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# Assessing the Efficiency of Jakarta Islamic Index-Linked Investing

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# Assessing the Efficiency of Jakarta Islamic Index-Linked Investing

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*The passive investing is getting easier with the fund that mimics indexes or market portfolio. The sharia market instruments is the answer to the need of Muslim investors. In the future, there are possibilities for more index-linked funds, exchange traded funds, and index-based derivatives in Indonesia including their sharia counterpart. We analyze the performance of Jakarta Islamic Index in three aspects, profitability, stability, and efficiency, compared with ordinary indexes, the BISNIS-27 Index and the LQ45 Index. The profitability is analyzed using Fama and French Three Factors model. The stability aspect is analyzed using Sharpe Return Based Style Analysis and Style Drift. The efficiency aspect is analyzed using the simulation of indexes with different assets allocation. The result is the JII needs to tighten the selection criteria for its constituents to be more efficient than the BISNIS-27 and LQ45 indexes and it is better to add fundamental criteria to the constituent selection.*

***Keywords:*** *Index, investment, weighting, efficiency*

## Introduction

In the stock market investment we are suggested to diversify our investment in a portfolio. The purpose is to reduce the effect of specific risk which is the risk that associated with individual assets. The theory that called Modern Portfolio Theory (MPT) stated that portfolio reduces risk only when assets combined have prices that move inversely, or at different times, in relation to each other (Markowitz, 1952).

In order to get the optimal index as suggested by MPT, investors tend to hold the market portfolio, an efficient portfolio that constitutes the best possible investment choice. According to Capital Assets Pricing Model (CAPM) derived by Sharpe (1964), all investors desired to hold the same optimal portfolio and asset weight in the optimal portfolio are equal with the market portfolio. Investors that want to hold the market portfolio can simply adopt a passive investment strategy by investing in market indexes (Amenc et al., 2006).

Now passive investor can choose several options to invest in the market portfolio, there are Index Fund and Exchanged Traded Fund. There are several reasons to buy an index fund, because they provide extensive diversification, low cost (compared to buying all shares in the market) and a low turnover which provides tax efficiency (Sharpe, 2002).

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Table 1. *Fatwas* that related to capital market

| Year | Fatwa number | About |
|---|---|---|
| 2000 | 05/DSN-MUI/IV/2000 | Stock trading |
| 2000 | 20/DSN-MUI/IX/2000 | Guidance to provide sharia mutual fund investment |
| 2002 | 32/DSN-MUI/IX/2002 | Sharia bond |
| 2002 | 33/DSN-MUI/IX/2002 | Sharia mudharabah bond |
| 2003 | 40/DSN-MUI/IX/2003 | Stock market and the application of sharia principle in stock market |
| 2004 | 41/DSN-MUI/III/2004 | Sharia ijarah bond |

## Literature Review

The sharia indexes are formed in order to answer the need of investors who want to allocate their capital according to sharia term. Muslims are harmed to *riba* (taking interest), as told in the Holy Quran, "*But Allah has permitted trade and has forbidden interest*" (2:275). Sharia system prefers profit sharing and partnership schemes. The screening of sharia investment can be summarized in Walkshäusl and Lobe (2011). *First*, the investment in preferred stocks and bonds are unacceptable under the Islamic law, because those have a fixed rate of return and grant no voting rights (Naughton and Naughton, 2000). *Second*, company with core business related to alcohol, conventional financial services (using interest), entertainment, pork-related products, tobacco, or weapons are not included. Additional restrictions are based on certain financial ratios, meaning companies with unacceptable levels of debt or impure interest income and companies with debt of more than one third of market capitalization are excluded (Hussein and Omran, 2005), but some variables varied on every countries.

In Indonesia, Islamic Capital Market was launched on 14th March 2003. But actually the instrument of Islamic Capital Market had been available since 1997. It is marked with the launching of Danareksa Syariah mutual fund on 3rd July 1997 by PT Danareksa Investment Management. Then the Jakarta Stock Exchange (now Indonesia Stock Exchange – IDX) in partnership with PT Danareksa Investment Management launched Jakarta Islamic Index (JII) on 3rd July 2000, three years after the first Sharia mutual fund (Djafri, 2009).

In 2000, the MUI (Indonesia Ulema Council) supported the Islamic Capital Market by issuing two *fatwas* regarding stock trading and investing in sharia mutual fund. Since then, there are six *fatwas* related to capital market, which can be seen in Table 1.

With the infrastructure and policy support, the next step is to gain investors' trust to invest in sharia stocks. A lot of researches have been conducted about sharia stock market and its instruments including analyses that compared sharia based and conventional investment. The research conducted by Amenc et al. (2006) examines the efficiency of assets allocation and performance measurement on 11 indexes in three regions: Europe, Japan, and US. The research stated facts that indexes with market capitalization weighting are lack of stable sector risk exposure, not efficiently performed, and not stable in the style stability. Research by Hussein and Omran (2005) examines the performance of Dow Jones Islamic Market Index (DJIMI) and its 13 sub indexes against their traditional counterparts over 1996 to 2003. The research finds that Islamic Indexes outperformed traditional indexes in bull markets but underperformed in bear markets.

Research conducted by Forte and Miglietta (2007) examines the asset allocation of the sharia-compliant FTSE Islamic Europe index compared to conventional socially responsible investing (SRI) stock indexes. The research finds that the Sharia Indexes and SRI are different in style, sector and country exposure. They should be addressed as separated investment approaches. Research by Albaity and Ahmad (2008) investigate the performance of the Kuala Lumpur Syariah Index (KLSI) and the Kuala Lumpur Composite Index (KLCI) from 1999 through 2005. The research provides no significant statistical differences in risk-adjusted returns between the Sharia Index and the Conventional Index.

Therefore it is necessary to perform the sharia index analysis in Indonesia. This research has to answer the question about whether inves-


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Table 2. Number of stock in the Indonesian sharia stock list

| Period | Update date | Number of sharia stock |
|---|---|---|
| I | 30th November 2007 | 164 |
| II | 30th May 2008 | 180 |
| III | 28th November 2008 | 185 |
| IV | 29th May 2009 | 177 |
| V | 30th November 2009 | 186 |
| VI | 27th May 2010 | 194 |
| VII | 29th November 2010 | 209 |
| VIII | 31st May 2011 | 221 |
| IX | 30th November 2011 | 241 |

tor in Indonesia, that mostly Muslims, have to sacrifice the performance of their investment by selecting their stocks in the sharia way. To perform the comparison, we use BISNIS-27 Index and LQ45 Index to be compared with Jakarta Islamic Index (JII). The reason for using BISNIS-27 Index and LQ45 Index because these indexes are big cap indexes, same with JII, and also the number of constituent is relatively similar to JII (30 constituents), BISNIS-27 have 27 constituents and LQ45 have 45 constituents.

**Jakarta Islamic Index**

Jakarta Islamic Index was launched on 3rd July 2000, created by Indonesian Stock Exchange (IDX) in collaboration with PT Danareksa Securities, one of the state owned securities companies. The index is aimed to increase investors' trust on investing in sharia based stock and to be a benchmark in selecting halal portfolio that free from *riba* (Indonesia Stock Exchange, 2010). JII uses the stocks that included in the sharia stocks list. The criteria of sharia stock list are based on BAPEPAM-LK (Stock Market and Financial Institution Supervisory Board) rule No II.K.1 about "Criteria and Issuance of Sharia Stock" (BAPEPAM-LK, 2009).

Enterprises which included in sharia stock list are: 1) prohibited to perform activities that related to gambling and game that categorized into gambling, trade that prohibited by sharia (trade without taking/giving goods or service and trade with fake offer/order), financial service that contains *riba* (interest based banking and interest based financing), risk trading that contains uncertainty (*gharar*) and/or gambling (*maisir*) like conventional insurance, producing, distributing, trading, and/or supplying goods or services that haram (*haram li-dzatihi*), goods or services that haram not because of the contains (*haram li-ghairihi*), and other goods or services that prohibited by DSN-MUI (National Sharia Board-Indonesia Ulema Council), and perform transactions that contains bribery; 2) fulfilled the minimum ratios of debt to equity not exceed 82% and total interest income and non halal income to revenue and other income not exceed 10%.

Update of the sharia stock list are performed every May and November. Until the early 2012, there are nine updated list of sharia stocks, as can be seen in Table 2.

JII is formed based on sharia stock list, with further selection process: from the sharia stocks list, 60 stocks with biggest market capitalization in the last one year are chosen; from the list of 60 stocks, 30 stocks with biggest transaction value in the regular market are chosen. The change of constituents is performed every January and July each year. JII uses the market capitalization weighting.

**BISNIS-27**

BISNIS-27 index was launched on 27th January 2009, initiated by *Bisnis Indonesia Daily*, the first business newspaper in Indonesia. Index constituents are chosen by fundamental, technical, and good corporate governance selection (Indonesia Stock Exchange, 2010). In terms of fundamental selection, the considerations are: 1) positive operating income and net income; 2) return on assets (ROA), return on equity (ROE), debt to equity ratio (DER) selection; and 3) for banks, several additional selection criteria are capital adequacy ratio (CAR), non performing

loans (NPL), and loan to deposit ratio (LDR). Technical selection considers several factors: 1) the stocks have been listed at least three months in the market; 2) empty transaction day is not more than 40% per year; 3) transaction frequency, transaction value, and transaction volume selection; 4) free floating shares must be more than 20%; and 5) biggest market capitalization in one year. With regards to accountability and good corporate governance criteria, the selection will be determined by the index committee.

The change of constituents is performed every May and November due to the release of audited report. But in the first year (2009) the constituent changed in August, so in 2009 BISNIS-27 undergone three constituent changes, January (launching), August (first change), and November (second change). BISNIS-27 Index uses market capitalization weighting.

### LQ45

The LQ45 index is created by Jakarta Stock Exchange, now Indonesia Stock Exchange. The "LQ" in LQ45 Index stand for 'liquidity'. LQ45 Index consists of the most liquid stocks in the Indonesia Stock Index. Launched in February 1997, the main criterion for the constituents selection is transaction value in regular market. But after 2005 revision, the number of trading days and transaction frequency are included in the selection criteria (Indonesia Stock Exchange, 2010). The full criteria for constituent selection are: 1) has been listed at least three months in the market; 2) transaction value, transaction volume, and transaction frequency selection; 3) number of trading days selection; 4) market capitalization selection; and 5) growth prospect of the constituents.

To ensure the fairness, Indonesian Stock Exchange can ask the advisory committee that consists of experts from BAPEPAM-LK (Indonesia Capital Market and Financial Institutions Supervisory Agency), universities, and academicians with specialty area of capital market.

The change of constituents is performed every February and August. LQ45 Index uses market capitalization weighting.

## Research Method

The data for this research is obtained from Bloomberg for the stock market related data and Bank Indonesia website for the Jakarta Interbank Offered Rate (JIBOR). This research uses weekly data, and JIBOR data is converted into weekly data by dividing by 52. The historical constituents list of JII and LQ45 are obtained from IDX Website and the historical constituents list of BISNIS-27 is obtained from Bisnis Indonesia Intelligence Unit (BIIU).

The JII and LQ45 were launched in 2000 and 1997, but BISNIS-27 were launched in 2009, the youngest of the three. Because of that, the data of this research starts from 2009 and ends in April 2012.

There are three aspects of indexes analyzed in the research, profitability, stability and efficiency. For profitability aspect, the research uses Fama and French Three Factor model (Fama and French, 1993). The model is developed after the evidence that the anomalies in average returns cannot be explained by Capital Assets Pricing Model (CAPM) (Fama and French, 1992). The formulation of Three Factor model is as follows:

$$R_p - R_f = \alpha_i + \beta_i(R_m - R_f) + s_p SMB + h_p HML + \varepsilon_p \qquad 1)$$

The variable $R_p - R_f$ is the excess return of the portfolio, in this research, the portfolio means the indexes. The intercept $\alpha_i$ is called the Fama-French alpha, which measures the average abnormal return. The $\beta_i$ is the sensitivity of portfolio excess return to the market excess return ($R_m - R_f$), $s_p$ is the sensitivity of portfolio excess return to the return difference between small stocks portfolio and big stocks portfolio (*SMB*), $h_p$ is the sensitivity of portfolio excess return to the return difference between high book to market value portfolio and low book to market value portfolio (*HML*), and $\varepsilon_p$ is the residual term.

The $R_f$ is based on JIBOR value obtained from Bank Indonesia website[1]. Because the data is in the form of annual rate, we need to

[1] Historical data for JIBOR: http://www.bi.go.id/web/id/Moneter/JIBOR/


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divide it by 52 to get the weekly rate for JIBOR. The $R_p$ is obtained from Blooomberg, it is the real weekly return value of JII, BISNIS-27, and LQ45. Because BISNIS-27 was launched in the middle of the month (27th January 2009), we need to simulate the return for the remaining January 2009 using the same constituents and market caps weighting. The $R_m$ is calculated using average return of all traded stocks in the Indonesian Stock Exchange.

For US market, the data of $R_m$, *SMB*, and *HML* portfolio can be obtained through Kenneth French's website[2]. Since the data is not available for Asian countries, we need to construct the market, *SMB,* and *HML* portfolio ourselves. The portfolio constructions for *SMB* and *HML* are based on Homsud et al. (2009) construction on three factor models. The market return ($R_m$) is obtained through average return of all stocks in the market. For *SMB* and *HML*, we need to create the portfolio based on book to market value and market capitalization.

To build the *SMB* and *HML* portfolio, first we need to remove stocks that have negative book value per share. Then the 5% biggest and smallest stocks based on market capitalization are removed. We use the median of market capitalization to separate big company (*B*) and small company (*S*). For the HML portfolio, the stocks are divided based on their book to market ratio, the 30% biggest book to market are categorized as the high companies (*H*), the 40% second biggest book to market ratio are categorized as medium companies (*M*), and the last 30% smallest book to market ratio are classified as low companies (*L*).

Then we need to organize the stocks into six groups classified by market capitalization and book to market ratio on the previous steps. The classifications are *S/L* (Small-Low), *S/M* (Small-Medium), *S/H* (Small-High), *B/L* (Big-Low), *B/M* (Big-Medium), and *B/H* (Big-High). For example, securities in *S/M* group are securities classified as *S* (small company) by market caps and also classified as *M* (medium company) by book to market ratio and so on. We used average weighting according to the method of Fama and French (1996) to calculate portfolio returns. The market value and book to market ratio are updated quarterly between 2009 and 2012, therefore each portfolio would have different constituent each quarter.

The *SMB* values are calculated from the difference between average rate of return of small sample groups (*S/L*, *S/M*, and *S/H*) and big sample groups (*B/L*, *B/M*, and *B/H*). It represented the risk factor diverge of rate return which related to the size effect:

$$SMB = \frac{1}{3}\{S/L+S/M+S/H\} - \frac{1}{3}\{B/L+B/M+B/H\} \quad 2)$$

The *HML* values are calculated from the difference between average return of two portfolios that have high book to market ratio (*S*/*H* and *B*/*H*) and two portfolios that have low book to market ratio (*S*/*L* and *B*/*L*):

$$HML = \frac{1}{2}\{S/H+B/H\} - \frac{1}{2}\{S/L+B/L\} \quad 3)$$

We use Gretl software to calculate the Ordinary Least Squares (OLS) statistics of the Fama and French Three Factor model.

For the stability aspect, we use Sharpe Return Based Style Analysis (RBSA) that originally formulated by Sharpe (1992). The purpose of RBSA is to provide an objective breakdown of the portfolio managers' true style Sharpe (1988). The original notation of RBSA is:

$$R_{it} = \varpi_{i1}F_{1t} + \varpi_{i2}F_{2t} + ... + \varpi_{iK}F_{Kt} + e_{it} \quad 4)$$

The $R_{it}$ is the return of a given portfolio ($i$) in the given time ($t$). The $F_{Kt}$ is the return of the portfolio used for style tracking. The $\varpi_{iK}$ is the factor of weight or exposure to the tracking portfolio, the sum of all $\varpi_{iK}$ is 1. The $e_{it}$ is a residual term. Research conducted by Atkinson and Choi (2001) modified the equation into:

$$e_{it} = R_{it} - [\varpi_{i1}F_{1t} + \varpi_{i2}F_{2t} + ... + \varpi_{iK}F_{Kt}] \quad 5)$$

The equation is interpreted as the $e_{it}$ is now the difference between the portfolio returns ($R_{it}$) and the weighted return of the tracking portfolios ($\varpi_{i1}F_{1t} + \varpi_{i2}F_{2t} + ... + \varpi_{iK}F_{Kt}$). The objective of

[2] Ken French's Website http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html

Table 3. List of tracking portfolios

| Portfolio name | Remarks |
|---|---|
| Small Low/Small Growth | Small sized company with small book value |
| Small High/Small Value | Small sized company with high book value |
| Big Low/Big Growth | Big sized company with small book value |
| Big High/Big Value | Big sized company with high book value |

Table 4. Jakarta Islamic Index coding

| Code | Date |
|---|---|
| 2009-1 | 1st January 2009 – 30th June 2009 |
| 2009-2 | 1st July 2009 – 31st December 2009 |
| 2010-1 | 1st January 2010 – 30th June 2010 |
| 2010-2 | 1st July 2010 – 31st December 2010 |
| 2011-1 | 1st January 2011 – 30th June 2011 |
| 2011-2 | 1st July 2011 – 31st December 2011 |
| 2012-1 | 1st January 2012 – 30th June 2012 |

the equation is to minimize the variance of the difference (the sum of the residual squared).

This paper uses the SCO Evolutionary Algorithm in Non Linear Solver for LibreOffice. The objective is to minimize sum of squares of residual with the change of weighting of tracking portfolio.

The result from the solver is varied over the time, and we use weekly data that have higher volatility than monthly data. Usually, the research using RBSA applied filtering method to make the weighting result smoother. Researches conducted by Amenc et al. (2006), Swinkels and Sluis (2006), and Annaert and Campenhout (2007) use Kalman Filter to smooth the RBSA result. This paper uses Hodrick-Prescott filter (Hodrick and Prescott, 1981), which composition is as follows:

$$Y_t = g_t + c_t \qquad 6)$$

The variable $Y_t$ is a sum of growth component ($g_t$) and the cyclical ($c_t$), the growth component is obtained through:

$$Min \sum_{t=1}^{T} (Y_t - g_t)^2 + \lambda \sum_{t=1}^{T-1} [(g_{t+1} - g_t) - (g_t - g_{t-1})]^2 \qquad 7)$$

The term $Min \sum_{t=1}^{T} (Y_t - g_t)^2$ is the sum of the squared deviations $d_t = (Y_t - g_t)$ that penalized the cyclical component. The second term, $\lambda \sum_{t=1}^{T-1} [(g_{t+1} - g_t) - (g_t - g_{t-1})]^2$ is a multiple $\lambda$ of the sum squared of the growth component's second differences that penalized variations in the change rate of growth component. The larger $\lambda$ value, the higher is the penalty. Hodrick and Prescott (1981) suggest that for the quarterly data $\lambda^{1/2} = [5/(1/8)]$ or $\lambda = 1{,}600$ is reasonable. Several adjustments of $\lambda$ have been used, like $\lambda = 400$ or $\lambda = 100$ for annual data (Ahumada and Garegnani, 1999). Recently a power adjustment of four has been proposed since the transfer is in this way invariant to the sampling frequency, for example Ravn and Uhlig (2002) uses $\lambda = 6.25$ for annual data. In this paper, we use $\lambda = 1{,}600$ as suggested by the original author. The Hodrick-Prescott Filter is performed using Gretl.

For a further measurement, we compare the intensity of style drift (the style instability) between JII, BISNIS-27, and LQ45. The style drift score is calculated based on notation proposed by Idzorek and Bertsch (2004):

$$D = \sum_{k=1}^{n} \sigma_k^2 \qquad 8)$$

where $\sigma^2_k$ is the variance of the style weight ($\varpi_k$) over time. The portfolio used to track the style is the portfolio obtained from Fama and French Three Factors.

To analyze the efficiency aspect, we use the same methodology with Amenc et al. (2006), using the same set of constituents but with different weighting in the JII, BISNIS-27, and LQ45 to mimic the market portfolio. In the calculation it is assumed that the stock is held with the same quantity until the change of constituent. So we use the fixed weight for a period


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Table 5. BISNIS-27 Index coding

| Code | Date |
|---|---|
| 2009-1 | 1st January 2009 – 31st July 2009 |
| 2009-2 | 1st August 2009 – 31st October 2009 |
| 2009-3 | 1st November 2009 – 30th April 2010 |
| 2010-1 | 1st May 2010 – 31st October 2010 |
| 2010-2 | 1st November 2010 – 30th April 2011 |
| 2011-1 | 1st May 2011 – 30th October 2011 |
| 2011-2 | 1st November 2011 – 30th April 2011 |

Table 6. LQ45 Index coding

| Code | Date |
|---|---|
| 2009-1 | 1st February 2009 – 31st July 2009 |
| 2009-2 | 1st August 2009 – 31st January 2010 |
| 2010-1 | 1st February 2010 – 31st July 2010 |
| 2010-2 | 1st August 2010 – 31st January 2011 |
| 2011-1 | 1st February 2011 – 31st July 2011 |
| 2011-2 | 1st August 2011 – 31st January 2011 |
| 2012-1 | 1st February 2012 – 30th July 2012 |

rather than market capitalization weighting that adjusted every day. The portfolios are adjusted to mimic the return (average weekly return) of market portfolio, mimic the risk (standard deviation) of market portfolio, and to maximize the Sharpe Ratio of the portfolio. The calculation uses the SCO Evolutionary Algorithm in Non Linear Solver for Libre Office.

All three indexes have differences in the date to update constituents list. The coding of these indexes can be seen in Table 4, 5, and 6. Because this research uses data from January 2009 until April 2012, the last update of constituents of JII in January 2012 is also captured. Index BISNIS-27 updated its constituents three times in 2009. The index is scheduled to update its constituents in May 2012, but since this research data end in April, the update is not included. Moreover, since LQ45 indexes updated at February 2012, the last update is captured on this research.

After the simulation is performed, we plot the risk and return data of three portfolio simulation, then we calculate the Euclidean Distance from the market portfolio to the simulations using the formula:

$$d(r, \sigma) = \sqrt{(r_m - \sigma_m)^2 + (r_p - \sigma_p)^2} \qquad 9)$$

Variable $r$ denotes the average return (return) and the variable $\sigma$ denotes the standard deviation (risk). Then $r_m$ denotes the return value of the market portfolio and $r_p$ denotes the return value of the simulated portfolio. Variable $\sigma_m$ denotes the risk value of the market portfolio and $\sigma_p$ denotes the risk value of the simulated portfolio.

# Result and Discussion

### Profitability

The profitability aspect is measured using Fama and French Three Factors model. We use Gretl software to calculate the ordinary least square of each index. The Gretl OLS output for Jakarta Islamic Index is given in Table 7. The output's *R*-squared and adjusted *R*-squared of 0.72 show that Fama and French Three Factors model can explain the return and volatility of Jakarta Islamic Index. The Durbin-Watson Statistic shows no auto-correlation ($dW$ 2.317> $dU$ 1.677). But among three variables, which are market excess return ($R_m$-$R_f$), small minus big (*SMB*), and high minus low (*HML*), only the market excess return that have significant value (*P*-Value < 0.05). It means that JII return is highly affected by market returns.

The Gretl OLS output for BISNIS-27 Index can be seen in Table 8. The BISNIS-27's output has *R*-squared and adjusted *R*-squared of 0.669 and 0.662. The *R*-squared and adjusted *R*-squared are slightly lower than JII's, but enough to show that the Fama and French Three Factors model could explain the return and volatility of BISNIS-27 Index. The Durbin-Watson

## Table 7. Fama and French Three Factor OLS output - Jakarta Islamic Index

Model 1: OLS, using observations 2009/01/09-2012/03/09 (T = 166)
Dependent variable: JII

| | Coefficient | Std. error | *t*-ratio | *p*-value |
|---|---|---|---|---|
| Const | -0.00313091 | 0.00867491 | -0.3609 | 0.71863 |
| *RMRF* | 1.14919000 | 0.05644350 | 20.3601 | 1.63E-046 *** |
| *SMB* | 0.02165150 | 0.02556710 | 0.8469 | 0.39833 |
| *HML* | 0.00360424 | 0.00715864 | 0.5035 | 0.61531 |
| Mean dependent var | 0.00523600 | | S.D. dependent var | 0.035624 |
| Sum squared resid | 0.05789500 | | S.E. of regression | 0.018904 |
| *R*-squared | 0.72351500 | | Adjusted *R*-squared | 0.718395 |
| *F*(3, 162) | 141.30900000 | | *P*-value(*F*) | 5.19E-045 |
| Log-likelihood | 425.22800000 | | Akaike criterion | -842.456000 |
| Schwarz criterion | -830.00810000 | | Hannan-Quinn | -837.403300 |
| Rho | -0.16706400 | | Durbin-Watson | 2.316575 |

Excluding the constant, *p*-value was the highest for variable 6 (*HML*)

## Table 8. Fama and French Three Factor OLS output - BISNIS-27 Index

Model 2: OLS, using observations 2009/01/09-2012/03/09 (T = 166)
Dependent variable: BISNIS27

| | Coefficient | Std. error | *t*-ratio | *p*-value |
|---|---|---|---|---|
| Const | 0.00209252 | 0.00944576 | 0.2215 | 0.82496 |
| *RMRF* | 1.09645000 | 0.06145910 | 17.8403 | 4.51E-040*** |
| *SMB* | 0.00800193 | 0.02783900 | 0.2874 | 0.77415 |
| *HML* | -0.00055228 | 0.00779476 | -0.0709 | 0.94360 |
| Mean dependent var | 0.005447 | | S.D. dependent var | 0.035427 |
| Sum squared resid | 0.068642 | | S.E. of regression | 0.020584 |
| *R*-squared | 0.668542 | | Adjusted *R*-squared | 0.662403 |
| *F*(3, 162) | 108.916300 | | *P*-value(F) | 1.19E-038 |
| Log-likelihood | 411.096100 | | Akaike criterion | -814.192300 |
| Schwarz criterion | -801.744300 | | Hannan-Quinn | -809.139600 |
| Rho | -0.131048 | | Durbin-Watson | 2.259726 |

Excluding the constant, *p*-value was highest for variable 6 (HML)

## Table 9. Fama and French Three Factor OLS output - LQ45 Index

Model 3: OLS, using observations 2009/01/09-2012/03/09 (T = 166)
Dependent variable: LQ45

| | Coefficient | Std. error | *t*-ratio | *p*-value |
|---|---|---|---|---|
| const | 0.000974626 | 0.00847846 | 0.1150 | 0.90862 |
| *RMRF* | 1.112440000 | 0.05516540 | 20.1656 | 4.97E-046 *** |
| *SMB* | 0.005933210 | 0.02498820 | 0.2374 | 0.81262 |
| *HML* | -0.000511205 | 0.00699654 | -0.0731 | 0.94184 |
| Mean dependent var | 0.005029 | | S.D. dependent var | 0.034584 |
| Sum squared resid | 0.055303 | | S.E. of regression | 0.018476 |
| *R*-squared | 0.719776 | | Adjusted *R*-squared | 0.714586 |
| *F*(3, 162) | 138.702700 | | *P*-value(F) | 1.54E-044 |
| Log-likelihood | 429.030200 | | Akaike criterion | -850.060500 |
| Schwarz criterion | -837.612500 | | Hannan-Quinn | -845.007800 |
| rho | -0.134893 | | Durbin-Watson | 2.266226 |

Excluding the constant, p-value was highest for variable 6 (HML)

Statistic also shows that no auto-correlation exist ($dW$ 2.259> $dU$ 1.677). It is the same with JII that among three variables, only market excess return ($R_m$-$R_f$) has significant value ($P$-value < 0.05), means that BISNIS-27 returns are highly affected by market returns.

Table 9 provides the output of LQ45 Index estimation. The output is similar to JII's, it also has the *R*-squared and adjusted *R*-squared of 0.72 and 0.71, means that the Fama and French Three Factors model could explain the return and volatility of LQ45 Index. The Durbin-Wat-


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Table 10. Fama and French Three Factors output summary

| Index | Alpha | Beta | Market capitalization (IDR) |
|---|---|---|---|
| Jakarta Islamic Index | -0.00313091 | 1.14919 | 1,495,715,313 |
| BISNIS-27 Index | 0.00209252 | 1.09645 | 1,689,996,544 |
| LQ45 Index | 0.000974626 | 1.11244 | 2,376,735,618 |

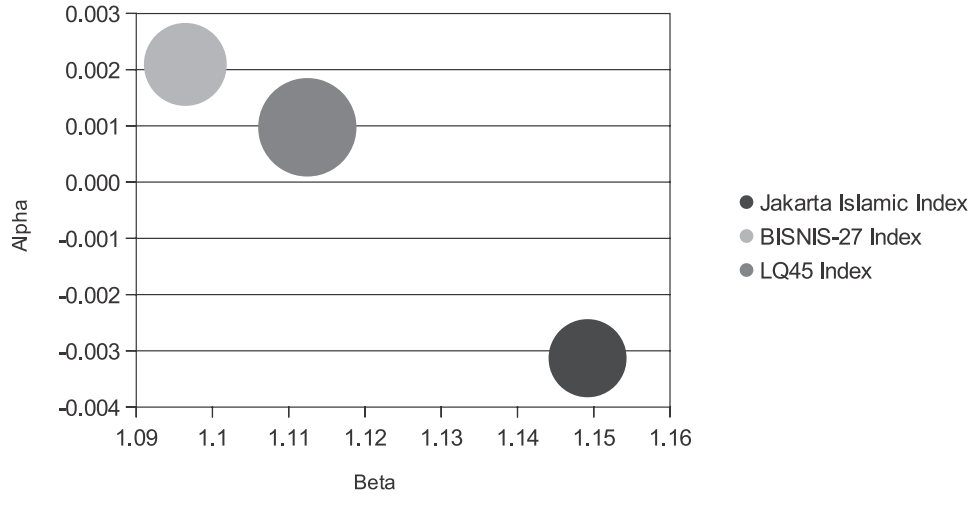


Figure 1. Fama and French Three Factor Alpha and Beta mapping

son Statistic also shows that no auto-correlation exist ($dW$ 2.266> $dU$ 1.677). But like two other indexes, the market excess return ($R_m$-$R_f$) is the only regressor that has significant value ($P$-value < 0.05). It means that LQ45 return is highly affected by market returns.

It can be concluded that Fama and French Three Factors model could explain the movement of all three indexes. But with only market excess return variable that has significant value, it means that the classic Capital Assets Pricing Model (CAPM) with only market return as the regressor could also explain the index return and movement.

We summarized the result of the Fama and French Three Factors model in Table 10. The Fama and French Alpha is obtained from the constant coefficient from the Gretl output. The Alpha shows the abnormal return of the index. The Fama and French Beta is obtained from the *RMRF* coefficient from Gretl output. The Beta function is similar with the Capital Assets Pricing Model, to show the sensitivity of the portfolio to the market return, and as the proxy of systematic risk. The summary is shown in Table 10.

Based on the table, we construct the mapping of Fama and French Three Factor Alpha, Beta, and Market Capitalization that can be seen from Figure 1. From the Alpha and Beta mappings, The Jakarta Islamic Index is having both of the lowest Alpha and the highest Beta of three indexes. With Alpha -0.00313 and Beta 1.149, it can be said that the Jakarta Islamic Index has high systematic risk but provides low return. On the other hand, BISNIS-27 Index is superior in this profitability comparison, with the highest Alpha of 0.002 and the lowest Beta of 1.096. It can be said that BISNIS-27 is the most profitable and also the least risky of the three. The Alpha and Beta of LQ45 is the middle of the three indexes, with Alpha of 0.0009 and Beta 1.112. All indexes have Beta value more than one, means that the three indexes are sensitive to the market movement.

To assess the rank of profitability aspect, we use the ratio of Alpha divided by Beta. The BISNIS-27 Index is in the first rank of the profitability aspect with Alpha/Beta Ratio of 0.00191. The LQ45 and Jakarta Islamic Index are in the second and third rank with Alpha/Beta Ratio of 0.00088 and -0.00272 respectively.

The BISNIS-27 Index is in the first rank of the profitability aspect with Alpha/Beta Ratio of 0.00191. The LQ45 and Jakarta Islamic Index are in the second and third rank with Alpha/Beta Ratio of 0.00088 and -0.00272, respectively.

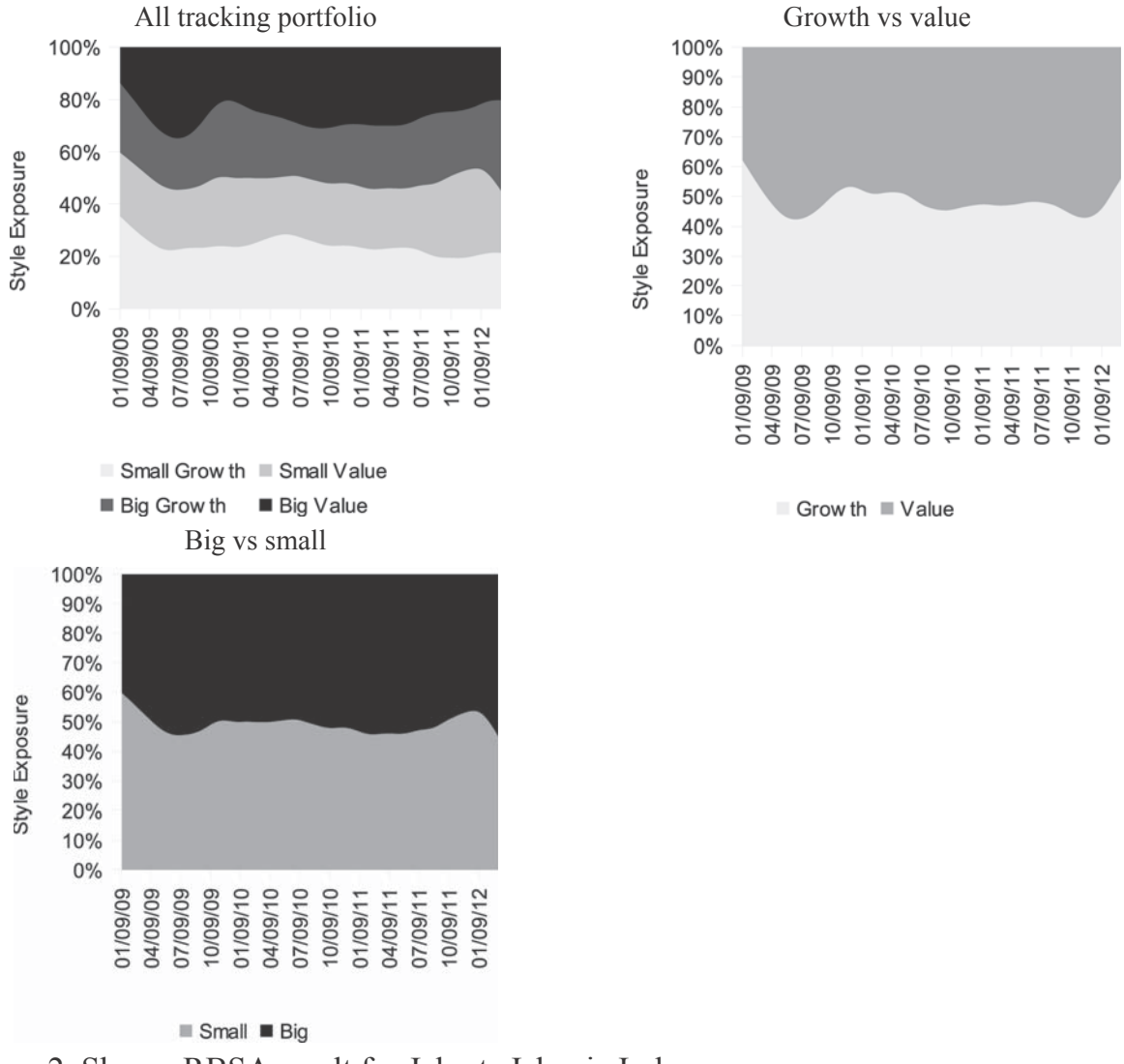


Figure 2. Sharpe RBSA result for Jakarta Islamic Index

Table 11. Rank of profitability aspect

| Rank | Index | Alpha/Beta |
|---|---|---|
| 1 | BISNIS-27 Index | 0.00191 |
| 2 | LQ45 Index | 0.00088 |
| 3 | Jakarta Islamic Index | -0.00272 |

**Stability**

We use the Sharpe Risk Based Style Analysis (RBSA) to analyze the stability aspect by using SCO Evolutionary Algorithm in Non Linear Solver for LibreOffice to mimimize sum squares of residuals. Then we calculate the style drift score by summarizing the variance of the style exposures.

The Sharpe Risk Based Style Analysis for Jakarta Islamic Index is given in Figure 2. The exposure on Jakarta Islamic Index is relatively equal. But at the beginning of 2009, the small stocks exposure on Jakarta Islamic Index is relatively high, especially for the small growth portfolio, but slowly the big stock exposure is increasing and relatively stable until the beginning of 2012. In 2012, the big stock exposure increased again with the portion over 50%. Based on the growth vs value graph, it can be seen that Jakarta Islamic Index is dominated by value stock rather than growth stock.


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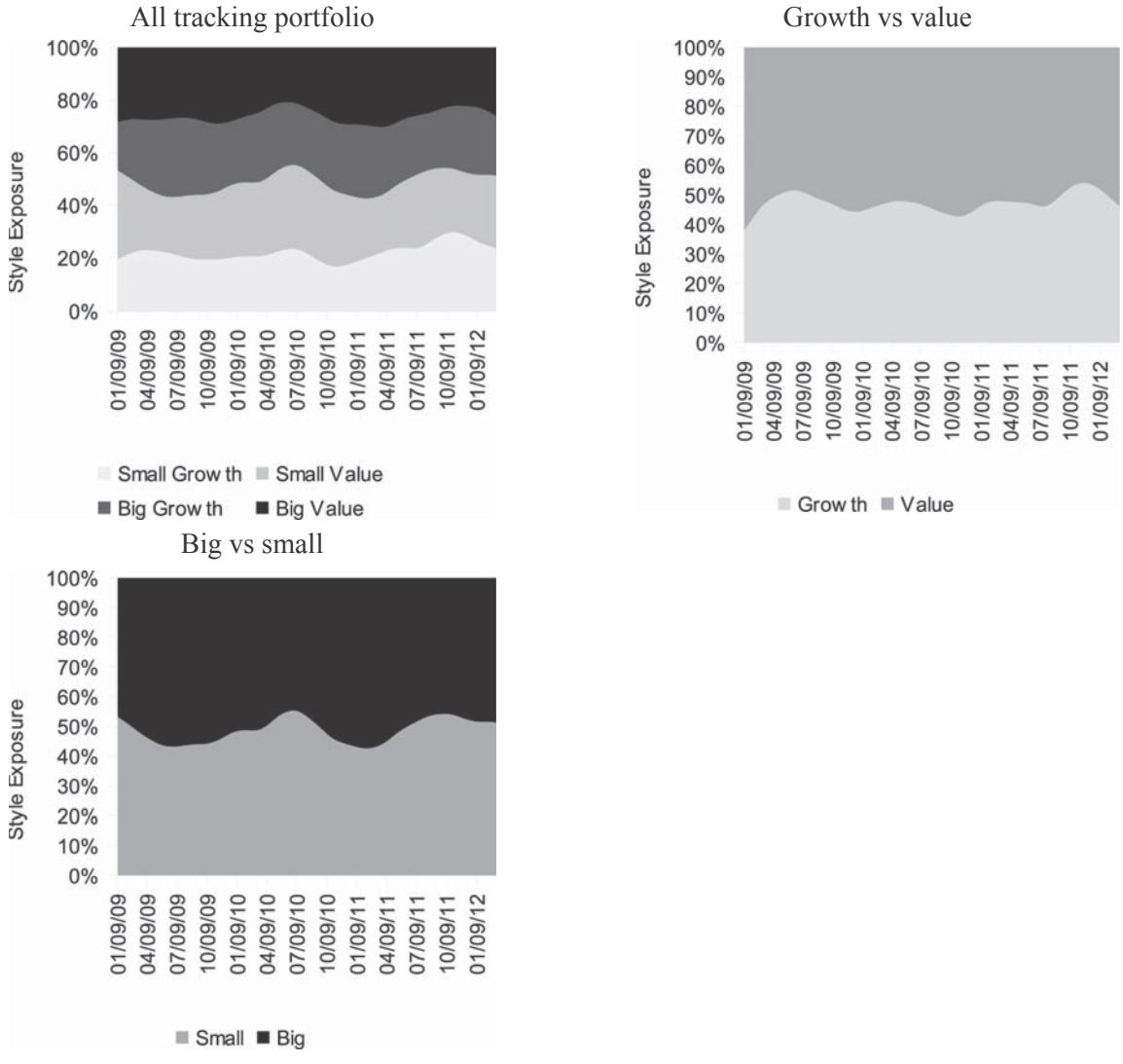


Figure 3. Sharpe RBSA result for BISNIS-27 Index

The Sharpe Risk Based Style Analysis result for BISNIS-27 Index can be seen in Figure 3. The more stable pattern can be found in the BISNIS-27 Index, small value and big growth portfolio have more exposure than the other tracking portfolios, even the difference is not big. The exposure of total value stocks is slightly higher than the exposure of growth stocks, and the exposure of big stocks is higher than the exposures of small stocks in the BISNIS-27 Index.

The Sharpe Risk Based Style Analysis result for LQ45 Index is given in Figure 4. In the beginning of 2009, the exposure of big value portfolio is higher than the others in LQ45 Index. But in 2012, small value portfolio exposure began to increase. From January to September 2009, value stock dominated growth stock in LQ45 Index, but the value of both portfolios were relatively equal between the Quarter-4 of 2009 to Quarter-3 of 2011, then the value stock exposure began to increase. Small and big stocks shared relatively equal portion in LQ45 Index.

The style drift value is calculated by summing the variance value of the style weight portfolio. As can be seen from Table 12 and 13, BISNIS-27 is the most stable index of all three because it has the lowest style drift score of 0.00319384. Jakarta Islamic Index has higher Style Drift score than BISNIS-27 Index, but is lower than LQ45 Index with 0.00467599. The last stable index according to style is the LQ45 index with Style Drift score of 0.00567379. The rank of the indexes in stability aspect is sorted by the lowest value of style drift.

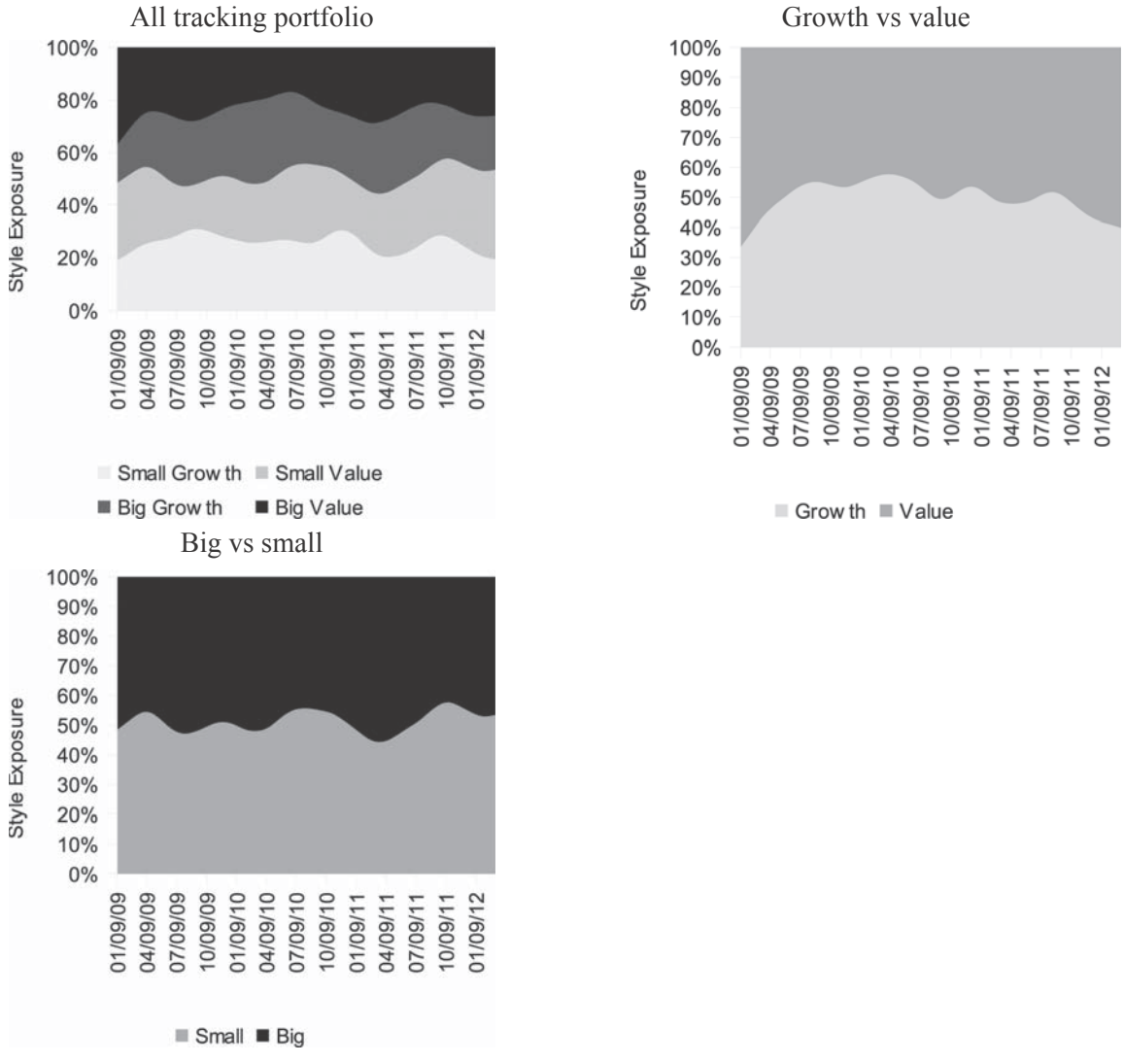


Figure 4. Sharpe RBSA result for LQ45 Index

Table 12. The variance value of style weight

| | JII | BISNIS-27 | LQ45 |
|---|---|---|---|
| Small growth | 0.00092863 | 0.00097977 | 0.00098963 |
| Small value | 0.00092667 | 0.00098171 | 0.00182446 |
| Big growth | 0.00085894 | 0.00052184 | 0.00146008 |
| Big value | 0.00196175 | 0.00071052 | 0.00139962 |
| **Style drift** | **0.00467599** | **0.00319384** | **0.00567379** |

Table 13. Rank of style drift

| Rank | Index | Style drift |
|---|---|---|
| 1 | BISNIS-27 Index | 0.00319384 |
| 2 | Jakarta Islamic Index | 0.00467599 |
| 3 | LQ45 Index | 0.00567379 |

## Efficiency

To analyze the efficiency aspect, we simulate the indexes with different asset allocation to the market portfolio, then we calculate the Euclidean Distance of the simulations to the market portfolio. The results can be seen below.

The simulation output for Jakarta Islamic Index can be seen in Table 14. In the normal amount of constituent it can be seen that like the other two indexes, Jakarta Islamic Index was mostly outperformed by the market in the terms of average return and Sharpe Ratio. Just in the 2009-2 (1st July 2009–31st December 2009), JII


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Table 14. Simulation results using different asset weighting - Jakarta Islamic Index

| Period | Asset weighting | Std. dev (risk) | Avg. return | Sharpe |
|---|---|---|---|---|
| 2009-1 | Market | 0.03617 | 0.01743 | 0.48205 |
| | Normal | 0.05329 | 0.01539 | 0.28875 |
| | Return Mimicking | 0.05959 | 0.01743 | 0.29259 |
| | Risk Mimicking | 0.03617 | 0.01445 | 0.39942 |
| | Maximum Sharpe | 0.03928 | 0.02558 | 0.65118 |
| 2009-2 | Market | 0.02138 | 0.00140 | 0.06539 |
| | Normal | 0.03158 | 0.00718 | 0.22737 |
| | Return Mimicking | 0.03750 | 0.00140 | 0.03729 |
| | Risk Mimicking | 0.02168 | 0.00485 | 0.22391 |
| | Maximum Sharpe | 0.02782 | 0.01667 | 0.59918 |
| 2010-1 | Market | 0.02733 | 0.00488 | 0.17867 |
| | Normal | 0.03729 | 0.00391 | 0.10479 |
| | Return Mimicking | 0.04689 | 0.00488 | 0.10413 |
| | Risk Mimicking | 0.02733 | 0.00069 | 0.02518 |
| | Maximum Sharpe | 0.03319 | 0.01865 | 0.56188 |
| 2010-2 | Market | 0.01518 | 0.01090 | 0.71822 |
| | Normal | 0.01995 | 0.00535 | 0.26815 |
| | Return Mimicking | 0.02127 | 0.01090 | 0.51249 |
| | Risk Mimicking | 0.01518 | 0.00836 | 0.55110 |
| | Maximum Sharpe | 0.01261 | 0.01323 | 1.04901 |
| 2011-1 | Market | 0.01987 | 0.00176 | 0.08850 |
| | Normal | 0.02708 | 0.00038 | 0.01414 |
| | Return Mimicking | 0.03035 | 0.00176 | 0.05797 |
| | Risk Mimicking | 0.01987 | -0.00310 | -0.15575 |
| | Maximum Sharpe | 0.04370 | 0.01352 | 0.30936 |
| 2011-2 | Market | 0.03415 | -0.00183 | -0.05349 |
| | Normal | 0.03959 | -0.00123 | -0.03118 |
| | Return Mimicking | 0.04686 | -0.00183 | -0.03898 |
| | Risk Mimicking | 0.03415 | -0.00149 | -0.04358 |
| | Maximum Sharpe | 0.03356 | 0.01016 | 0.30273 |
| 2012-1 | Market | 0.01346 | 0.00843 | 0.62677 |
| | Normal | 0.02291 | 0.00328 | 0.14327 |
| | Return Mimicking | 0.01464 | 0.00843 | 0.57612 |
| | Risk Mimicking | 0.01346 | 0.00663 | 0.49261 |
| | Maximum Sharpe | 0.00616 | 0.01291 | 2.09570 |

can beat the perfect market portfolio. After the simulation is performed using different asset weighting, the return mimicking scheme will increase the risk (average standard deviation of excess return). But in some schemes of risk mimicking, like 2010-2 and 2012-1, JII can produce higher average excess return than normal.

The simulation output for BISNIS-27 Index is given in Table 15. Similar to Jakarta Islamic Index, BISNIS-27 Index is mostly outperformed by the market. But in the beginning (2009-1 and 2009-2), the index had the same or higher return than the market. Interestingly not all of the return mimicking give higher risk, in 2009-1 (1st January 2009–31st July 2009), 2009-3 (1st November 2009–30th April 2010), and 2011-2 (1st November 2011–30th April 2011), the return mimicking simulation is having lower risk than normal weighting. The risk mimicking scheme has an impact on lower average return, even than normal weighting scheme return. It can be noted that in 2010-2 Risk Mimicking scheme, our solver is unable to mimic the standard deviation of the market until five digits decimal, so the value remains 0.01735 instead of 0.01722.

The simulation output for LQ45 Index is provided in Table 16. In 2009-2 (1st August 2009–31st January 2010) and 2010-1 (1st February 2010–31st July 2010), LQ45 Index can beat the market average return. But after that, the index is having lower return than market, and in 2011-2 and 2012-1, the average return of LQ45 Index is negative. The risk mimicking simulation sometimes gives higher return

Table 15. Simulation results using different asset weighting - BISNIS-27 Index

| Period | Asset allocation | Std. dev (risk) | Avg. return | Sharpe |
|---|---|---|---|---|
| 2009-1 | Market | 0.03391 | 0.01696 | 0.50002 |
| | Normal | 0.05183 | 0.01696 | 0.32712 |
| | Return Mimicking | 0.05178 | 0.01696 | 0.32752 |
| | Risk Mimicking | 0.03391 | 0.00888 | 0.26192 |
| | Maximum Sharpe | 0.05984 | 0.03141 | 0.52487 |
| 2009-2 | Market | 0.02302 | -0.00124 | -0.05384 |
| | Normal | 0.02475 | 0.00111 | 0.04496 |
| | Return Mimicking | 0.02466 | -0.00124 | -0.05027 |
| | Risk Mimicking | 0.02302 | 0.00032 | 0.01385 |
| | Maximum Sharpe | 0.01964 | 0.01082 | 0.55118 |
| 2009-3 | Market | 0.01730 | 0.00808 | 0.46709 |
| | Normal | 0.02163 | 0.00730 | 0.33725 |
| | Return Mimicking | 0.01889 | 0.00808 | 0.42776 |
| | Risk Mimicking | 0.01730 | 0.00710 | 0.41067 |
| | Maximum Sharpe | 0.01345 | 0.01390 | 1.03338 |
| 2010-1 | Market | 0.02357 | 0.00989 | 0.41954 |
| | Normal | 0.03022 | 0.00934 | 0.30894 |
| | Return Mimicking | 0.03233 | 0.00989 | 0.30578 |
| | Risk Mimicking | 0.02357 | 0.00799 | 0.33913 |
| | Maximum Sharpe | 0.02893 | 0.01907 | 0.65909 |
| 2010-2 | Market | 0.01722 | 0.00123 | 0.07144 |
| | Normal | 0.02908 | 0.00015 | 0.00525 |
| | Return Mimicking | 0.02931 | 0.00123 | 0.04197 |
| | Risk Mimicking | 0.01735 | -0.00215 | -0.12377 |
| | Maximum Sharpe | 0.04294 | 0.00972 | 0.22644 |
| 2011-1 | Market | 0.03555 | -0.00175 | -0.04916 |
| | Normal | 0.04282 | -0.00017 | -0.00391 |
| | Return Mimicking | 0.04378 | -0.00175 | -0.03992 |
| | Risk Mimicking | 0.03555 | -0.00212 | -0.05953 |
| | Maximum Sharpe | 0.06783 | 0.01380 | 0.20344 |
| 2011-2 | Market | 0.01361 | 0.00647 | 0.47519 |
| | Normal | 0.02148 | 0.00025 | 0.01169 |
| | Return Mimicking | 0.02124 | 0.00647 | 0.30458 |
| | Risk Mimicking | 0.01361 | 0.00196 | 0.14361 |
| | Maximum Sharpe | 0.01907 | 0.01167 | 0.61190 |

than normal weighting scheme like at 2009-2 and 2010-2, but the simulation has an impact on lower Sharpe Ratio value.

Afterwards, we calculate the Euclidean Distance based on the value of average return and risk of the normal weighting and the simulations to the value of the market. The rank is sorted by the lowest Euclidean Distance. The BISNIS-27 Index is in the top rank based on the Euclidean Distance. It means that portfolio manager is able to mimic the market index using BISNIS-27 Index without sacrificing returns and risk than using LQ45 Index and Jakarta Islamic Index. On the other hand, the portfolio manager needs to sacrifice either the increasing risk or lower return to mimic the market porfolio if using Jakarta Islamic Index.

Based on the profitability, stability and efficiency aspects, we can summarize the ranks of the indexes as shown in Table 18.

## Conclusion

We analyze the performance of Jakarta Islamic Index in three aspects, profitability, stability, and efficiency, compared with ordinary indexes, the BISNIS-27 Index and the LQ45 Index. The results show that BISNIS-27 Index is superior in the three aspects measured. On the other hand, Jakarta Islamic Index as the sharia index cannot outperform the BISNIS-27 Index and LQ45 Index. The key here is the portfolio selection of the indexes. The impact of sharia filtering is the choice of available assets become


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Table 16. Simulation results using different asset weighting - LQ45 Index

| Period | Asset allocation | St. dev (risk) | Avg. return | Sharpe |
|---|---|---|---|---|
| 2009-1 | Market | 0.03240 | 0.02168 | 0.66921 |
| | Normal | 0.04915 | 0.02079 | 0.42296 |
| | Return Mimicking | 0.05722 | 0.02168 | 0.37891 |
| | Risk Mimicking | 0.03239 | 0.01602 | 0.49467 |
| | Maximum Sharpe | 0.03396 | 0.02765 | 0.81418 |
| 2009-2 | Market | 0.02013 | 0.00108 | 0.05367 |
| | Normal | 0.02517 | 0.00309 | 0.12292 |
| | Return Mimicking | 0.03047 | 0.00108 | 0.03545 |
| | Risk Mimicking | 0.02013 | 0.00326 | 0.16190 |
| | Maximum Sharpe | 0.02251 | 0.01174 | 0.52176 |
| 2010-1 | Market | 0.02713 | 0.00555 | 0.20473 |
| | Normal | 0.03483 | 0.00668 | 0.19191 |
| | Return Mimicking | 0.03794 | 0.00555 | 0.14637 |
| | Risk Mimicking | 0.02713 | 0.00113 | 0.04177 |
| | Maximum Sharpe | 0.02899 | 0.01257 | 0.43354 |
| 2010-2 | Market | 0.02011 | 0.00708 | 0.35196 |
| | Normal | 0.02684 | 0.00130 | 0.04834 |
| | Return Mimicking | 0.02941 | 0.00708 | 0.24060 |
| | Risk Mimicking | 0.02011 | 0.00206 | 0.10252 |
| | Maximum Sharpe | 0.02918 | 0.01765 | 0.60501 |
| 2011-1 | Market | 0.01759 | 0.00684 | 0.38904 |
| | Normal | 0.02051 | 0.00596 | 0.29041 |
| | Return Mimicking | 0.02286 | 0.00684 | 0.29923 |
| | Risk Mimicking | 0.01759 | 0.00276 | 0.15681 |
| | Maximum Sharpe | 0.02401 | 0.01619 | 0.67434 |
| 2011-2 | Market | 0.03223 | 0.00036 | 0.01130 |
| | Normal | 0.04037 | -0.00033 | -0.00824 |
| | Return Mimicking | 0.03954 | 0.00036 | 0.00921 |
| | Risk Mimicking | 0.03223 | -0.00205 | -0.06358 |
| | Maximum Sharpe | 0.03379 | 0.00438 | 0.12948 |
| 2012-1 | Market | 0.01420 | 0.00176 | 0.12398 |
| | Normal | 0.03012 | -0.00459 | -0.15232 |
| | Return Mimicking | 0.01719 | 0.00176 | 0.10242 |
| | Risk Mimicking | 0.01420 | -0.00005 | -0.00320 |
| | Maximum Sharpe | 0.00035 | 0.00453 | 13.10413 |

Table 17. Average Euclidean Distance and rank

| Index | Normal | Rank | Return Mimicking | Rank | Risk Mimicking | Rank | Max Sharpe | Rank | average point | Rank |
|---|---|---|---|---|---|---|---|---|---|---|
| BISNIS-27 | 0.008755 | 1 | 0.008257 | 1 | 0.002967 | 2 | 0.018608 | 3 | 1.75 | 1 |
| LQ45 | 0.009605 | 2 | 0.010124 | 2 | 0.003653 | 3 | 0.009725 | 1 | 2.00 | 2 |
| JII | 0.009982 | 3 | 0.012794 | 3 | 0.002884 | 1 | 0.012979 | 2 | 2.25 | 3 |

Table 18: Final rank of the indexes

| | Profitability | Stability | Efficiency | Average point | Final rank |
|---|---|---|---|---|---|
| BISNIS-27 Index | 1 | 1 | 1 | 1.000 | 1 |
| LQ45 Index | 2 | 3 | 2 | 2.333 | 2 |
| Jakarta Islamic Index | 3 | 2 | 3 | 2.667 | 3 |

more limited than the ordinary index. The further impact of the limited choice is the competent stock cannot be captured and then degrade the performance of the index.

The BISNIS-27 Index here is the only index that applied the fundamental criteria on constituents selection process. The advantage gained on this application is the risk exposures can be lower than other indexes because the constituents are stronger on the fundamental.

The stronger constituents are necessary for the investors, especially the passive investors. Then the application of the fundamental selection can make the index to have stronger performance.

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