sembiring (2012), Sembiring and Rahmah (2014), Septyanto and Kertopati (2014a, 2014b), Triharjono (2013), and Wijayanti and Marjono (2013).

Research by Abdilah and Rahayu (2015), Anggraini (2013), Kewal (2014), Mirah and Wijaya (2013), Sartono and Zulaihati (1998), Sembiring (2012), Triharjono (2013), and Wijayanti and Marjono (2013) employed the single index model in formulating their portfolio, although they used stocks which were various based on their type of sector and time period. Conversely, a research by Natalia (2014) employed the Markowitz model in the portfolio formulation, while Septyanto and Kertopati (2014a, 2014b) employed both the Markowitz and the single index model in their portfolio formulation. The application of these models showed that all these researchers were still using a static approach to portfolio formulation. Further, they still tended to use one asset class only, which was stock, in formulating portfolio, while portfolio can be formed using cross-asset class instruments.

In relation to the cross-asset class portfolio, Greer (1997) suggested that asset allocation was strongly associated with the decision in determining the asset portion within the portfolio. Further, he stated that in order to correspond to the real conditions, the asset allocation should also be made among asset classes (Putra, Atahau, & Robiyanto, 2018). It has also been also supported by Boido and Fasano (2009), who stated that the portfolio managers needed to determine the weight of asset classes in their portfolio. Several related studies had been done by Arouri, Lahiani, and Nguyen (2015) and Putra et al. (2018) by using gold as a complementary instrument in the portfolio because of its potential role as a hedge and safe haven. Arouri et al. (2015) did a study in China capital market, while Putra et al. (2018) conducted a study in Indonesia capital market. With regard to bond studies, many had studied this topic, for example, Ciner, Gurdgiev, and Lucey (2012), Sumner, Johnson, and Soenen (2010), Tomak (2013) and Robiyanto (2018b). However, these studies did not use a bond as a complementary instrument in portfolio.

Studies about portfolio shaping combining asset classes, especially the ones using fixed income instrument, are still relatively rare, although fixed income instrument has been classified as a different class asset which could also enhance the portfolio performance. Therefore, this study seeks to establish a portfolio formulation among asset classes, which are stocks and fixed-income instruments (government bonds and corporate bonds), by utilizing a dynamic approach in Indonesia, in order to examine whether this portfolio has better performance compared to stock portfolio. This research used LQ45 Index as a proxy for stock market, while the S&P Indonesia Corporate Bond Index and S&P Indonesia Government Bond Index are used as a proxy for corporate bond market and government/sovereign bond market in Indonesia. The LQ45 Index was used as the stock market proxy in Indonesia because it was considered capable of becoming a better market proxy than the JCI (Sembiring & Rahmah, 2014) for it only involved 45 actively traded stocks, which could help avoid bias. It was also because the thin trading and also stocks counted into the LQ45 Index calculation were able to represent more than 75% of market capitalization in Indonesia Stock Exchange.

2. Literature Review

2.1. Asset Class and Portfolio

Asset class is defined as a collection of assets with the same characteristic of economic fundamental weight that makes it different to the other assets (Greer, 1997). In general, there are three asset classes in the financial world, they are stocks, fixed income instruments (bonds), and cash (Baur, 2013). The stocks asset class is different from the asset class of bonds for the stocks contain an element of ownership and possess mutual result in the form of dividend which may change over time, while bonds contain an element of debt and are characterized with interest regularly paid.

An asset allocation method is often carried out based on the modern portfolio theory developed by Markowitz (1952). Shortly after introducing the modern portfolio theory, Markowitz (1959) stated that a good portfolio is more than just a long list consisting of stocks and bonds. Further, he explained that investors need to develop an integrated portfolio tailored to their needs. Both investors and portfolio managers need to create decisions on the asset allocation. Portfolio can eliminate risks if the returns of the securities (both equity and fixed income) have no correlation. If those securities returns are perfectly correlated, then the returns of all securities will be a perfect unity, and the establishment of portfolio cannot eliminate the risks. Thus, to reduce the risks, the formulation of portfolio which consists of securities with high correlation between one and another must be avoided.

Many studies had examined whether another asset class, such as gold, could enhance the portfolio performance (Arouri et al. (2015), Kumar (2014), Putra et al. (2018), Robiyanto et al. (2017)). Arouri et al. (2015) used stocks in China capital market and found that class assets, including gold, could enhance the stock portfolio performance. This finding was also supported by Kumar (2014), who conducted a study in India, Putra et al. (2018) in Indonesia and Robiyanto et al. (2017) in Indonesia and Malaysia. Beside gold, there is another instrument which could also be included in a portfolio, namely fixed income securities, such as corporate and sovereign or government bonds. Robiyanto (2018b) found that corporate bonds could act as a safe haven instrument in Indonesia, while Baur and Lucey (2010) and Ciner et al. (2012) found that sovereign bonds could act as a safe haven in several developed capital markets.

2.2. The Establishment of Dynamic Portfolio with Dynamic Conditional Correlation (DCC)

Correlation is a very important input in financial management (Engle, 2002). Asset allocation and risk estimation depend on the correlation, but often a large number of correlation coefficients are required. Efforts to find estimated correlation among financial variables have motivated various studies done by the academics and practitioners in the capital market. A simple method such as using historical correlations and exponential smoothing has been widely applied. Several more complex methods such as various types of GARCH or stochastic volatility have been studied in the econometric literature and used by practitioners with expertise. Engle (2002) proposed a Dynamic Conditional Correlation (DCC) estimator which owns flexibility within the GARCH univariate.

This model, which provides a direct conditional correlation parameter, is naturally calculated in two phases, which are through a series of GARCH univariate estimation and correlation estimation. This method has advantages in calculation compared to the GARCH multivariate in terms of the parameter number to be estimated during the correlation process which is independent to the to-be-correlated series number. Thus, a massive potential of correlation matrix can be estimated. This method produces a model with a good prediction in estimating various correlation processes with time variation. The comparison between the DCC and GARCH and other methods shows that the DCC often becomes the most accurate method. This DCC method can be expanded to carry out portfolio diversification and increase the effectiveness of hedging (Robiyanto et al., 2017).

Dynamic portfolio is based on the assumption that correlation will tend to be dynamic rather than static. Therefore, in the calculation of the dynamic portfolio, the conditional correlation is used as a substitute for static correlation. Engle (2002) stated that conditional correlation between two random variables of r_1 and r_2 which has an average of zero can be formulated as follows:

$$\rho_{12,t} = \frac{E_{t-1}(r_{1,t}r_{2,t})}{\sqrt{E_{t-1}(r_{1,t}^2)E_{t-1}(r_{2,t}^2)}} \tag{1}$$

In this formula, the conditional correlation is based on the information known about the prior period, and the multi-period correlation forecasting can be explained in the same way. By applying the law of probabilities, all correlations described in similar ways should be located in the interval (-1 to 1). The conditional correlation meets this limit for each realization of the past information and for any linear combination of variables.

To explain the relationship between the conditional correlation and conditional variances, it will be easier to write the returns as a conditional standard deviation multiplied by standardized disturbances (Engle, 2002) as follows:

$$h_{i,t} = E_{t-1}\left(r_{i,t}^2\right), \quad r_{i,t} = \sqrt{h_{i,t}\varepsilon_{i,t}}, \quad i = 1, 2$$

ε is the standardized disturbances which has an average of zero and variance equal to 1 for each series. Then Equation 1 can be written as follows:

$$\rho_{12,t} = \frac{E_{t-1}(\varepsilon_{1,t}\varepsilon_{2,t})}{\sqrt{E_{t-1}(\varepsilon_{1,t}^2)E_{t-1}(\varepsilon_{2,t}^2)}} = E_{t-1}(\varepsilon_{1,t}\varepsilon_{2,t}) \tag{2}$$

Hence, the conditional correlation represents the conditional variance between the standardized disturbance.

Many estimators have been filed for conditional correlation. The rolling correlation estimator is the most popular one which explains returns with an average of zero as follows:

$$\hat{\rho}_{12,t} = \frac{\sum_{s=t-n-1}^{t-1} r_{1,s}r_{2,s}}{\sqrt{(\sum_{s=t-n-1}^{t-1} r_{1,s}^2)(\sum_{s=t-n-1}^{t-1} r_{2,s}^2)}} \tag{3}$$

From Equation 3 it is clear that the rolling correlation becomes an interesting estimator only in special circumstances. In particular, the rolling correlation gives an equal weight to each observation minus a certain n-period in the past and a zero weight on a longer observation. This estimator will always lie between -1 and 1. However, there is a lack of clarity concerning the assumptions which consistently estimate the conditional correlation.

The exponential balancer used by RiskMetrics employs the decreasing weight according to parameter λ. In the context of multivariate, the same λ must be used for all assets to ensure a positive definite correlation matrix. The conditional correlation matrix of returns is depicted as:

$$E_{t-1}(r_t \acute{r}_t) \equiv H_{t.} \tag{4}$$

Hence, these estimators can be represented in the following matrix notation:

$$H_t = \frac{1}{n}\sum_{j=1}^{n}(r_{t-j}\acute{r}_{t-j}) \text{ and } H_t = \lambda(r_{t-1}\acute{r}_{t-1}) + (1+\lambda)H_{t-1} \tag{5}$$

2.3. Portfolio Performance Measurement with the Sharpe Ratio

The Sharpe Ratio introduced by Sharpe (1966) is often used to measure a portfolio performance. It has been accepted and implemented widely by academics and practitioners in finance to measure the performance of a portfolio (Kidd, 2011; Low & Chin, 2013; Pangestuti, Wahyudi, & Robiyanto, 2017). The Sharpe Ratio is also referred to as Reward to Variability (Horowitz, 1966; Robiyanto, 2017; Sharpe, 1966). Formulation for the Sharpe Ratio / Reward to Variability is as follows:

$$\textit{Reward to Variability Ratio}\ \text{(RVAR)} = \frac{Average\ of\ Return\ Portofolio}{Portfolio\ Standard\ Deviation} \tag{6}$$

3. Research Method

3.1. Research Data

The data used in this research were the daily closing LQ45 Index data, S&P Indonesia Corporate Bond Index data, and S&P Indonesia Government Bond Index data during the period of June 4th, 2007 to April 11th, 2016. During the period, there were about 2,158 days of valid observations. The daily closing data of LQ45 index were obtained from www.idx.co.id, while the S&P Indonesia Corporate Bond Index data and S&P Indonesia Government Bond Index data were obtained from http://us.spindices.com/indices/fixed-income/. The S&P Indonesia Corporate Bond Index is an index designed to measure the performance of corporate bonds from Indonesia which are denominated by Indonesian Rupiah (IDR), while S&P Indonesia Government Bond Index is an index designed to measure the performance of Indonesia government bonds which are predominantly in Indonesian Rupiah (IDR).

3.2. Definition of Operational Variable

Below, the definition of operational variables used in this study is elaborated.

1. Stock market returns are calculated from LQ45 Index returns by using the following formula:

$$R_{LQ45,t} = \left[\frac{LQ45_t - LQ45_{t-1}}{LQ45_{t-1}}\right] \quad (7)$$

Where:

$LQ45_t$ = Closing of LQ45 Index in Indonesia Stock Exchange at day t
$LQ45_{t-1}$ = Closing of LQ45 Index in Indonesia Stock Exchange at day t – 1

2. Indonesia Government Bond Market returns are calculated from S&P Indonesia Government Bond Index by applying the following formula:

$$R_{S\&P\ IGBI,t} = \left[\frac{S\&PIGBI_t - S\&P\ IGBI_{t-1}}{S\&P\ IGBI_{t-1}}\right] \quad (8)$$

Where:

S&P $IGBI_t$ = Closing of S&P Indonesia Government Bond Index at day t
S&P $IGBI_{t-1}$ = Closing of S&P Indonesia Government Bond Index at day t – 1

3. Indonesia Corporate Bond Market returns are calculated from S&P Indonesia Corporate Bond Index by using the following formula:

$$R_{S\&P\ ICBI,t} = \left[\frac{S\&PICBI_t - S\&P\ ICBI_{t-1}}{S\&P\ ICBI_{t-1}}\right] \quad (9)$$

Where:

S&P $ICBI_t$ = Closing of S&P Indonesia Corporate Bond Index at day t
S&P $ICBI_{t-1}$ = Closing of S&P Indonesia Corporate Bond Index at day t – 1

3.3. Analysis Technique

This study employed a model of Dynamic Conditional Correlation – Generalized Autoregressive Conditional Heteroscedasticity (DCC-GARCH) introduced by Engle (2002). The DCC-GARCH was the development of the GARCH model, which was originally introduced by Bollerslev (1986). The DCC-GARCH model assumes that the conditional correlation matrix changes over time. The DCC-GARCH calculation was carried out by employing Eviews Program. The use of the DCC-GARCH model to calculate the dynamic correlation to replace constant correlation during portfolio formulation is relatively new nowadays. This was based on the assumption that stock market is dynamically changing, so the use of constant correlation is not appropriate. Several studies (Arouri et al., 2015; Kumar, 2014; Robiyanto et al., 2017) had showed that the use of DCC-GARCH was appropriate to formulate the dynamic portfolio.

Meanwhile, hedging effectiveness (HE) was estimated by using a formula developed by Ku, Chen and Chen (2007) as follows:

$$\text{HE} = \frac{Variance_{unhedged} - Variance_{hedged}}{Variance_{unhedged}} \quad (10)$$

Where, $Variance_{hedged}$ is the stock-bond portfolio returns and $Variance_{unhedged}$ is the stocks (stock market) portfolio returns variance. The higher the HE portfolio, the bigger the reduction of portfolio risk, which implies that this investment strategy is a better strategy. For example, the HE portfolio value of 70% indicates that the portfolio involving other asset class instruments can reduce the risk level by up to 70%.

Returns value risk (risk adjusted return) of the formed portfolio is calculated by using the following Sharpe Index:

$$\textit{Reward to Variability Ratio}\ (\text{RVAR}) = \frac{Average\ of Portfolio\ Return}{Portfolio\ Standard\ Deviation} \tag{11}$$

4. Discussion

4.1. Dynamic Conditional Correlation (DCC) of LQ45 Index Return with S&P Indonesia Corporate Bond Index Return

Based on the analysis performed using the DCC-GARCH, the results show that the DCC value between the LQ45 index return and the S&P Indonesia Corporate Bond Index return during the research period is in a range of -0.05 to 0.15. It showed that the correlation between the LQ45 index return with the S&P Indonesia Corporate Bond Index return during the research period was too weak to be suitable for the establishment of a portfolio among stocks represented by the LQ45 index with the corporate bond as represented by the S&P Indonesia Corporate Bond Index.

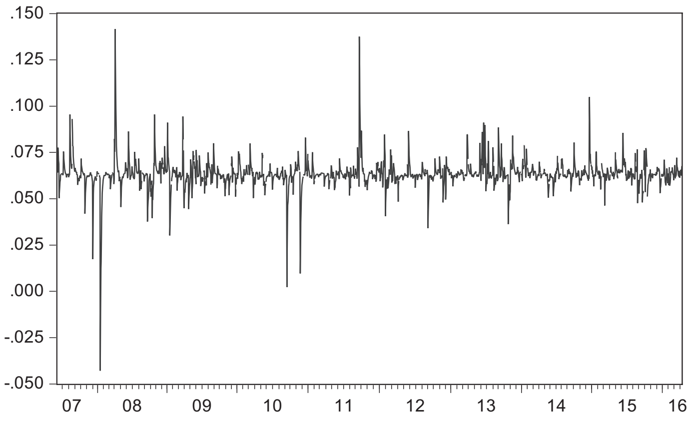

FIGURE 1. **Dynamic Conditional Correlation LQ45-S&P Indonesia Corporate Bond Index**

4.2. Dynamic Conditional Correlation (DCC) of LQ45 Index Return with S&P Indonesia Government Bond Index Return

The results of the analysis done using the DCC-GARCH show that the DCC between the LQ45 Index return and the S&P Indonesia Government Bond Index return during the research period is in a range of -0.2 to 0.1. This indicates that the correlation between the LQ45 Index return and the S&P Indonesia Government Bond Index return during the research period was too weak to be suitable for the establishment of portfolio among stocks represented by the LQ45 Index with government bond as represented by the S&P Indonesia Government Bond Index.

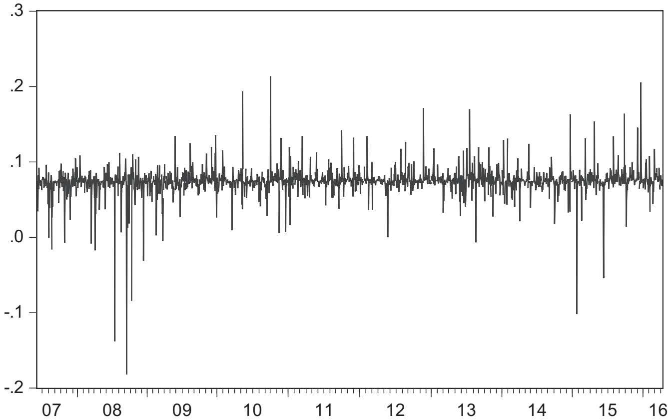

FIGURE 2. **Dynamic Conditional Correlation LQ45-S&P Indonesia Government Bond Index**

4.3. The Formulation of Dynamic Portfolio with LQ45 Index and S&P Indonesia Corporate Bond Index

Based on the establishment of dynamic portfolio carried out between the LQ45 Index and the S&P Indonesia Corporate Bond Index during the research period, it can be seen that the largest weight of portfolio for S&P Indonesia Corporate Bond Index was 64.4%, which occurred on November 30th, 2007, the average portfolio weight of the S&P Indonesia Corporate Bond Index during the research period was 49.99%, and the stocks represented by the LQ45 Index amounted to 50.01%.

The portfolio formulation of the LQ45 Index and the S&P Indonesia Corporate Bond Index is able to reduce risk by 17.32%, where the hedging effectiveness value is 17.32%. The portfolio generated using the LQ45 Index and the S&P Indonesia Corporate Bond Index is able to produce an average portfolio return of 0.0349% with a deviation standard of 0.002. Although the average return of this portfolio is smaller than the average return of the LQ45, which is 0.04%, the average return of portfolio formed is bigger than the average return of the S&P Indonesia Corporate Index at 0.028%. Meanwhile, it is seen from the deviation standard indicating the risk that the risk of portfolio formed by the LQ45 Index with the S&P Indonesia Corporate Bond Index is by 0.002 smaller than the risk contained within the stocks represented by the LQ45 Index which was at 0.003. However, the risk was relatively similar to the risk contained in the S&P Indonesia Corporate Index, which has a deviation standard of 0.002.

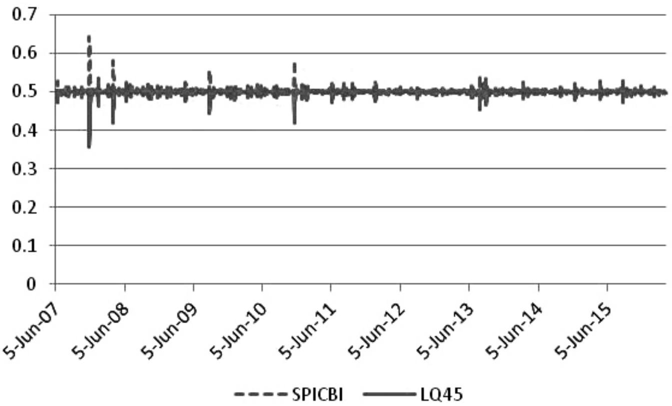

FIGURE 3. **Dynamic Portfolio Weight between LQ45 Index and S&P Indonesia Corporate Bond Index During the Research Period**

TABLE 1. **Results of Dynamic Portfolio Formulation of LQ45 Index with S&P Indonesia Corporate Bond Index**

Note	LQ45 Index	S&P Indonesia Corporate Bond Index	Portfolio of LQ45 Index with S&P Indonesia Corporate Bond Index
Return Average	0.042%	0.028%	0.0349%
Standard Deviation	0.003	0.002	0.002
Hedging Effectiveness	-	-	17.323%
Sharpe Ratio	0.105%	-7.384%	-3.559%

Looking at the Sharpe Ratio value, which is -3.559%, it can be concluded that the portfolio performance generated by using the LQ45 Index with the S&P Indonesia Corporate Bond Index was better than the S&P Indonesia Corporate Bond Index performance, which had the Sharpe Ratio of -7.384%. However, it was worse than the LQ45 Index performance, which had the Sharpe Ratio of 0.105%. This finding shows that the corporate bond in a portfolio could decrease the portfolio risk, but could not enhance the portfolio return in Indonesia. One of the main reasons was that the corporate bond had played a role as a safe haven in the Indonesian capital market rather than that of a diversifier instrument as previously proven by Robiyanto (2018b).

4.4. The Formulation of Dynamic Portfolio of LQ45 Index with S&P Indonesia Government Bond Index

The analysis of the formulation of dynamic portfolio of the LQ45 Index with the S&P Indonesia Government Bond Index during the research period shows that the largest portfolio weight for the S&P Indonesia Government Bond Index is 81.59%, which occurred on December 18th, 2014, the average portfolio weight of the S&P Indonesia Government Bond Index during the research period is 49.98% and the stocks represented by the LQ45 Index amount to 50.02%.

The portfolio formulation of the LQ45 Index with the S&P Indonesia Government Bond Index is able to reduce the risk by 16.96%, as the hedging effectiveness value is 16.69%. The portfolio generated using the LQ45 Index with the S&P Indonesia Government Bond Index is able to produce the average of portfolio return at 0.035%, with a deviation standard of 0.002. Although this average of portfolio return is smaller than the return average of LQ45, which is 0.042%, the portfolio return average formed is bigger than the return average of the S&P Indonesia Government Index of 0.028%. Meanwhile, it is seen from the deviation standard indicating risk that the risk of portfolio formed of the LQ45 Index and the S&P Indonesia Government Bond Index is 0.002, which is smaller than the risks contained in the stocks represented by the LQ45 Index at 0.003. However, this risk is relatively similar to the risks contained in the S&P Indonesia Government Index, which has a deviation standard of 0.002.

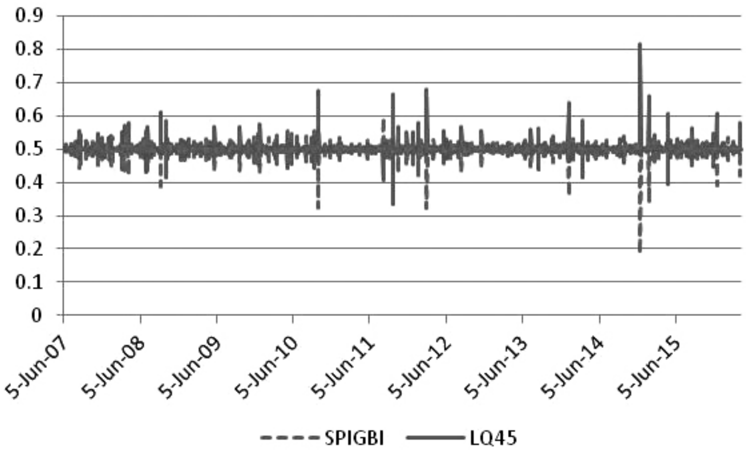

FIGURE 4. **Dynamic Portfolio Weight between LQ45 and S&P Indonesia Government Bond Index during the Research Period**

Based on the Sharpe Ratio, the value of which is -3.45%, it can be concluded that the portfolio performance generated by using the LQ45 Index with the S&P Indonesia Government Bond Index was better than the S&P Indonesia Government Bond Index

TABLE 2. **Results of Dynamic Portfolio Formulation of LQ45 Index with S&P Indonesia Government Bond Index**

Note	LQ45 Index	S&P Indonesia Government Bond Index	Portfolio of LQ45 Index with S&P Indonesia Government Bond Index
Return Average	0.042%	0.028%	0.0350%
Standard Deviation	0.003	0.002	0.002
Hedging Effectiveness	-	-	16.961%
Sharpe Ratio	0.105%	-7.384%	-3.457%

performance, which has the Sharpe Ratio of -7.384. However, it was worse than the LQ45 Index performance, which has the Sharpe Ratio of 0.105%. Similar to the previous findings in corporate bond, government bond has played a role as a safe haven, even as a hedge in Indonesian capital market, rather than a diversifier instrument. Therefore, it is not surprising if the government bond could only reduce the portfolio risk. This finding supports the findings by Baur and Lucey (2010) and Ciner et al. (2012).

5. Conclusions

This research found that the dynamic portfolio with a formulation of the LQ45 Index with the S&P Indonesia Corporate Bond Index is able to reduce risk by 17.323% compared to the risk of investing in the LQ45 stocks alone. Furthermore, it is also found that the dynamic portfolio formulation of the LQ45 Index with the S&P Indonesia Government Bond Index is able to reduce the risk by 16.691% compared to the risk of only investing in the LQ45 stocks. It indicates that the inclusion of corporate bonds into the LQ45 stocks portfolio would be able to reduce risk level more than that involving the government bonds. Unfortunately, the risk is not offset by an increase in the portfolio performance for the Sharpe Ratio value of the formed dynamic portfolio, both by involving corporate bonds and government bonds, which are not capable of exceeding the Sharpe Ratio value of the LQ45 stocks portfolio alone. However, the dynamic portfolio formulated both by involving corporate bonds and government bonds is able to show better performances than investments in corporate bonds or government bonds only. This finding also indicated that a fixed income instrument could also act as a diversifier and risk reduction instrument if it was included in a highly volatile portfolio consisting of stocks.

6. Managerial Implications

The results of this study indicate that the dynamic formulation of portfolio including bonds (both the government and corporate bonds) could significantly reduce the risks, although it produced a lower rate of returns than an investment specifically in a stock market alone. Due to this reason, investors, especially those institutional investors that tend to promote prudent investment principles, can use the dynamic approach in establishing portfolio combining stocks and fixed-income instruments.

7. Future Research Agenda

This study still focuses on the stock market and fixed income instruments in general. This study does not specifically focus on the formulation of dynamic portfolio based on the individual stocks or government bonds or particular corporate bonds, therefore there is still a potential for future research to utilize these instruments individually. Future research may also specifically use indexes in measuring other fixed income instruments such as Indonesia Government Bond Index (IGBX) issued by Indonesia Bond Pricing Agency (IBPA) with different methods used for the S&P Indonesia Government Bond Index involved in this study.

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