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How Islamic Rural Bank Overcomes the Trade-off Between Sustainability and Outreach: Does Market Competition Matter?

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Abstract

There was no consensus on how to deal with the trade-off between maintaining sustainability and outreach of microfinance institutions among researchers. This research aims to find out how Islamic rural banks balance the demands for sustainability and financial outreach at the same time where competition in the microfinance segment is increasing. The paper provides time series data which includes monthly industry data from Islamic Rural Bank for a period of more than 14 years starting from January 2009 to March 2023. In the first analysis, an estimate of the level of market competition is computed by the Lerner Index (LI) of each period. Furthermore, the efficiency analysis of Data Envelopment Analysis (DEA) is used to measure efficiency which allows estimation of efficiency performance using multiple inputs and outputs to understand how Islamic Rural Bank deals with sustainability and outreach. Finally, a Vector Autoregression/Vector Error Correction Model (VAR/VECM) analysis is used to analyse the relationship between the level of market competition and the efficiency of Islamic Rural Bank in achieving sustainability and outreach objectives. The results of the study suggest that by using a production approach, Islamic Rural Bank can operate efficiently while maintaining sustainability and outreach objectives without trade-offs. In addition, market competition has a moderate influence on achieving sustainability goals and their outreach. This research examines how Islamic Rural Bank is one of the microfinances to overcome the trade-off between the goals among high competition and the increasing financial needs of customers. The Microfinance model from Islamic Rural Banks can be replicated in other microfinance institutions (MFIs) to reach both outreach and sustainability goals.

Keywords: Islamic Rural Bank; Sustainability; Outreach; Market Competition
JEL classification: C14, D40, G21

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1. Introduction

The existence of Rural Bank in Indonesia has a specific purpose; to provide financial services for low-income people and micro-Small enterprises (MSE) both in Urban and rural areas. Based on the Greuning, Gallardo and Randhawa (1999) categorization of microfinance institutions (1999), Islamic Rural Bank can be included as category C of MFIs whose sources of funds mainly contribute from the public in a limited product to raise funds because Islamic Rural Bank can only provide savings and time deposits supervised by the supervisory agency.

Initially, the Banking Law stated that Islamic Rural Banks (IRB) operations were relatively limited, covering activities to raise savings and provide financing as well as to diversify portfolios on deposit in Islamic commercial banks. Furthermore, Islamic Rural Banks are prohibited from providing financial services on demand deposits, issuing cheques, participating in remittance businesses, adopting business in foreign currency, capital investment, and conducting insurance businesses.

Based on Law No. 4 of 2023, IRB now allowed to provide remittance services and foreign currency exchange. However, it is still not permitted to provide demand deposit services, or foreign currency transactions, and there is a restriction on operating area (up to two/three neighboring provinces). Generally, Islamic Rural Bank has relatively similar objectives and characteristics to other MFIs. MFIs have two main objectives that must be achieved at once; sustainability and outreach. MFIs in running their business have to generate a decent profit so that their activities can be sustainable. MFIs are responsible for broadening their financial services to give low-income people affordable and inclusive services (Ledgerwood, Earne & Nelson, 2013).

Islamic Rural Bank assets, which are one of the microfinance institutions have been increasing exponentially for the past 15 years (Financial Services Authority of Indonesia, 2023). The tight competition in the microfinance segment and the requirement to be sustainable can hamper their responsibility to provide inclusive financial services (Assefa, E., Hermes, N., & Meesters, A (2013). Besides, the government enforces Commercial banks to provide their services in the MSE segment by raising the ratio of MSE loans to 30% of total financing (Department of MSMEs and Consumer Protection, Bank Indonesia, 2023).

How Islamic Rural Bank can maintain sustainability and outreach goals amid high competition in the micro and small financial services have discussed by Muhari & Hosen (2015), Agustina, Sholihin, & Fithria (2019), Devi & Firmansyah (2018), Moechdi, et. al. (2016), Muhammad, Suluki & Nugraheni (2020), Risfandy et. al. (2019), Risfandy & Pratiwi (2022), Sudarsono, Afriadi & Suciningtias (2021), Trinugroho, Risfandy & Ariefianto (2018), and Wasiaturrahma et. al. (2020).

Prioritizing sustainability goals can hamper low-income people who have limitations in accessing financial services, on the other hand prioritizing outreach goals by reaching more low-income people cannot guarantee MFI sustainability. Thus, IRB must be able to remain efficient to be able to balance these two objectives (Muhari & Hosen, 2016). This research examines how Islamic Rural Bank as one of the microfinance institutions overcomes the trade-off between these goals to remain sustainable and maintain the outreach amid high competition.

2. Literature Review

In line with Greuning, Gallardo & Randhawa (1999), Mersland & Strom (2014a) defines MFIs as Institutions that lend in small amounts (which sometimes do not require collateral) with relatively short installments and target the groups that are not covered by commercial banking services. The trade-off between sustainability and outreach goals of microfinance institutions has been widely debated (Abeysekera, Oguzoglu, and Thanh, 2014), different results were stated by a study by Arief, Izmuddin & Puteri (2019) who found that sustainability has positive effect on increasing Islamic Rural Bank outreach.

To guarantee the sustainability of microfinance institutions, they need to maintain profitability at optimal levels while at the same time able to minimize the cost of providing financial services (Mersland & Strom, 2014b). The profit margin of microfinance market is relatively higher compared to commercial banking because the financial risk in this segment is relatively high as well (Bandyopadhyay & Shankar 2014). Therefore, many commercial banks are also targeting the micro and small business segment (MSE) to increase profitability (Assefa, Hermes, & Meesters, 2013). Even non-bank financing institutions have started to enter this segment, thereby the level of profitability in financial institutions that were traditionally in the MSE segment was gradually reduced (Henthorne, 1988).

The increased level of competition in the MSE segment has led microfinance institutions to minimize costs that may arise while maintaining profitability levels. However, minimizing costs is a problem for microfinance institutions considering that operationally they have to reach lower-income customers who have limited access to commercial financial services (Mersland & Strom, 2014b). Several factors that can affect the sustainability of Islamic rural banks in Indonesia are the amount of assets, the spread of the cost of funds, and the amount of capital (Moechdi, Ananda & Yustika, 2016).

It is not uncommon for microfinance institutions to rely on subsidies and grants for operational costs (Doshi, 2010). Instead of receiving donations such as grants or donors, Islamic Rural Banks in Indonesia should be incorporated as Limited Liability Companies (Perseroan Terbatas/PT) to generate profit. Moreover, the subsidies to microfinance institutions can lead to high dependency and be unsustainable when the subsidies are revoked (Kar & Swain, 2014). Therefore, Microfinance Institutions should be able to create sustainability while maintaining outreach to their customers (Tamanni & Liu, 2017 and Balkenhol, 2007). There are three aspects in understanding the performance of microfinance institutions, namely financial sustainability, service coverage, and the relationship between the two (Mersland & Strom, 2014b).

In addition based on the sustainability aspect, microfinance institutions must be able to provide outreach in financial services to customers, through both savings products and financing products (Abeysekera, Oguzoglu, & Thanh (2014), Kar & Swain (2014), Balkenhol (2007), Luzzi & Weber (2007)). Not only to raise the quantity but also the financial products are expected to be of higher quality by taking into account customer needs (Tamanni & Liu, 2017). Therefore, it is expected that the financial services needed by lower middle-class people can be bridged by microfinance institutions. Moreover, microfinance institutions or Islamic Rural Bank have an advantage in maintaining close relationships with their

customers compared to commercial banks. Among recent technological developments, office services for MFI customers are still needed, especially those in rural areas who require face-to-face services (Meyer, 2013).

Amid microfinance institutions that must be financially independent and are expected to be able to expand financial inclusion, competition is also the main problem for microfinance institutions. This challenging situation is proved by the competitive conditions in this sector in Indonesia, where at least five market players are controlling around 70–80% market share. The microfinance sector is controlled by commercial banks that have micro and small financial services and may be able to achieve outreach goals considering the large amount of capital they have (Tamanni & Liu, 2017). Responding to this competition, microfinance institutions will focus on commercial principles which are feared to sideline their outreach development mission. This shift occurred in small credit institutions in Vietnam, where the goals of outreach were still maintained at the beginning of the institution's establishment and remained in line with the age of the institution (Abeysekera, Oguzoglu, and Thanh, 2014).

Islamic Rural Bank can optimize its performance for both sustainability and outreach purposes by increasing its efficiency. The results of the research suggested by Wasiaturrahma (2020) suggested that Islamic Rural Banks experience inefficiency when perceived from the financial intermediation approach, whereas, in the production efficiency approach, Islamic Rural Banks are much more efficient. The problem with increasing efficiency lies in the small economies of scale and economies of scope of Islamic Rural Bank because of the requirement of minimum equity.

This is also in line with Devi & Firmansyah's research (2019) which states that capital capacity will affect the efficiency of the Islamic Rural Bank, especially in its role as a financial intermediary institution. Sudarsono (2021) explains that an increase in assets owned by islamic rural banks has an impact on decreasing profitability, which indicates that there are problems in asset management that should be able to be optimized to generate higher profits. Assefa, Hermes, & Meesters (2013) and Trinugroho, Risfandy & Ariefianto (2018) state that microfinance institutions, including Islamic rural banks, do not have sufficient ability to dominate a wider market compared to commercial banks who have larger equity. Islamic rural banks as microfinance institutions tend to use operational instruments as well as profit optimization to remain competitive. Therefore, the Lerner Index (LI) is more suitable to use in Islamic Rural Bank and other microfinance institutions compared to the Herfindahl–Hirschman index (HHI) in measuring the level of competition for Islamic Rural Bank in the micro, small and medium financial markets.

With this high level of competition, microfinance institutions will respond by diversifying their financial services to retain customers or attract new customers (Assefa, Hermes, & Meesters, 2013). Islamic rural banks are one of the microfinance institutions as well as one of the forms of Islamic banks whose goals are not only to generate profit but also have social concerns such as poverty alleviation, meeting financial needs, and fulfilling spiritual needs (Hassan & Mollah, 2018).

Islamic Rural Bank as a financial institution with Sharia principles also benefits from its status as an Islamic bank, for instance, the high financing margin does not affect customers who have strong religious belief (Risafndy, et. al., 2019). In line with the objectives of sustainability and outreach, Islamic Rural Bank has many contract innovations both in savings and financing products. Trinugroho, Risfandy & Ariefianto (2018) stated that Islamic banks have more diverse financing characteristics compared to conventional banks. Ideally, Islamic banks manage to finance using contracts based on profit sharing (*syirkah*), buying and selling (*bai'*), and leasing (*ijarah*).

Furthermore, diversification of financing is proven to be able to reduce Islamic Rural Bank margin levels and generate more affordable lending products by Islamic Rural banks. Islamic Rural banks are expected to maintain profitability level while they must expand their inclusive financial services to alleviate poverty (Mselek, 2020). However, Risfandy & Pratiwi (2022) suggested that Islamic Rural Banks should focus more on their function as financial institutions compared to diversifying income outside of banking activities after perceiving the impact that occurred on Islamic Rural Banks during the Covid-19 pandemic which had an impact on economic activities. This also considers that the Islamic Rural Bank has a role in optimizing financial services in its niche market, especially for those underserved by commercial financial services.

3. Research Method

This study uses time series data from monthly industry data reports of Islamic Rural Bank for more than 14 years from January 2009 to March 2023. This research examines how Islamic Rural Bank achieves sustainability and outreach objectives amid tight market competition in the micro and small enterprise services and lower-income customers. In the first analysis, an estimate of the level of market competition is measured by the Lerner Index (LI) for micro, small, and medium finance. Furthermore, the efficiency analysis of Data Envelopment Analysis (DEA) is used to measure Islamic Rural Bank's efficiency performance which allows estimation of efficiency performance using multiple inputs and outputs to better understand sustainability and outreach goals. In the final stage, a Vector Autoregression/Vector Error Correction Model (VAR/VECM) analysis is used to analyze the relationship between the level of market competition and the efficiency of Islamic Rural Bank in achieving sustainability and outreach objectives. Lerner Index is used to estimate market competition where this index estimates the balance between the output value produced and the average marginal cost incurred by banks, in other words, the Lerner Index will analyze whether banks can monopolize or there is perfect market competition (Gischer, Muller, & Richter, 2015). The Formula of Lerner Index of Islamic Rural Banks is explained in Equation (1) and (2).

In determining inputs and outputs in the DEA method, several approaches can be used. Hadad, Santoso, Mardanugraha & Illyas (2003) explained that there are three approaches used in defining input-output from financial institutions in parametric and non-parametric methods namely; *first, the production approach*, which perceives financial institutions as producers of deposit accounts and loans; defines output as the sum of those accounts or

related transactions. The inputs in this case are calculated as the sum of labor, and capital expenditures on fixed and other material assets. *Second, the intermediation approach* perceives a financial institution as an intermediary: Changing and transferring financial assets from surplus units to deficit units. In this case institutional inputs such as labor and capital costs and interest payments on deposits, with outputs measured in terms of credit loans and financial investments. *Third, the asset approach* perceives the primary function of a financial institution as a credit creator. The latter is an asset approach that visualizes the primary function of a financial institution as a credit creator; it is very close to the intermediation approach, where output is defined in terms of assets.

Based on the purpose of Islamic Rural Bank as a part of Microfinance Institutions which has the goal of expanding outreach and continuing to be sustainable, a production approach is used as previous research conducted by Wasiaturrahma (2020) with the argument that banks provide output in the form of financial services either in savings and financing/lending products. The input component is operational cost, assets, branches, and labor, meanwhile, the output component are number of saving, number of financing, and revenue.

Referring to Mersland & Strom (2014a) output component, the Average Savings (AVS) variable which calculates the average amount of savings owned by customers, and Average Financing (AVF) which calculates the amount of financing provided to customers is used as a proxy for Islamic Rural Bank outreach. Another output component is the Islamic Rural Bank revenue variable, which is a proxy for Islamic Rural Bank sustainability. The input component in this study used variables that are the basis for the operation of microfinance institutions, namely assets, operational costs, branch offices, and workforce.

3.1 Lerner Index

Banks compete with each other to manage third party funds and financing so that several studies have used some method to measure market competition, including using the Herfindahl-Hirschman Index (HHI) or the Lerner Index (LI). Particularly for Islamic Rural Bank in Indonesia, the Herfindahl-Hirschman Index has weaknesses because the operational areas of Islamic Rural Bank are limited up to three neighboring province and competition is not involve Islamic Rural Bank but also by conventional Islamic Rural Bank, Commercial Banks, and Cooperatives. The Lerner Index is more superior than the Herfindahl-Hirschman Index because it is estimating the marginal costs and benefits incurred by each unit or entity. The Lerner Index formula in this study will use the formula developed by Gischer, Muller & Richter (2015) in analyzing market competition measurements for banks.

Furthermore, the Lerner Index is used to measure market competition by adapting the formula formulated by Gischer, Muller, & Richter (2015) estimated marginal costs and benefits. The formulation of the Lerner Index (LI) in this study is as follows:

$$LI = \frac{P(Q) - MC(Q)}{P(Q)} \quad (1)$$

The Lerner Index (LI) in the banking system defines the balance between the output value produced and the average marginal cost issued by the bank, meanwhile Q is the

amount of goods/services sold. The ability to set prices above the marginal cost and meet market demand means that the value of LI will be even higher. The LI value ranges between 0 (perfect competition) and 1 (monopoly competition). Furthermore, to estimate LI results, equation 1 can be reduced to the following equation:

$$LI_{it} = \frac{\sum_{a=1}^{n} A_{it}^{a}.i_{it}^{a} \Big/ \sum_{a=1}^{n} A_{it}^{a} - \sum_{p=1}^{n} P_{it}^{p}.j_{it}^{p} \Big/ \sum_{p=1}^{n} P_{it}^{p}}{\sum_{a=1}^{n} A_{it}^{a}.i_{it}^{a} \Big/ \sum_{a=1}^{n} A_{it}^{a}} \quad (2)$$

Where $A_{t,k}^{a}$ are productive financing assets for each category and $P_{t,k}^{p}$ are third party funds for all categories whose profit sharing or bonus is charged to the bank. The cost of funds from financing and third-party funds are denoted i_{it}^{a} and j_{it}^{p}. respectively.

3.2 Data Envelopment Analysis

DEA is a linear programming technique for measuring how a Decision-Making Unit (DMU, in this study, is a bank) operates relative to the other banks in the sample. This technique makes a frontier line set by efficient banks and compared with inefficient banks to produce efficiency values. Furthermore, bank efficiency scores range from 0 to 1, where 1 is the most efficient value.

In the DEA analysis, the most efficient bank (with an efficiency value of 1) does not need to produce the maximum level of output from existing inputs. Furthermore, this bank is a bank with best practice output levels compared to other banks in the sample. The term DEA was introduced by Charnes, Cooper and Rhodes (1978), based on Farrell's (1957) research. For n in DMUs in the banking industry, all output and input samples are denoted by m and n, respectively. The efficiency level of each bank is calculated as follows (Yudistira, 2004):

$$e_s = \sum_{i=1}^{m} \frac{v_i v_{is}}{\sum_{j=1}^{n} v_j v_{js}}, for\ i = 1, \dots, m\ and\ j = 1, \dots, n, \quad (3)$$

Where y_{is} is the ith output produced from the s-bank, x_{js} is the jth input issued by the s-bank, u_i is the output weight, v_j is the input weight. The efficiency ratio (e_s) is then maximized to select the optimal weight depending on:

$$\sum_{i=1}^{m} v_i y_{ir} / \sum_{j=1}^{n} v_j x_{jr} \leq 1, for\ r = 1, \dots, N\ and\ v_i\ and\ v_j \geq 0, \quad (4)$$

Where the first inequality ensures that the efficiency ratio is at least 1 and the second inequality ensures that the efficiency weight is positive. Based on Charnes, Cooper and Rhodes (1978), this linear programming can be transformed into ordinary linear programming:

$$Max.\ e_s = \sum_{i=1}^{m} v_i y_{is} \quad (5)$$

$$Constraint\ \sum_{i=1}^{m} v_i y_{is} - \sum_{j=1}^{m} v_j x_{ir} \leq 0, r = 1, \dots N; \quad (6)$$

$\sum_{j=1}^{m} v_j x_{js} = 1 \; and \; v_i \; and \; v_j \geq 0$ (7)

In the same way, programming can be converted into two constraints:

$Minimize \; \xi_s$
$constraint \; \sum_{r=1}^{N} \varphi_r y_{ir} \geq y_{is,} \; i = 1, \ldots, m;$ (8)
$\xi_s x_{js} - \sum_{r=1}^{N} \varphi_r x_{ir} \geq 0, j = 1, \ldots, n; \; \varphi_r \geq 0,$ (9)
$and \; 0 \leq \xi_s \leq 1.$ (10)

Where ξ_s is all the technical efficiency values of the s-bank, where the value 1 indicates the frontier point. Furthermore, there are two conditions required in estimating efficiency values with DEA, namely 1) The weight cannot be negative; and 2) The weight must be universal. This means that each DMU in the sample must be able to use the same set of weights to evaluate the ratio (total weighted output/total weighted input) and the ratio is not more than 1 (total weighted output/total weighted input ≤ 1). DEA assume that each DMU will have a weight that maximizes its efficiency ratio (maximizes total weighted output/total weighted input). This efficiency ratio maximization assumption makes this DEA study use output orientation in calculating engineering efficiency. Another orientation is input minimization, but the two assumptions will yield the same results. Each DMU uses a different combination of inputs to produce a different combination of outputs, so each DMU will select a set of weights that reflect that variation.

Each DMU tends to have a minimum input usage pattern on inputs that have a high weight or a maximum output production pattern on outputs that have a high weight to achieve a maximum level of efficiency. The selected weights do not merely describe an economic value, but rather constitute a quantitative plan to maximize the efficiency concerned (Yudistira, 2004).

This condition can be described if a DMU is a profit-oriented company (profit-maximizing firm) and each input-output has a cost per unit and a selling price per unit. This means that the company will use as little as possible the input with the highest per-unit cost or try to produce as much output as possible with the highest selling price. A DMU is said to be relatively efficient if its dual value is equal to 1 (100 percent efficiency value), conversely, if the dual value is less than 1 then the DMU concerned is considered to be relatively inefficient (Coelli, et. al., 2005).

3.3 Vector Auto Regression/Vector Error Correction Model

The analytical method used in this research is vector autoregression (VAR). VAR is defined as a non-structural approach (as opposed to a structural approach, such as the simultaneous equation) which describes the "causalistic" relationship between variables in the system. In this method, it is assumed that all variables contained in the model are endogenous (defined in the model). Therefore, the VAR method is referred to as an a-theoretical model (not based on theory). This method is used because we often encounter situations where economic theory alone is unable to capture (not rich enough to provide

specifications) accurately and completely the dynamic relationship between variables (Ascarya, 2009).

This VAR model actually also answers the challenges of difficulties encountered due to structural models that must refer to theory. Or in other words, the VAR model does not depend much on theory, but we only need to determine the interacting (causing) variables that need to be included in the system and the number of lag variables that need to be included in the model which is expected to "capture" the relationship between variables in the system (Gujarati, 2021). Therefore, the first step that must be taken before forming a VAR model is to look at the causality relationship between variables by using the Granger Causality Test. Adapting the model proposed by Gujarati (2021), the VAR model in this study can be written as follows:

$$LI_{1t} = \alpha + \sum_{i=1}^{k} \beta_i \, LI_{t-1} + \sum_{i=1}^{k} \gamma_i EFF_{t-i} + \mu_{1t} \quad (11)$$

$$EFF_t = \alpha' + \sum_{i=1}^{k} \theta_i LI_i EFF_{t-i} + \sum_{i=1}^{k} \gamma_i EFF_{t-1} + \mu_{2t} \quad (12)$$

The above equation describes the causal relationship between the level of market competition in the micro, small and medium finance (LI) segment and the efficiency carried out by Islamic Rural Bank (EFF). The μ' value describes the stochastic error terms which in VAR are referred to as impulses or innovations or shocks. Although the individual coefficients in the estimation of the VAR model are difficult to interpret, interpretation of the Impulse Response Function (IRF) can predict the response of the dependent variable in the VAR model to shocks due to term errors. The first test to be carried out is the unit root test. This test is conducted to find out whether the data is stationary or still contains a trend. If the data is stationary at the level, then the VAR can be carried out at the level test. VAR level can estimate the long-term relationship between variables. However, if the data is stationary at the level, then the data must be derived at the first level. If the data is stationary in the first derivative, then the data will be tested for co-integration between variables, so VAR can only be performed on the first derivative. However, under these conditions VAR can only estimate short-term relationships between variables. If there is co-integration between variables, then VECM can be carried out using level data to obtain long-term relationships between variables Ascarya (2009). The VECM model as proposed by Alogoskoufis & Smith (1991) is as follows:

$$\Delta y_t = \frac{\delta\mu(1-\mu)(1-\rho)g}{(1-\delta\mu)(1-\rho\delta\mu)} + \frac{1-\mu}{1-\rho\delta\mu}\Delta y_t^* - (1-\mu)(y_{t-1} - y_{t-1}^*) \quad (13)$$

where g is the growth rate at steady state while ρ is the persistence of the growth rate with ρ is one.

4. RESULTS AND DISCUSSION

4.1 Measuring Market Competition

Lerner Index of Islamic Rural Bank in Indonesia which measures the relationship between the amount of financing margin charged by Islamic Rural Bank to customers and the marginal cost in the form of cost of funds from third party funds. The Lerner Index is an indicator of the profit cost margin that determines the impact of market forces on the price and demand for Islamic Rural Bank products, both in the form of savings and financing products. Indicator 0 indicates perfect competition for Islamic Rural Bank and Indicator 1 indicates monopoly competition.

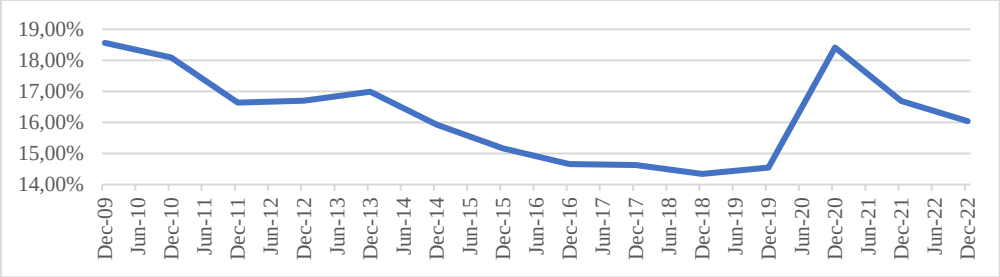


Figure 1. Lerner Index of Islamic Rural Banks in Indonesia
Source: Financial Services Authority (data processed, 2023)

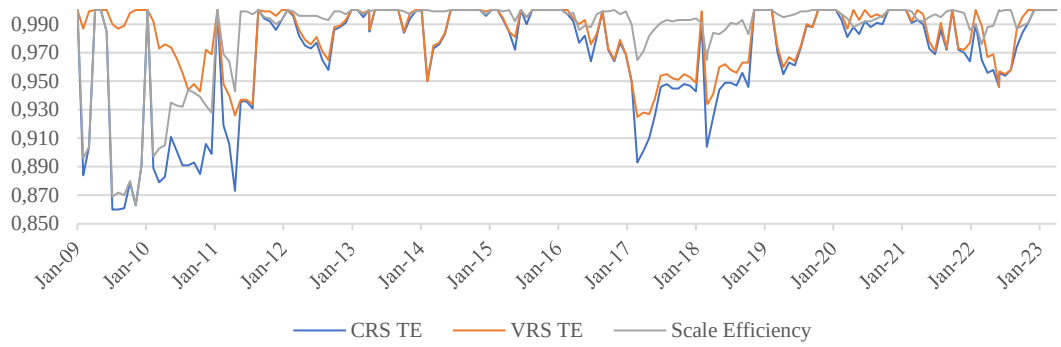
The Islamic Rural Bank Lerner Index has shown a downward trend in the last 14 years, although in the 2019 to 2020 period it has experienced an increase in line with the decline in economic activity due to the Covid-19 pandemic. Risfandy & Pratiwi (2022) suggested that during this period Islamic Rural Bank experienced difficulties in trying to maintain profitability which was accompanied by an increase in problem financing. Along with the easing of social restrictions, the Islamic Rural Bank Lerner Index again showed a decline indicating that the determination of the business environment of the Islamic Rural Bank tends towards a perfectly competitive market.

4.2 DEA Efficiency

Islamic Rural Bank efficiency levels show quite diverse fluctuations during the study period. On average, the overall efficiency level is 0.985 or 98.5% whereas the efficiency level in the period 2009 to 2011 was at the lowest level during the study period, namely below 0.9 or 90%. In general, constant return to scale (CRS) efficiency is lower than scale efficiency and variable return to scale (VRS) efficiency. The efficiency level of Islamic Rural Bank has again decreased quite substantially in the period 2017 to 2018 and again experienced a slight decline in the period 2020 to mid-2022. At the end of 2022 to early 2023, the efficiency level of Islamic Rural Bank has shown efficiency whereas the Islamic Rural Bank DEA Efficiency value shows a value of 1 or 100% in the last four months.

Islamic Rural Bank input shows the components that determine the continuity of the Islamic Rural Bank function as a microfinance institution capable of providing financial services to people who are not covered by commercial banking services (*outreach*) whilst

maintaining business continuity (*sustainability*). The Actual line depicts input costs incurred in real terms and the target line shows the target amount of input costs that should be incurred by the Islamic Rural Bank so that the efficiency target is achieved.



***CRSTE**: Technical efficiency from CRS DEA, **VRSTE**: Technical efficiency from VRS DEA, **Scale Efficiency**: CRSTE/VRSTE.*

The Mean of CRSTE, VRSTE, and Scale Efficiency are 0.967, 0.982, and 0.985.

Figure 2. DEA Efficiency of Islamic Rural Banks in Indonesia

Source: *Financial Services Authority (data processed, 2023)*

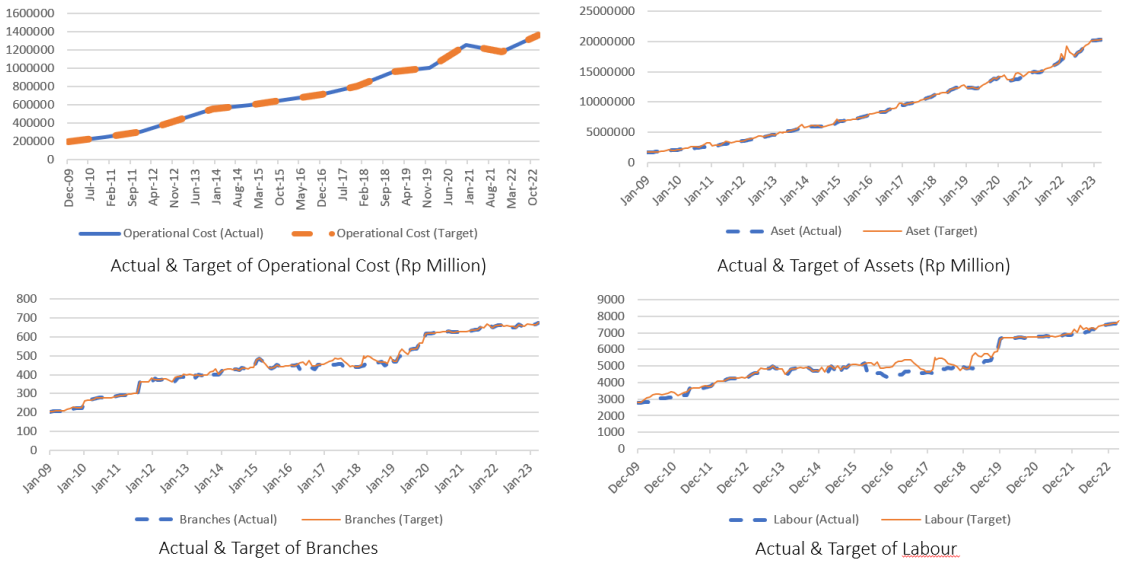


Figure 3. Actual & Target of Input Components

Source: Financial Services Authority (data processed, 2023)

In the last fourteen years, Islamic Rural Bank assets have increased exponentially. This increase was also accompanied by an increase in the number of branch offices and the number of workforce, which in turn increased the operational costs of Islamic Rural Bank in the same period. On the actual & target operational cost graphs, the operational costs that have been

incurred are equivalent to the targets that have been set. Likewise, the assets owned by the Islamic Rural Bank during the study period showed a similar trend where the actual and target assets of the Islamic Rural Bank, but in the early 2022 period, larger assets were needed thus the outreach function and sustainability of the Islamic Rural Bank could be achieved.

It is interesting that in the period of 2015 to 2017 the actual & target components of the Islamic Rural Bank show that the Islamic Rural Bank should be able to increase the number of offices and also its workforce so that the resulting output in the form of third party funds, financing and income can be more optimal. This is in line with the decline in the Islamic Rural Bank Lerner Index so it can be argued that the level of market competition must be responded to by optimizing input from the components of physical office services and manpower. As stated by Meyer (2013) the presence of a physical office and direct interaction is still relevant and needed in the microfinance segment, especially those in rural areas where technology penetration is not very fast. Islamic Rural Bank itself is a small-scale bank with a segmented niche market thus emotional relationships with customers need to be maintained amidst the increasing of fierce market competition.

Meanwhile, the Islamic Rural Bank Actual and Target Output Components show that the achievement of income, average savings, and average financing are in line which indicates that the increase in the performance of Islamic Rural Bank sustainability and outreach has been efficient. In addition, both average savings and average are increased dramatically over the last fourteen years. As Wasiaturrahma (2020) study used DEA input-output specification using a production approach, the performance of Islamic Rural Bank shows its efficiency as a microfinance institution capable of providing financial services to people who are underserved by Commercial Banking.

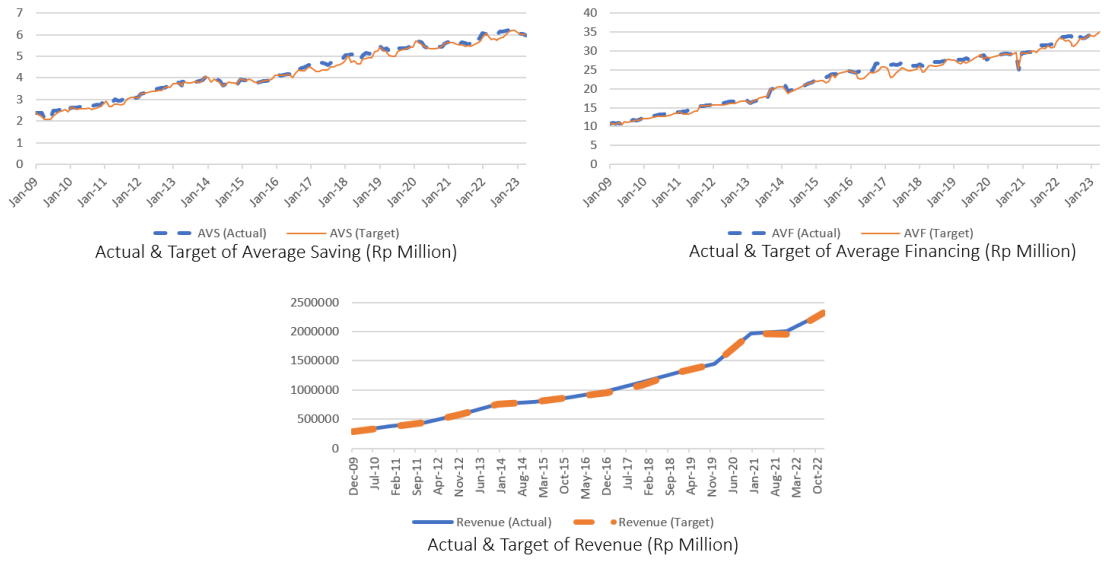


Figure 4. Actual & Target of Output Components
Source: Financial Services Authority (data processed, 2023)

In addition, Islamic Rural Bank is able to utilize a segmented niche market in the Islamic microfinance segment who have large different contracts compared to Conventional banks and it is targeting religious customers (Trinugroho, Risfandy & Ariefianto, 2018), able to understand customer needs (Tamanni & Liu, 2017), and will to accept higher margin compared to conventional banks (Risfandy, et. al., 2019). Thus the Islamic Rural Bank can increase the average value of deposits and the average financing of its customers while consistently increasing profits. Based on the graph of Actual and Target trends in the DEA output component with a production approach, this result of the study is in line with Arief, Izmuddin & Puteri (2019) and Moechdi, Ananda & Yustika (2016) that Islamic Rural Bank in Indonesia have been able to balance their sustainability and outreach objectives. This also breaks the argument of Mersland & Strom (2014b) and Abeysekera, Oguzoglu, and Thanh (2014), where in the case of Islamic Rural Bank in Indonesia there is no sufficient evidence of a trade-off between sustainability and outreach goals because the two can grow side by side.

4.3 *Vector Autoregression/Vector Error Correction Model*

4.3.1 *Unit Root Tests*

To fulfill one of the assumptions in the causality test and VAR, it is necessary to first estimate a stationarity test. With the aim to obtain a more accurate variable stationarity, the next stationarity test is to estimate by unit root test. The stationarity test used in this study is to use the unit root test with the Augmented Dickey Fuller Test (ADF Test) and Phillips-Perrin Test (PP Test) methods.

Table 1. Unit Root Tests

Test Type	Test for Unit root in	Lerner Index	DEA Efficiency
Augmented Dickey-Fuller	Level	-0.3956014*	-5.594610*
	1st Diff.	-4.386305*	-3.181743*
	2nd Diff.	-44.03561*	-8.729440*
Phillips-Perron	Level	-5.808543*	-4.324792*
	1st Diff.	-19.00060*	-28.61677*
	2nd Diff.	-93.67847*	-67.16117*

* This table presents the unit root test of the variables according to the two methods, namely Augmented Dickey-Fuller (ADF) and Phillips-Perron (PPP). The null hypothesis for ADF and PP tests are that the series are stationary at Level. *= significant at 5%.

Based on the results, it shows that the Lerner Index and DEA Efficiency have statistical absolute values of ADF (Augmented Dickey-Fuller) and PP (Philips-Perron) from the intercept, trend, and slope testing models which are smaller than the absolute critical value (α) on the Mac-Kinnon table. Moreover, it can also be seen that the probability value of the Lerner Index data and Islamic Rural Bank efficiency is significant at the 95% confidence level, so that conclusions can be drawn from the results of the unit root test at the stationary level. Thus, VAR analysis is used to find out the relationship between market competition and Islamic Rural Bank efficiency in achieving sustainability and outreach goals.

4.3.2 Optimal Lag

Optimal lag aims to determine how long a variable reacts to other variables. VAR model estimation commences by determining the appropriate length of lag. Determining the optimal lag is important in VAR modeling because if the optimal lag is too short, the dynamics of the model could not be explained fully. The result of the optimal lag tests can be seen in table 2:

Table 2. Optimal Lag Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	4772.119	NA	4.88e-41	-58.76691	**-58.53819***	**-58.67405***
1	4946.649	321.0487	3.36e-41	-59.14382	-56.17058	-57.93664
2	5180.509	395.5406	1.14e41	-60.25320	-54.53543	-57.93169
3	5421.596	372.0475	3.67e-42	-61.45180	-52.98950	-58.01598
4	5579.133	219.7743	3.56e-42	-61.61893	-50.41210	-57.06878
5	5813.303	291.9902	1.48e-42	-62.73214	-48.78078	-57.06768
6	6058.568	269.4885	6.12e-43	-63.98232	-47.28643	-57.20354
7	6280.810	211,2672	4.07e-43	-64.94828	-45.50786	-57.05517
8	6548.254	214.6151*	2.02e-43*	-66.47227*	-44.28732	-57.46484

Note: * Indication of order lag based on criteria

Based on the result of model stability, the optimum lag in this study using the Schwarz Information Criterion (SC) and Hannan Quinn Information Criterion (HQ) shows that the model stabilizes at Lag 0.

4.3.3 Granger Causality Tests

The causality test is determined whether there is a two-way or only one-way relationship between the Lerner Index variables and Islamic Rural Bank Efficiency. The causality test was carried out using the Granger causality test with the test statistics contained in equations (11) and (12). Based on the results of the Granger causality test in table 2;

Table 3. Granger Causality Tests

Hypothesis	Obs.	F-Statistic	Prob.
D(EFF) does not Granger Cause D(LI)	168	0.03333	0.9672
D(LI) does not Granger Cause D(EFF)		3.23472	0.0419*

*= significant at 5%.

From the table, model 1 has a prob value. of $0.9672 < \alpha = 0.05$ meanwhile model 2 has a prob value. of $0.0419 < \alpha = 0.05$, so it can be concluded that efficiency affects the Lerner Index while the Lerner Index does not affect the efficiency of the Islamic Rural Bank. Then it can be concluded that the two variables only have a one-way relationship.

4.3.4 Johansen Cointegration Tests

The cointegration test can be used as a basis for determining whether the equation used has a long-term balance, if the equation is proven to be cointegrated through this Johansen

test, then the estimated equation has a long-term balance (Gujarati, 2021). When seen from the trace statistics which are greater than the critical value at the confidence level α = 5% and α = 1%, then based on the trace statistics one form of the cointegration equation is obtained at the 95% confidence level.

Meanwhile, the results of the Johansen cointegration test based on the max-eigen value statistics indicate that there is one form of the cointegration equation at the 95% confidence level. In the cointegration equation, the max-eigen value in Table 3 is that in the cointegration equation which states that the Lerner Index and Islamic Rural Bank Efficiency will move together to achieve balance.

Table 4. Johansen Cointegration Test Result

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical value	Prob.*
None*	0.521576	123.8594	14.26460	0.0000
At most 1*	0.389438	82.88715	3.841465	0.0000

*= significant at 5%.

4.3.5 Vector Autoregression

The Lerner Index (LI) describes how banks could operate optimally by generating more marginal revenue. Gischer, Muller & Richter (2015) argue that LI is better than Herfindahl-Hirschman (HHI) to measure competition, especially considering that Financial Service Authority (FSA) regulations have a limited IRB operational area. In other words, the measurement of LI Index also considers efficiency aspects to find out the competitiveness of IRB in Indonesian microfinance market. Meanwhile, the IRB efficiency is measured by Data Envelopment Analysis (DEA) using a production approach where the output components are Average Financing (AVF) and Average Saving (AVS) as a proxy of sustainability and outreach respectively.

Furthermore, the Impulse Response Function (IRF), as shown in Figure 5, in the first to third periods, Islamic Rural Bank efficiency responds to the Lerner Index, and continues to decline until the fifth to tenth period.

Table 5. Vector Autoregression Estimation

	D(LI)	D(EFF)
D(LI(-1))	-0.092076	0.080123
	(0.07957)	(0.03151)*
	[-1.15710]	[2.54307]
D(LI(-2))	-0.095946	0.005295
	(0.08104)	(0.03209)*
	[-1.18393]	[0.16501]
D(EFF(-1))	-0.047777	-0.195208
	(0.19434)	(0.07695)
	[-0.24584]	[-2.53698]

	D(LI)	D(EFF)
D(EFF(-2))	0.007019	-0.239937
	(0.17446)	(0.06907)
	[0.04023]	[-3.47363]
C	3.19E-05	0.000692
	(0.00351)	(0.00139)
	[0.00909]	[0.49808]
R-Squared	0.017017	0.141393
Adj. R-Squared	-0.007105	0.120323
F-Statistic	0.705453	6.710612

*= significant at 5%.

The results of the Vector Autoregression analysis show that the level of market competition proxied by the Lerner Index has a significant effect on the efficiency level of DEA in both the first and second lags. The VAR model in this study is able to explain the relationship to the diversity of the Lerner Index of 0.141393, meaning that market competition in the micro and small finance segment is able to contribute to 14.39% of the efficiency of Islamic Rural Bank performance in achieving the objectives of Islamic Rural Bank sustainability and outreach.

By considering the tight activities form of IRB, it is assumed that there are other variables outside the model that might be affected by IRB efficiency, so it can be considered that the coefficient value of 0.141393 is moderate. Compared to Wasiaturrahma's study (2020) which states that IRB is not efficient in the financial intermediation approach but more efficient in the production approach, the condition indicates that the economies of scale and the economies of scope from IRB are still limited. Therefore, IRB has operated optimally providing financial services to customers while still balancing the aspects of sustainability and outreach.

The results of the VAR show that the ability of the Islamic Rural Bank in determining the cost of funds of savings and financing products has been responded by the Islamic Rural Bank since the first lag and the coefficient will decrease in the second lag. This shows that the Islamic Rural Bank responds quickly to market competition in this segment which is also shown by the IRF of this function. In addition, the magnitude of the influence of market competition on the efficiency of Islamic Rural Bank is relatively small which indicates that Islamic Rural Bank may have a different market compared to commercial banks that enter a similar market. Therefore, in line with the research results of Assefa, Hermes, & Meesters (2013) and Trinugroho, Risfandy & Ariefianto (2018), in surviving amid high competition in the micro and small financial services segments, Islamic Rural Bank tends to perform efficiently in optimizing outreach and sustainability, instead of expanding the market. Thus, the Islamic Rural Bank will try to improve the quality of its products first compared to the quantity by focusing on its niche market.

As one of the integral parts of Microfinance and Islamic Banks, Hassan & Mollah (2018) stated that IRBs should generate profit while fulfill their social goals like poverty alleviation, fulfil customer or human basic and spiritual needs, to environmental responsibility. Therefore, Islamic rural bank is expected to be more careful in running its business to meet market needs.

Meanwhile, the Islamic Rural Bank Actual and Target Output Components show that the achievement of income, average savings, and average financing are in line which indicates that the increase in the performance of Islamic Rural Bank sustainability and outreach has been efficient. In addition, both average savings and average are increased dramatically over the last fourteen years. As Wasiaturrahma (2020) study used DEA input-output specification using a production approach, the performance of Islamic Rural Bank shows its efficiency as a microfinance institution capable of providing financial services to people who are underserved by Commercial Banking.

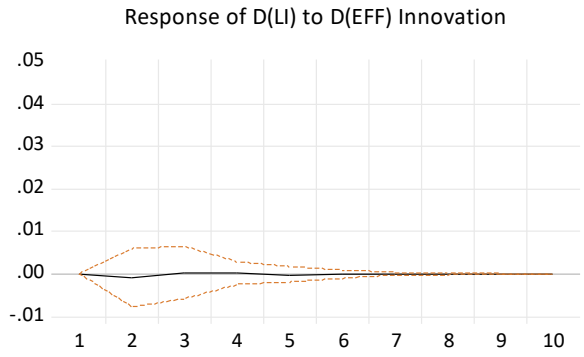


Figure 5. Impulse Response Function

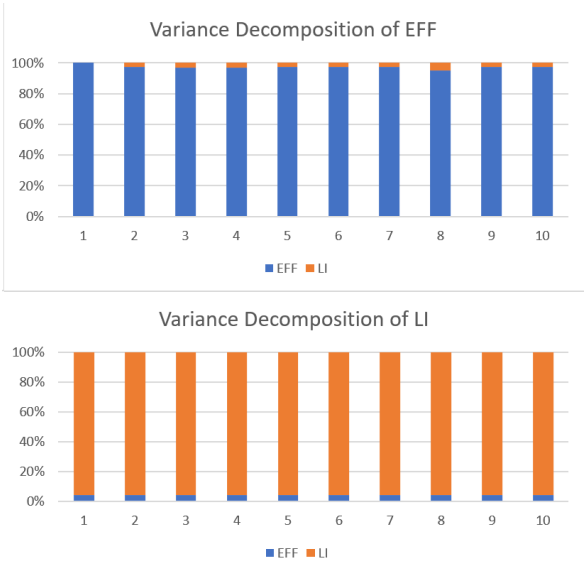


Figure 6. Variance Decomposition Results

5. Conclusions

This research empirically proves how market competition can affect the efficiency of Islamic Rural Bank in overcoming trade-offs between sustainability and outreach goals and the results of the study found evidence that Islamic Rural Bank as a microfinance institution able to overcome the trade-off. Islamic Rural Bank can provide inclusive financial services for customers who are not served by Commercial Banks since Islamic Rural Bank competes among tight competition in the micro and small financial service market. Furthermore, Islamic Rural Banks have an advantage in a very segmented niche market, where customers in the religious MSE segment are expected to become loyal customers, considering that Islamic Rural Bank products are in accordance with the beliefs held and have many variations of product development considering the various Islamic contracts. On the other hand, the impact of tight competition in the micro and small financial services segment quite significant to the sustainability and outreach because Islamic Rural Bank tend to focus on maximizing efficiency rather than expanding markets and competing with commercial banks directly. It can be concluded that customers in microfinance institutions need financial services that are able to understand their needs and build strong emotional bonds. Indeed, Islamic Rural Bank must be able to focus on the basic needs of financial services including saving and lending/financing services. Furthermore, this evidence also suggested that the trade-off between sustainability and outreach goals in microfinance institutions, especially Islamic Rural Bank, can be overcome by understanding the characteristics of customers

Empirical findings suggested that Islamic Rural Bank can take an important role in encouraging Islamic financial inclusion by utilizing the role of microfinance functions. The ability of Islamic Rural Bank to achieve outreach goals by providing financial services to the segments who are not served by commercial banks whilst pursuing sustainability can be realized. Amid the recent rapid technological developments, Islamic Rural Bank can be sustainable by keeping in the traditional business model by optimizing and adding new branch offices as well as providing bankers who are capable of maintaining strong relationships with their customers.

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