

BOUNDED RATIONALITY UNDER SHARIA NORMS: EVIDENCE FROM INDONESIA

Budi Purwanto (Department of Management, Faculty of Economics and Management, IPB University-Bogor Agricultural University)

Nanda Karunia Amanah (Graduate School in Management, IPB University (Bogor Agricultural University))

Email: budipurwanto@apps.ipb.ac.id

Abstract—In Indonesia, the application of Islamic norms in finance, commonly referred to as sharia finance, has recently begun to be studied from a behavioral economics perspective, especially under the hypothesis of agency problems and bounded rationality. By clustering, profiling, and portfolio analysis using data released by the Financial Services Authority (FSA) regarding sharia banking, and by Indonesia Stock Exchange (IDX) regarding sharia securities in the Indonesian capital market, this study aims to 1) identify the impact of moral restrictions in the form of sharia compliance, 2) evaluate the existence of agency problems in sharia financing, and 3) bounded rationality in portfolio investment that conforms with sharia compliance. Analysis using data from sharia finance in Indonesia indicate a bounded financing decision but does not indicate a significant agency problem, especially in profit-loss sharing financing; there are only insignificant signs. Meanwhile, the hypothesis of bounded rationality in Islamic investment portfolios is significantly proven. Sharia compliance can reduce portfolio risk but it also reduces its rate of return; and vice versa, a reduction in the level of compliance within the allowed limits can increase the rate of portfolio return but it is accompanied by an increase in risk.

Keywords—Bounded rationality, Financing, Portfolio Investment, Sharia Compliance

I. INTRODUCTION

Research on Islamic finance in Indonesia from an economic perspective, especially behavioral finance, has been carried out by Kurniawati (2016; 2018). Kurniawati has classified and analyzed the behavior of financing decisions made by Islamic banks in Indonesia by using cluster analysis and getting Islamic banks in Indonesia grouped into a) seven banks entered into the bounded rationality group, and b) only one Islamic bank enters in groups that are completely rational.

The contribution of Islamic finance in more general economic system explained by Djennas (2016) by modeling a composite index in order to analyze the risk of crises caused by financial openness and its impact on

growth and volatility of business cycles. Through a sample of 14 industrialized countries in the world, of which 8 countries are considered as leaders of Islamic finance, Djennas showed a relatively similar performance between economies where Islamic finance prevails, and other conventional economic systems, but when considering some specific components of the financial stress index, countries that adopt the principles of Islamic finance are strongly positioned to avoid various situations of crisis and economic downturns. There is possible connection to Ismail & Ahmad (2006) findings that the more services that can be offered by the financial intermediaries, the greater the chances of producing more specialized financial services and diversification of financial institutions. When the conventional financial system is mainly based on credit, and in the case of losses, the possibility of replacing capital to the issuing institution will decrease with the amount of loss. However, when the profit-loss sharing system is considered as the amount of money in circulation depending on the supply of goods and services, this balance can slow down the inflation. So, in the Islamic financial system, profit and loss is a sharing process in guaranteeing investment renewal, diversification and work creation. This is because not only can it create a project with high profits but it also ensures the interest rate plus value-added income. Economic activities will bring added value in the profit-sharing system.

Some studies also show that globally the bounded rationality of sharia Islamic stock indices is arguably more resilient in facing financial crises compared to conventional stock indices. Kim (2018) investigated the transmission of two-way volatility between the Korean joint stock index (KOSPI 200) and the S&P Sharia Stock Index (SHX) and DJIM benchmarks. The study found that SHX will act as a hedge asset that is better than the DJIM when combined with the KOSPI200. They also explained that the role of hedging by sharia assets would be effectively protected by taking a short-term position in the Islamic stock market. But the study did not explicitly identify screening of sharia stocks in Korea.

Rifqi (2016) explains that in order to be included in the Islamic index, certain shares must go through a

series of selection criteria. Although there may be differences in the criteria used in various countries, the screening process usually consists of two stages, namely screening of the company's business activities; and screening of the company's financial ratios. Overall, as determined by the sharia principles, the elimination of interest in Islamic finance can greatly reduce speculative conduct on profit-loss sharing. Accordingly, this will bring sanity back to the market and allow increased funds for the company and liquidity for shareholders.

Utami (2018) further investigated the problem of rationality in financing by sharia financial institutions in Indonesia by focusing on the imbalance in the performance of the rate of return and risk of Islamic financial products which shows that profit-loss sharing (PLS) products, namely *musyarakah* and *mudarabah*, have a higher risk but give relatively lower return than non-PLS trading-based *murabahah* products, which are lower risk but offer a higher rate of return. Based on the unevenness in performance of the rate of return and risk, Utami who focused on PLS products, tested the agency problems hypothesis in PLS financing.

Sharia compliance in portfolio investment in the capital market with issuers that only meet sharia compliance requirements, namely investment portfolios in sharia stocks, are proven to reduce portfolio risk (Amanah, Purwanto & Ermawati, 2019). However, the decline in the portfolio was also significantly followed by a decrease in the expected rate of return; on the other hand, the same population of sharia issuers but classified in several different levels of compliance, indicated that the investment portfolio with a higher rate of return under sharia compliance can be significantly obtained but it would be followed by an increase in the risk of the portfolio.

So, it is interesting to find the role of Islamic norms in the economy, especially the impact of moral restrictions on financing and investment. Does this reduce risk and increase returns? Do restrictions on sharia norms trigger agency problems?

A. Objectives

This study aims to:

1. identify the impact of restrictions under sharia norms (i.e. sharia compliance);
2. evaluate the existence of agency problem in sharia financial institutions; and
3. evaluate sub-optimality hypothesis under the bounded rationality condition in portfolio investment that consists of issuers conforming with sharia compliance requirements.

II. LITERATURE REVIEW

A. Sharia Compliance

The use of Islamic norms in finance, commonly referred to as sharia finance, measured by sharia compliance, continues to receive special attention because of its enormous potential. The increasing number of requests for sharia financial products in the global market is a sign that sharia compliance is not only attractive for Muslims but also investors in general. Reviewing the formation of counterparts based on Islamic principles provides an indication that products based on sharia compliance can continuously reduce risk. By specifically entering sharia shares as part of the portfolio, the value of the portfolio optimization will increase (Kim, 2018).

B. Bounded Rationality

Bounded rationality refers to rational principles underlying non-optimizing adaptive behavior of real people. Decision makers (irrespective of their level of intelligence) have to work under such unavoidable constraints. This concept was a classic idea proposed by Simon (1960) as an alternative to mathematical modeling of decision-making, such as that used in economics and related decision-making disciplines as a fully rational process for finding optimal choices in available information.

Moral constraints under sharia norms can be seen as bounded rationality. In their research, Derigs and Marzban (2009) succeeded in positioning the sharia compliance paradigm not only as assessed individually, but also at the portfolio management level. Islamic norms explicitly describe the level of compliance that must be measured in the rules of investment to be categorized as sharia investment. According to them, sharia compliance from individual assets to asset management in the portfolio will produce better performance if they all meet the value of sharia compliance.

Moral restrictions based on Islamic rules and principles in the issuance of financial products and the making of sharia contracts, trade transaction contracts, and other asset allocation activities in Indonesia are carried out based on POJK No. 35/POJK.04/2017 which confirms five basic principles of sharia that must be fulfilled. National Sharia Council (DSN) of Indonesian Ulema Council (MUI) has issued a fatwa No: 40/ DSN-MUI/X/ 2003 which is also listed in the FSA Regulation Number 35/POJK.04/2017 concerning criteria and issuance of list of sharia securities, determining the limit of quantitative financial ratios which must be corrected after being sterile from the qualitative rules:

1. Interest-based debt to total assets ratio is not more than forty-five percent (45%), and

2. *Non-halal* and non-legal interest income compared to total business income and other income is no more than ten percent (10%).

C. Agency Problems

The agency theory was originally stated by Jensen and Meckling (1976). They mention the manager of a company as an "agent" and the shareholder as the "principal". Agency problems arise because the objectives of the principal and agent are different and this can create a conflict of interest (Asmara, 2010). Agents tend to pursue personal goals. In the relationship between the principal and the agent, there are two types of problems, namely moral hazard and adverse selection (Beach, 2007). Moral hazard is that the principal cannot observe the actions taken by the agent, for example, the extent to which the agent carries out the task. Whereas adverse selection is an agent having personal information and knowing a better way than the principal.

The relationship sharia contracts as partners both with savers and with loan-borrowing entrepreneurs such as in profit-sharing contracts is known as the principal-agent relationship or agency relationship (Harahap, 2016). In the Islamic finance context, there are three important problems that can cause agency problems (Kurniawati, 2018): 1) Not everyone has the same information; 2) Everyone has information that is less than perfect; 3) In making transaction one party has better information than the other. To eliminate agency problems, sharia transactions require complete information so that no party feels cheated because they do not have the information known to others (Karim 2016), or in other words, there is asymmetric information.

The application of Islamic moral norms in the form of sharia compliance based on the above studies can increase economic value, and reduce risk, but also may cause agency problems.

III. METHODS

A. Data

This study uses data from the FSA for banking data, and from the Indonesian Stock Exchange for capital market data. The banking data taken is limited to financing by Islamic banks. Capital market data is limited to those covered by the requirements of formal sharia compliance. The level of reward and risk is taken from the issuers selected with compliance criteria in sharia. The first criteria regarding compliance will be evaluated based on the DSN MUI fatwa number: 40/DSN-MUI/X/2003 which is also listed in the FSA Regulation Number 35/POJK.04/2017 concerning criteria and issuance of list of sharia securities. The data used in the last quarter of 2018 is evaluated from the annual financial statements of all the companies listed on the IDX.

B. Analysis

1) Cluster Analysis of Sharia Financing

The data obtained from OJK was processed by cluster analysis and paired t-test for cluster differences. The paired t-test test is used as a comparative test or difference in quantitative data. The requirement for the paired t-test is the difference between the two groups of data that are normally distributed. The normal distribution test was carried out using the Kolmogorov Smirnov test. The decision to reject the hypothesis is a significance value less than alpha. The cluster analysis used in this study is by non-hierarchical cluster analysis (*Ward's Linkage*). The interpretation of Euclidean distance as a Pythagorean theorem is adjusted to the number of dimensions (Fielding 2007). The Euclidean distance puts progressively greater weight on far apart objects and is defined:

$$d_{ij} = \sum_{k=1}^p [(x_{ik} - x_{jk})^2]^{1/2} \quad (1)$$

d_{ij} : distance between object i and object j

x_{ik} : the value of the i -object in the k -variable

x_{jk} : the value of the j -object in the k -variable

p : the number of variables observed

(Amanah *et al.*, 2019)

Ward's method is the agglomerative observations method of hierarchical cluster analysis. Fielding (2007) explained that Ward would take the composition of cluster membership by calculating the sum square error (SSE) of the cluster average. If AB is a cluster obtained by combining groups A and B, then the sum of distances in a cluster is defined:

$$SSE_A = \sum_{i=1}^{n_A} (y_i - \bar{y}_A)'(y_i - \bar{y}_A), \quad (2)$$

$$SSE_B = \sum_{i=1}^{n_B} (y_i - \bar{y}_B)'(y_i - \bar{y}_B), \quad (3)$$

$$SSE_{AB} = \sum_{i=1}^{n_{AB}} (y_i - \bar{y}_{AB})'(y_i - \bar{y}_{AB}), \quad (4)$$

With $\bar{y}_{AB} = (n_A \bar{y}_A + n_B \bar{y}_B) / (n_A + n_B)$ and n_{AB} is the sum of the results of n_A and n_B (Amanah *et al.*, 2019). The number of indices is the number of points for A, B, and AB (denoted by SSE_A , SSE_B , and SSE_{AB}). The Ward method will combine groups A and B so that the smallest increase in SSE is obtained, defined as:

$$I_{AB} = SSE_{AB} - (SSE_A + SSE_B) \quad (5)$$

Thus, the Ward method is often the best alternative in hordes, because it forms a cluster with a small observation distance so that the size of the cluster formed is almost equal.

2) Profiling of Sharia Comply Stocks

Financial report data of all the companies listed in the sharia compliance stock (ISSI group) in the last quarter of 2018 firstly profiled as a percentage of the level of compliance based on the fatwa foundation number: 40/DSN-MUI/X/2003 which is also included in the FSA Regulation Number 35/POJK. 04/2017 concerning criteria and issuance of list of sharia securities. Quantitative financial ratio limits must be in accordance with the following formulation:

1. Interest-based total debt total asset $\leq 45\%$; and
2. Total interest income + unlawful income total business income + other income $\leq 10\%$

The compliance to the sharia stocks can be grouped into Ward clusters based on the level of sharia compliance weighted average (WASCR).

3) Portfolio Analysis and Clustering

The portfolio with the composition of sharia stocks is analyzed based on the level of compliance. Sharia stocks are then classified under weighting, optimization with the Karush Kuhn Tucker method (KKT) and Ward's Linkage method. KKT condition for a single index model of Modern Portfolio Theory (MPT) was developed and first formalized by Markowitz (1952). The Ward Linkage analysis is used to find a natural cluster of portfolios with the hope that the diversity of each cluster is different (Jolliffe, 2002). Size distance difference is the most commonly used Euclidean distance measure. The Ward method is a hierarchical cluster analysis method with agglomerative observations.

IV. RESULTS AND DISCUSSION

A. Bounded Rationality in Sharia Financing

At least since 2012, financing by Islamic banks in Indonesia is dominated by trading-based *murabaha* contract. The amount of *murabaha* financing has a larger proportion (41%) compared to that of national commercial bank similar credit, i.e. consumption loans (28%), while the financing of working capital of *mudharabah* has a smaller percentage (40%) compared to national banks of working capital loan (47%). The highest yield rate among the various financing products is the rate of return on *murabahah* financing. The rate of return from profit sharing (i.e. *mudharabah* and *musyarakah*) financing is relatively smaller. Meanwhile, judging from the risks, the highest Islamic financing products rate of return were the *mudharabah* contract with a risk of 6.47%, *musyarakah* 4.79%, and *murabahah* 3.70%. High-risk financing is profit-loss sharing (i.e. *mudharabah* and *musyarakah*). So, risks and returns on each type of financing in Islamic banks are different. Predictably, Islamic banks tend to be risk-averse, avoiding profit sharing financing, namely at *mudharabah* contracts with shares of 2.23% and

musyarakah contracts of 3.51%. Overall, seven out of eight Islamic commercial banks have risk-averse behavior by avoiding financing for profit sharing and prefer financing based on trading transactions with a fixed rate of return agreed upon in advance.

B. Agency Problem on Profit-Loss Sharing Financing

Profit sharing financing is a type of natural uncertainty contract (NUC), namely the existence of income uncertainty depends on the results of investment decisions of debtor/fund managers who have better business information than banks/fund owners (asymmetric information). Therefore, banks behave in risk-averse by not channeling financing for profit sharing such as *mudharabah*. The Bank disburse *musyarakah* financing more as an alternative profit-sharing financing, which actually raises a high-risk financing problem (adverse selection). By analyzing the agency function and the rate of equal profit sharing return ratio, and the ratio of non-performing financing through analysis of Islamic Bank data in Indonesia 2012-2016, as reported by Utami (2018), that the agency function in profit-loss sharing financing is not enough to prove that adverse selection exist. There is a tendency for indications of risk-averse but it is not significant. Likewise, there is a tendency for adverse selection but it is also not significant. The indication of the occurrence of agency problems in the distribution of profit-loss sharing financing still requires further research.

C. Bounded Rationality on Sharia-Compliant Portfolio

Sharia compliance in investing in the Indonesian capital market is based on the FSA Regulation number 35/POJK.04/2017 concerning Sharia Securities Criteria and Issues. Based on the sharia compliance criteria, stocks that meet sharia compliance (ISSI group) have capitalized reaching IDR 3,704.54 trillion in 2017. In addition, Islamic bonds (*sukuk*) have also increased significantly to reach a capitalization of Rp33.68 trillion in September 2018. The net asset value (NAV) of Islamic mutual funds reached Rp33.97 trillion in November 2018 or 6.8% of the total national mutual fund market which has a capitalization of Rp.499.52 trillion. The results of the stock portfolio analysis that meets sharia compliance are grouped into three Ward clusters based on the level of sharia compliance weighted average (WASCR) with portfolio formation in two approaches or orientations, namely minimizing risk and maximizing returns, and the results obtained can be seen in Table 1.

The sharia-compliant investment portfolio with higher compliance (lower WASCR) with the formation approach minimizes risk, can significantly reduce portfolio risk. However, the decline in risk was also followed by a significant decrease in the level of portfolio returns. Conversely, the establishment of a compliant sharia stock portfolio with an orientation to

maximizing the rate of return can also be done by reducing the level of compliance (WASCR is higher but still under the regulations permitted by the FSA), but this is also significantly followed by an increase in portfolio risk.

In general, sharia compliance can reduce portfolio risk but is followed by a decrease in the rate of return too, and vice versa, a lesser compliance level can increase the rate of return and is accompanied by an increase in risk. In other words, bounded rationality hypothesis, that is conformity with sharia compliance, is supported by data for the investment portfolio of sharia compliance stocks.

TABLE 1 . PORTFOLIO PERFORMANCE BASED ON PORTFOLIO CLUSTER AND COMPOSITION APPROACH

		Portfolio Cluster Based on Compliance		
Approach		1	2	3
Minimizing Risk	WASCR	19.23%	12.64%	10.16%
	Return	1.28%	0.58%	0.87%
Maximizing Return	Risk	0.28%	0.08%	0.27%
	N	2	12	10
	WASCR	Na	12.78%	9.27%
	Return	Na	0.58%	0.87%
	Risk	Na	0.08%	0.27%
	N	Na	18	6

WACSR: weighted average of sharia compliance rate

V. CONCLUSION

Data from Islamic finance in Indonesia show that sharia compliance is matter but in case of profit-loss sharing does not show any real agency problems, rather only a few indications that are not significant. Meanwhile, the hypothesis of bounded rationality, that conforms with sharia compliance, is evident in portfolio investment. Sharia compliance can reduce portfolio risk but is followed by a decrease in the rate of return too, and vice versa, a smaller compliance level can increase the rate of return and is accompanied by an increase in risk.

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