






ISLAMIC BANK SUSTAINABILITY: AN ECONOMETRIC APPROACH



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ABSTRACT

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This paper aims to assess the behavior of Islamic banks regarding their financial sustainability. It employed an econometric approach to estimate the financial sustainability of Islamic banks in ten predominantly Muslim countries. We derived financial sustainability indicators using the Bellman equation to demonstrate when Islamic banks achieved sustainability performance. We estimated the model with a refined Heckman selection through simulated maximum likelihood. Most of the results confirmed the findings of previous studies that financial sustainability of Islamic banks is influenced by ROA and efficiency. According to our estimation, we predicted that the majority of Islamic banks in ten Muslim countries failed to deliver Islamic moral economy. Islamic bank financing activities are still dominated by commercial financing rather than maqasid concepts. This paper explicitly shows a strong message for Islamic banks in Muslim countries to implement maqasid to improve the mandates of Islamic moral economy. We have presented a quantitative approach to produce robust estimations and predict bank sustainability according to the latest econometric methods.

Contribution/Originality: This study contributes to the existing literature on Islamic bank sustainability. This study used new estimation methodology that introduces Islamic bank behavior with a refined Heckman selection methodology that has not previously been used. This study introduces a new formula of Islamic bank sustainability with dynamic optimization through the Bellman equation.

1. INTRODUCTION

The development of financial institutions is crucial for the country to support strategic sectors of the economy and financial institutions need to effectively ensure that the economy strongly supports financial sustainability in the long term. Therefore, developing financial institutions requires proper regulation, supervision and monitoring of business activities, and measurement of the impact of the institutions in the economy. Beck, De Jonghe, and Schepens (2013) reported that Islamic banks are better capitalized than conventional banks. They have higher asset quality and are less likely to disintermediate during crises. This argument is supported by Pappas, Ongena, Izzeldin, and Fuertes (2017), who stated that Islamic banks have a significantly lower risk of failure than conventional banks. This lower risk is affected by microstructures as well as macroeconomic indicators in the market structure. On the other hand, some Islamic banks have failed to achieve better financial performance. Aliyu, Hassan, Mohd Yusof, and Naiimi (2017) reported that although Islamic banks have recorded about 80 percent of the

world's Islamic financial assets (which accounted for US\$2 trillion), the institutions have lacked excess liquidity, solvency, survival and sustenance of institutional capacities.

This failure has been highlighted by Aliyu et al. (2017) who pointed out that increasing gaps between aspirations and real practices of institutions are major factors hindering the performance of Islamic banks. If we look at the moral hazards of Islamic banks' objectives, the Islamic moral economy should be fundamental to the institutional capacities that focus on social objectives, especially for delivering financial support to the poor in society. In fact, Platonova, Asutay, Dixon, and Mohammad (2016) confirmed there is an inadequacy between the aspirations and real practices of mandating Islamic moral economy in socio-economic and environmental disclosures; they are unable to align institutional objectives with Islamic moral economy.

To date, there are limited references to Islamic banking sustainability in existing literature that propose tools for empirical analysis (Aliyu et al., 2017). The growth of Islamic banks in the majority of Muslim countries (from 1975 to 2008 with over 300 institutions operating in more than 75 countries) has led to international attention and studies conducted on how Islamic finance contributes to the economy (Cihák & Hesse, 2010). This paper intends to investigate the behavior of Islamic banks in achieving financial sustainability from the perspective of the maqasid concept (Bedoui & Mansour, 2015) with emphasis on a sustainable development perspective (Ahmed, Mohieldin, Verbeek, & Aboulmagd, 2015). We explicitly defined the maqasid concept through financial performance with a multi-level decision process, and we demonstrated the multi-level interactions of financial sustainability concepts with microeconomic estimation by applying selection-based Heckman style modelling, which has not been conducted in previous studies.

We did not use the Maqasid Index as noted by Bedoui and Mansour (2015) and adopted by Mergaliyev, Asutay, Avdukic, and Karbhari (2019). However, we employed the maqasid concept sustainable financing indicators that are close, such as financing for poverty alleviation programs (i.e., financing in agricultural sectors, small-scale enterprises and related sectors – henceforth, we called these maqasid sectors). We chose these sectors due to the fact that financial services account for environmental, social and government characteristics and policies, and are reflected through their financing policies and decisions (Ahmed et al., 2015; Scholtens & van 't Klooster, 2019). When the Islamic banks focus on Maqasid financing sector, we count Islamic banks towards sustainability goals.

Following this, we assessed the behavioral effects towards bank sustainability according to multi-level decisions that were classified into stability, sustenance and sustainability (Aliyu et al., 2017). We assumed that this multi-level behavior indicates how Islamic banks decide and trade off their resource capacity either to engage commercial orientation or sustainable orientation (Shen, Wu, Chen, & Fang, 2016). Therefore, we can estimate the probability of Islamic banks prioritizing either sustainability or commercialism.

2. LITERATURE REVIEW

Aliyu et al. (2017) suggested that Islamic banks should adopt dual objectives to efficiently balance social well-being as well as financial performance. In a microstructure, Ayayi and Sene (2010) defined that financial sustainability has the capacity to cover all of its expenses by its revenue and to generate enough to finance its growth. Hence, financial sustainability is determined by management efficiency and good governance coupled with profit maximization. Finance will be sustainable if financial performance is in line with output and efficiency.

Financial performance determined by revenue and improved cost efficiency (Beck, De Jonghe, et al., 2013) and along with these variables, when the fundament is robust, the banks will strengthen their financial growth and achieve sustainability in the forthcoming years (Koetter & Scholtens, 2009). Furthermore, financial performance is a key indicator that financial sustainability exists, and the sustained financial stability of the banks will reduce the probability of a crisis, or reduce the severity of losses should a crisis occur (Moenjak, 2017).

We adopted Wu and Shen (2013) procedure to define the multi-level behavior regarding whether Islamic banks lean towards a sustainable motive or a commercial motive; we assumed the sustainable motive according to altruism

motives as noted by Benabout and Tirole (2010). The Islamic banks that follow an altruism motive are indicated by increasing non-interest income (NII) due to sustainable activities. When Islamic banks improve sustainability due to Islamic moral economy this will increase zakat, waqf, qard al-hasan and other shari'ah charity (Jo, Kim, & Park, 2015). Furthermore, better financial performance is determined by financial stability along with improved risk management (Scholtens & Van't Klooster, 2019).

The advantages of Islamic banks adopting sustainability are the increase of customer loyalty and a better reputation among Muslim people in major Muslim countries (Khan, 2010). Ideally, Islamic identity will assist Muslims to adopt Islamic banking as part Muslim life to be closer to shari'ah compliance, otherwise, Islamic bank sustainability will decline if moral economy and reputation move closer to conventional banking operations (Khan, 2008). Evidence indicates that the significance of murabahah is declining due the majority of people still viewing Islamic banks as relatively new financial innovations (El-Gamal, 2006). Therefore, it is crucial for Islamic banks' operations to be fully Islamic.

In the following sub section, we describe how financial and economic variables in each multi-level behavior affect bank sustainability. We drop down for each financial variable that affects financial performance and its stability effects on financial sustainability.

2.1. Bank Sustainability

According to Ahmed et al. (2015), the role of Islamic finance is to increase social sustainability, such as financial inclusion and the reduction of vulnerability. Islamic banks should strongly focus on achieving environmental and social goals and facilitating sustainable infrastructure development. These activities include poverty alleviation, ending hunger, promoting healthy living, equitable equity education, sustainable management of water and sanitation, inclusive growth, sustainable growth in cities, addressing climate change, sustainable forest management and development of partnerships for sustainable development. They also proposed that zakat and waqf should be delivered to Maqasid sectors that are related to shari'ah compliance.

Scholtens and Van't Klooster (2019) suggested that bank sustainability should consist of environmental, social and corporate governance pillars. The environmental pillar includes emissions reduction, product innovation and resource reduction; the social pillar includes community, diversity, employment quality, health and safety, human rights, product responsibility and training and development; and the corporate governance pillar includes board function, board structure, compensation policy, shareholder rights and vision and strategy. These aspects are aggregated into sustainability ratings with an equal degree of importance.

From an Islamic perspective, Bedoui and Mansour (2015) stated that sustainability is called maqasid al-shari'ah. Financial institutions or industrial firms could contribute to the promotion of human welfare, prevent corruption and enhance social and economic stability. They defined that maqasid al-shari'ah comprises faith, human rights, self, mind, prosperity, social entity, wealth and environment or ecology. This definition was later adopted by Mergaliyev et al. (2019) who reported that maqasid performance in Islamic banks is increasing but the macro index, such as gross domestic product (GDP), financial development and human development, has a negative effect on maqasid performance.

Mohammed, Tarique, and Islam (2015) proposed that the maqasid al-shari'ah index is a comprehensive index with which Islamic banks should comply. The concept was designated by Bedoui and Mansour (2015), but they focused on a core maqasid index that consists of five dimensions for Islamic institutions providing employment, stimulating growth and socio-economic justice realization. These five elements are:

1. Preservation of faith (i.e., they proxied a ratio of mudarabah and musharakah investment/total investment; and interest-free income/total income).
2. Preservation of life (i.e., corporate social responsibility (CSR) expenditure/total expenses; and zakat distribution/net assets).

3. Preservation of intellect (i.e., investment in technology/total assets; and number of employees left/total number of employees).
4. Preservation of progeny (i.e., market value/book value; research expense/total expense; net income/total assets; credit risk; tax paid/profit before tax).
5. Preservation of wealth (i.e., investment in the real economic sector/total investment; investment in small and medium enterprises (SMEs)/total investment; investment in agriculture/total investment).

We define that financial sustainability is determined by financial stability as well as financial performance. The Islamic banks must be able to maintain strategies for long-term decisions to achieve both financial and operational self-sufficiency. Development of financial sustainability is a process of maintaining financial balance and anticipating risks in the long term. We propose that financial sustainability is a two-part strategy that Islamic banks should fulfill in their objectives. In the long term, both financial as well as welfare are crucial developments that should converge along with maintaining Islamic shari'ah principles.

2.2. Financial Stability

As noted earlier, the fundamental objective of financial sustainability in Islamic banks requires value maximization that is derived from institutional performance. Sustainability focuses on the long-term survival, solvency and operational sufficiency from financial performance (Cull, Demirgu, & Morduch, 2007). We can conclude that financial sustainability in Islamic banking maintains stability of financial performance for providing social welfare through financing inclusive sectors in the economy.

Financial sustainability also includes interperiod stability for both short-term and long-term financial performance stability and improves financing growth for included sectors (Ahmed et al., 2015). Therefore, we can conclude that Islamic bank sustainability is associated with financial performance stability as well as welfare delivery along with their business growth (Cihák & Hesse, 2010).

Sustainability conditions are achieved if financial indicators are below the financial instability threshold. These thresholds require precision instruments to ensure that risk assessments are robust in order to predict financial instability conditions. Moenjok (2017) noted that macroprudential indicators are necessary to address financial instability in the banking industry through evaluating indicators, such as credit performance, liquidity performance and capital performance.

In the short term, bank stability includes the ability of banks to operate self-sufficiently and survive in the longer term. It is not sustainable if banks are unstable and unable to operate sufficiently to survive in the industry.

Cull et al. (2007) measured overall sufficiency through financial self-sufficiency, operational self-sufficiency, return on assets, real gross portfolio, labor cost to assets and average loan size to GDP per capita of the poorest 20%. Improvements in self-sufficiency for each bank will improve financial development for providing credit to sustainable sectors and focus on poverty alleviation. In addition, financial stability is measured by Z-score, which compares capitalization and returns with the variability of those returns.

2.3. Financial Performance

In Islamic or shari'ah compliant finance (Beck, De Jonghe, et al., 2013; El-Gamal, 2006), Islamic banks are required to follow five basic rules: prohibition of *riba*, prohibition of *gharar*, prohibition of illicit sectors such as *maysir*, and the use of profit and loss sharing practices and real economic transactions that involve tangible assets. Due to these principles, Islamic banks' products are based strictly on profit and loss sharing contracts, called *mudarabah*. Under this contract, entrepreneurs and bank-shared profits and losses are at a predetermined ratio, and banks must approve the business investment decisions of entrepreneurs, including the participation of other investors. There is also the *musharakah* contract that shares both profits and losses among all investors.

Accordingly, on the deposit side, investment deposit returns affected by profit and loss contracts at a bank profit level. Deposits are separated into non-remunerated deposits (*qard*) and saving deposits (*wadiah* and *amanah*). In doing so, the banks are directly responsible for managing their funds under *mudarah* and *musharakah* contracts, whereas banks manage *qard*, *wadiah* and *amanah* contracts on behalf of their investors.

Islamic banks will improve their financial performance and maintain efficiency by applying the shari'ah rules. In empirical studies, Beck, De Jonghe, et al. (2013) and Cihák and Hesse (2010) stated that financial performance is determined through three aspects: business model, efficiency and stability. The Islamic banks will improve their financial performance if those aspects improve significantly. Business models consist of income fee, non-deposit funding and loan deposit ratios, and efficiency comprises of cost income ratio, overheads and loss reserve. Asset quality is determined by loan loss provisions, non-performing loans, maturity match, return on assets and equity to assets ratio.

3. MODEL SETUP

We developed the model from Satyakti, Budiman, and Febrian (2018) with simple and aggregative perspectives. We did not use a microeconomic approach as per previous models, rather we focused on bank sustainability as part of financial systems, whereas previous models assessed bank sustainability within financial systems where an Islamic bank behavior connects into SUKUK market development, financial development and monetary policy indicators. We assumed that Islamic banks operate according to three basic principles, as noted by Beck, Demirgüç-Kunt, and Merrouche (2013), that a business model includes production function, efficiency and stability, with efficiency and stability controlling the input within banks' production functions. We assumed that banking activity is the production of financing services (i.e., loans in conventional bank terms) and deposits. Financing models in Islamic banks are the function of deposit and financing services (Freixas & Rochet, 2009).

$$(1) F_i = f(D_i)$$

where F_i is financing and D_i is deposit. Therefore, from this perspective, maqasid activity can be separated into financing maqasid (*mudarah*, *murabah*) and deposit maqasid (*qard*, *wadiah* and *amanah*), while we assumed that the financial sector in a perfect competition market is no barrier to entry. Bank sustainability was proxied as a financing activity that portrays a bank's output determined by firm performance in D_i that is affected by its sustainable activities (SA) on the input side. From Equation 1, we separated the process activity indicators that represent the input and output. We assumed that output is affected by input subject to financial capacity. Thus, every activity, including efficiency, sustainable activities and risk, affects output, and financial performance is a result of these activities.

We defined financial sustainability as a composite activity of Islamic banks that produces output or financing to maqasid sectors, such as environment or ecology sectors (Ahmed et al., 2015), while we followed Freixas & Rochet (2009) who classified profit in Islamic banks as a function:

$$(2) \text{Max } \pi = FI(\rho_M, \rho_w, \theta, X) + NFI(\theta, X) - OC(\theta, X)$$

where π is bank profit, FI is financing income, ρ_M from *mudarah* or *musharakah*, ρ_w is non-financing income from *wadiah* or *amanah*, θ is bank sustainability orientation, X is the factor that affects bank profit, NFI is non-financing income and OC is overhead cost.

From Equation 2 we can state that θ will exist if current financial performance is better in the following period.

While we are uncertain whether θ will be available in future periods, we employed the Bellman equation to solve a period of financial sustainability for Islamic banks with its capacity constraint (i.e., $\rho_M, \rho_w, X, NFI, OC$).

Before we applied the Bellman equation, first we set up the modeling process with a sustainability concept. As we noted in the literature review, the financial sustainability of Islamic banks is defined as the improvement in performance for both financial self-sustenance and growth. We employed the growth indicators for sustainability as noted by Stiglitz (1974), who stated that sustainability will be exist in longer term path and impact better on financial performance in future period. We can define this mathematically by the following:

$$(3) \theta_t^i = \theta_{t+1}^i$$

where i is Islamic bank performance in the economy, θ_t^i is sustainability growth in the current period and θ_{t+1}^i in the future period, and θ^i is the performance of one country for both financial performance and bank sustainability that affects welfare, such as gross domestic product and income equality. Therefore, we have:

$$(3) \theta^i = f(\varphi^i) \geq 0$$

where φ^i is the financial performance of a bank- i , and we treat financial performance as an infinite horizon over the decision of Islamic banks to maximize their financial performance $t^\varphi \in 1,2,3, \dots, \bar{\alpha}^i$ as well as for sustainability $t^\phi \in 1,2,3, \dots, \bar{\alpha}^i$, where α is financial capacity proxied as assets. In longer-term periods, Islamic banks should focus on both conditions, then:

$$(4) \theta_{t+1}^i \begin{cases} 1. \text{ Sustainable if : } \theta_{t+1}^i > 0 \text{ where both } \varphi^i > 0 \text{ and } \phi^i > 0 \\ 2. \text{ Sustenance if : } \theta_{t+1}^i < 0 \text{ where both } \varphi^i > 0 \text{ and } \phi^i < 0 \\ 3. \text{ Not Sustainable if : } \theta_{t+1}^i < 0 \end{cases}$$

The first condition achieved is sustainable if banks produce more growth in financing for maqasid sectors ($\phi^i > 0$) and is supported by further growth in financial performance ($\varphi^i > 0$). The second condition achieved is sustenance, because Islamic banks are more concerned with financial performance ($\varphi^i > 0$) rather than financing maqasid sectors ($\phi^i < 0$). Otherwise, both conditions have failed and the bank is not sustainable.

The options in Equation 4 require more than the binary choices of 1 or 0; furthermore, the condition of (4) demonstrates ordered options where 1 is the highest level. Islamic banks enjoy sustainability because $\pi_\phi^i > 0$.

$$(5) \text{ sustainability} = \pi_{\phi}^i > 0 = \pi_{\phi}^i + \varphi^i \text{ or sustainability} = \pi_{\phi}^i - 1 + \varphi^i$$

Equation 5 is a sustainability equation that shows if Islamic banks will achieve maximum profit (π_{ϕ}^i) if they demonstrate excellent financial performance and sustainability. On the other hand, when a bank has more profit without achieving sustainability, portrayed by π_{ϕ}^i , the profit function is given by:

$$(6) \text{ sustenance} = \varphi^i = 0; \pi_{\phi}^i = 0 = \pi_{\phi}^i - 1$$

Equation 6 indicates whether banks only performed financially without significant improvement or growth in shari'ah financing (maqasid sector). Neither condition is achieved when $\theta_{t+1}^i < 0$.

The indication of financial sustainability applies to Equation 4 regarding growth of financing to maqasid sectors (ϕ^i) and positive growth of financial performance (φ^i) along with positive growth of preservation of wealth.

According to these definitions, the probability of sustainability of Islamic banks in Equation 3 is satisfied by the Bellman equation:

$$(7) V_{t+1}^s = \max_{k \in 1,2,3,\dots,n} \{ \varphi^i V_{t+1} (\min \bar{\alpha}^i, \pi^i - 1 + \varphi^i) + (1 - \varphi^i) V_{t+1} (\pi^i - 1) \}$$

Equation 7 defines whether Islamic banks have achieved sustainability if the term of $1 - \varphi^i$ achieves the ideal of financing growth to maqasid sectors at $\varphi_{t+1}/\varphi_t > 1$. If we examine this behavior, we can transform bank sustainability processes in future periods by θ_{t+1}^i to help eliminate the uncertainty of future effects and if they are affected by the current period of θ_t^i or past period of θ_{t-1}^i . The improvement of both financial performance and financing performance to maqasid sectors is constrained by financial capacity on α^i . Financial constraint as a capacity to achieve sustainability α^i relies on financial performance over the threshold of self-sustenance and stability. We can add periods of short-term or longer-term Islamic bank sustainability (7) by the following:

$$(8) V_t^s = V_{t,t-1}^s + \delta \int \max_k [V_{t+1}^s] g(\epsilon_t) d\epsilon_t$$

where $V_{t,t-1}^s = \varphi^i V_t (\min \bar{\alpha}^i, \pi^i - 1)$; $V_{t,t+1}^s = \{ \varphi^i V_t (\min \bar{\alpha}^i, \pi^i - 1 + \varphi^i) + (1 - \varphi^i) V_{t+1} (\pi^i - 1) \}$.

The first term of $V_{t,t-1}^s$ stated that financial and financing growth is necessary in the short term (first period), while in the second term or future periods, the banks should aim for better financial performance and financing for maqasid sectors, which is defined as $\delta \int \max_k [V_{t+1}^s]$. We add uncertainty with $g(\epsilon_t) d\epsilon_t$ as a subjective decision distribution for uncertainty factors. We can define Islamic banks' probability of being able to sustain or not by employing:

$$(9) P(V_t^s) = \text{Prob}(V_{t+1}^s > V_{t,t-1}^s).$$

As noted in Equation 8, $g(e)$ is the kernel density function of unknown or uncertain features, we modify Equation 9 and 10 as:

$$(10) P(V_t^s) = \int I(V_{t+1}^s > V_{t-1}^s) f(\epsilon) d(\epsilon)$$

The ability of Islamic banks to achieve sustainability in the second period is unknown due to the uncertainty of the iid (independent and identically distributed) vector values, which we can define by $V_{t+1}^i = v_{t+1}^i + \epsilon_{t+1}^i$. This factor is recognized by Islamic banks in the second period or future periods when shari'ah maqasid financing should perform well. We found that expected maximum utilities of bank sustainability in Islamic banks will achieve sustainability, and that the iid extreme value of bank sustainability is linear with respect to financial performance and maqasid financing performance by the following linearizing logarithm:

$$(11) E(\max_k v_{t+1}^i + \epsilon_{t+1}^i) = \frac{1}{\alpha} \ln(\sum_{i=1}^i e^{V_{t+1}^s}) + C$$

The probability of Islamic banks to choose sustainability is defined in Equation 9, where $(\sum_{i=1}^i e^{V_{t+1}^s}) = \int \max_k [V_{t+1}^s]$

$$(12) \frac{1}{\alpha} \ln(\sum_{i=1}^i e^{V_{t+1}^s}) + C^{V_{t+1}^s} > \frac{1}{\alpha} \ln(\sum_{i=1}^i e^{V_t^s}) + C^{V_t^s}$$

And we can simplify Equation 12 to become:

$$(13) C_{t+1} + \delta V_{t+1}^s > C_t + \delta V_t^s$$

Finally, we can show Islamic banks' decisions on their motives regarding sustainability (BS_t) by:

$$(14) BS_t = \text{Prob}(C_{t+1} + \delta V_{t+1}^s > C_t + \delta V_t^s)$$

$$BS_t = \text{Prob}(V_{t+1}^C + \epsilon_{t+1} + \delta V_{t+1}^s > V_t^C + \epsilon_t + \delta V_t^s)$$

$$BS_t = \frac{e^{V_{t+1}^C + \delta V_{t+1}^s}}{e^{V_{t+1}^C + \delta V_{t+1}^s} + e^{V_t^C + \delta V_t^s}}$$

Equation 14 informs us that $e^{V_{t+1}^C + \delta V_{t+1}^s}$, along with a decision regarding the path of bank sustainability (Train, 2009), by:

$$(15) BS_t \begin{cases} P_t(\theta_t^i = 1) \Rightarrow \frac{e^{V_{t+1}^C + \delta V_{t+1}^s}}{e^{V_{t+1}^C + \delta V_{t+1}^s} + e^{V_t^C + \delta V_t^s}} > 0 \\ P_t(\theta_t^i = 0) \Rightarrow \frac{e^{V_{t+1}^C + \delta V_{t+1}^s}}{e^{V_{t+1}^C + \delta V_{t+1}^s} + e^{V_t^C + \delta V_t^s}} < 0 \end{cases}$$

Equation 15 informs us of the bank sustainability (BS) decisions in a particular period (t) that exists when the binary choice is 1 ($BS_t = 1$). This decision is determined by variables V_t^S and V^C as exogenous factors that effect BS_t where the sub indicators ($\varphi_t^i =$ financial performance and $\varphi_t =$ growth of maqasid financing) have positive growth and indicates that ($\theta_t^i = 1 \Rightarrow \varphi_t^i > 0; \varphi_t > 0$). Otherwise, $BS_t = 0$ if the former condition is not achieved.

In regard to Equation 15, bank sustainability decides the growth function (γ), which is applied to decide whether a sub indicator of bank sustainability, such as growth of financial performance φ_t^i or growth of financing φ_t , achieved their goal. Along with Equation 13, bank sustainability should meet the threshold of financial performance (FP_t) (φ^1_t) and financial stability ($FST_t = (\varphi^1_t)$). The maqasid financing (MS) (θ^i_t) is a self-selection because of altruism motives and financial efficiency (FEF). Furthermore, the first terms of a decision threshold for financial stability ($FST = (\varphi^1_t)$) include bank sustenance (BSS).

We depict Equation 15 according to Figure 1; the equation should be derived as a multi-level nesting decision (where the second level is BS_t determined by the first level that is $CS_t = 0$ and $MS_t = 1$). The decision of $MS_t = 1$ depends upon sustainable activities (SA) through financial efficiency (FEF). We proxied the maqasid sector (MS) as Islamic bank financing for agriculture, water, energy, small and medium enterprises, and health and education sectors where the growth of financing for MS sectors is determined by sustainable activities, such as governance factors (i.e., financial disclosure report (FDR)) and social factors (i.e., corporate social responsibility (CSR)). In addition, these factors should be supported by financial indicators that are in line with sustainability and altruism motives that are cost efficient and generate non-interest income.

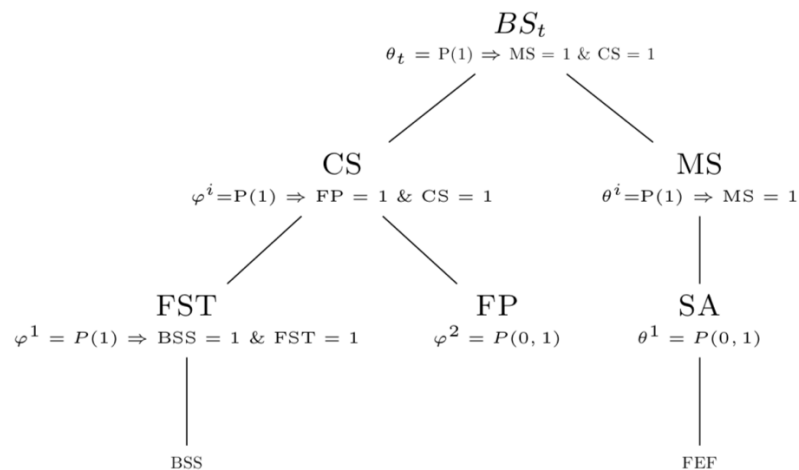


Figure 1. Nesting Level of Banks' Sustainability Decisions.

We assumed that Islamic banks' movement towards bank sustainability (BS) is stimulated after commercial financing is achieved, therefore we can estimate that BS is determined by commercial financing (CS) and maqasid sector activities (MS). The achievement of bank sustainability will be crucial to promote maqasid sectors along with better management of FP (i.e. Financial Performance) and FST on Commercial Sector (CS) as well as sustainable activities (SA) on MS. On the other side, it is necessary for Islamic banks to engage in the commercial financing sector before they enter into the inclusive maqasid financing sector. Commercial financing is determined by two

factors, FST and FP. FST is determined by BSS, which indicates if a bank is close to bankruptcy through the Altman Z-score indicator. Moreover, FP is determined by return on assets (α), ROA portrays bank size, and returns and net profit margin (NPM) proxy the margin between financing and deposits.

Each decision, either θ^i for financing in MS or φ^i for CS, is defined with binary variables 0 and 1. When BS = 1, decisions that drive the growth of BS increase and are determined by each maqasid sector (MS) that has been triggered by Islamic banks to improve their sustainable activities, such as financial disclosure reporting and corporate responsibility. Along with increasing sustainable activities, Islamic banks were triggered to improve cost efficiency (FEF) and increase their non-interest income (NII). Otherwise, BS = 0, meaning banks prefer to engage with CS rather than MS. Increasing ROA and a decreasing Z-score will improve NPM and drive motives to finance CS.

4. DATA AND METHODS

4.1. Data

The database consist of two types of data, macro and micro data. Macro data was retrieved from Prudential and Structural Islamic Financial Indicators (PSIFIs) from the Islamic Financial Services Board (IFSB) containing quarterly data from Q4 2013 to Q3 2020. We collected Islamic bank performance data from the IFSB which includes countries such as Afghanistan, Bahrain, Brunei Darussalam, Egypt, Indonesia, Iran, Jordan, Kuwait, Lebanon, Malaysia, Nigeria, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Sudan, Turkey, United Arab Emirates and United Kingdom. The number of countries was reduced to ten due to the data availability and consistency requirement for estimation—Bangladesh, Brunei Darussalam, Indonesia, Iran, Jordan, Kazakhstan, Malaysia, Oman, Pakistan and United Arab Emirates.

The first macro data for endogenous variable (BS) for growth of financing in maqasid sectors that is aggregate financing for agriculture sectors, water sectors, science sectors, social sectors, health sectors and household sectors we called maqasid sectors (MS). We generated binary data if BS = 1 and if growth of MS > 0, otherwise 0 if MS = 0. While the CS is multilevel nesting decision affect MS. The CS still estimates with similar methodology to MS. The MS sectors define total financing sectors exclude commercial sector. The other areas of macro data are net interest income (NII), cost to income and non-profit margin (NPM), which were retrieved from the IFSB database from Q1 2013 to Q2 2020.

The micro data used comprises zakat, qard al-hasan, wadiah and other shari'ah charity as well as sustainability activity indicators, such as the Corporate Social Responsibility (CSR) Index and Financial Disclosure Report Index (FDRI). We retrieved these data from Thomson Reuters Islamic Financial Development Indicators (IFDI) database from 159 Islamic banks across ten predominantly Muslim countries from 2013 to 2019. We directly used CSR and FDRI from the IFDI by creating scores between 0–100, whereas for each sub index of CSR and FDRI we gathered and equally distributed the weight. Since the macro data is quarterly, we combined these datasets into quarterly data according to the approach taken by Meijering (2002).

We estimated a modified Z-score according to Cihák and Hesse (2010) that $z = (k + \mu)/\sigma$ where k is equity of capital and reserve as a percent of assets, μ is average return as a percent of assets, and σ is the standard deviation of return on assets as a proxy of return volatility. We retrieved return on assets (ROA) and equity of capital data from IFDI Thomson Reuters dataset from 159 Islamic banks. We calculated σ by estimating the

standard deviation for each Islamic bank across the period and aggregated it with the average of all Islamic banks. The descriptive data for those variables are depicted in Table 1.

4.2. Methods

As noted earlier in Figure 1, the selection choice regarding whether Islamic banks operate sustainably depends on CS and MS where the selection decision is affected by sustainable activities, such as SG_t that is CSR activities and FDR. The altruism motive is measured by non-interest income (NII), zakat, qard al-hasan, other shari'ah charities (ZQO) and financial efficiency (FEF). On the other hand, the decision can be directly or indirectly affected by individual time constant, hence we add u_1 as an unobserved time varying constant to the equation. Succinctly, the bank sustainable motive model is calculated by:

$$BS_t = \beta_0 + \beta_1 \cdot CS_t + \beta_2 \cdot NII_t + \beta_3 \cdot SG_t + \beta_4 \cdot ZQO_t + \beta_5 \cdot FEF_t + u_1 \quad (16)$$

and we assume that commercial motive (CS_t) is observed with financial performance that is proxied by ROA and NPM, and FST is proxied by the Altman Z-score as follows:

$$CS_t = \gamma_0 + \gamma_1 \cdot ROA_t + \gamma_2 \cdot NPM_t + \gamma_3 \cdot Z\text{-Score}_t + u_2 \quad (17)$$

where u_1 and u_2 are errors with correlation ρ . Equations 16 and 17 stated that bank sustainability (BS) is determined by the maqasid sector through sustainable activities (i.e., NII, SG, ZQO) and financial efficiency (FEF), whereas the likelihood of bank sustainability being observed is a function by FP (i.e., ROA, NPM) and FST (i.e., Z-score). In particular of SG is an abbreviation of Sustainable (S) and Governance (G). Where S proxied by CSR Index and Governance proxied by IFDI. The parameter SG stated where increasing in SG lead to increasing in BS. When Islamic Bank have more CSR and more good governance will increase its BS.

Therefore, according to Equations 16 and 17, the likelihood function under the assumption that all correlation coefficients may potentially be different from zero. In order to include the uncertainty of unobserved time for those equations, we have $\xi_t^1 = \beta_0 + \beta_1 \cdot SA_t + \beta_2 \cdot FEF_t + u_1$ for bank sustainability, and

$\xi_t^2 = \gamma_0 + \gamma_1 \cdot FP_t + \gamma_2 \cdot FST_t + u_2$ for sustainable activities. We can depict levels of decision in Figure 1 with

$$\begin{bmatrix} \xi_t^1 \\ \xi_t^2 \end{bmatrix} \sim Normal \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \\ & 1 \end{bmatrix} \right) \quad (18)$$

where ξ_t^1 is first level (Equation 16), and ξ_t^2 is the selection (Equation 17), $\sigma_{1,2}$ is the variance parameter from BS_t at the second level and first level from FST_t and FP_t . According to Equation 18, Islamic banks with sustainability are determined by financial stability ($P^{11} \equiv \varphi^1 = 1; \varphi^1 = 1$) and financial performance ($P^{11} \equiv \varphi^1 = 1; \varphi^2 = 1$). We separated these variables because we assumed that FST_t is a process variable that is portrayed in the output along with FP_t as stated in Equation 1. We keep FP_t as a results variable (i.e. Return on Assets), whereas

FST_t as a process variable affects financing growth, especially for commercial financing. Furthermore, we separated the selection effect of MS determined by sustainable activities in the right hand side of the equation. We assumed that the altruism motive of Islamic banks portrayed by SA exists, but we should confirm whether SA directly reflects on MS or not, which is the main question we should address. Therefore, sustainability of financing growth in the commercial sector (CS) without financing growth in MS ($P^{111} \equiv P(\theta^i = 1; \varphi^i = 0)$), and with financing growth in MS ($P^{111} \equiv P(\theta^i = 0; \varphi^i = 1)$). The likelihood function for Islamic banks in year t is calculated as follows:

$$BS_t = (P_t^{i,MS=1;CS=1} = 1; 0) = \int_{-\infty}^{\varphi_t^i \cdot \beta_t^i} \int_{-\infty}^{\theta_t^i \cdot \gamma_t^i} \zeta_2(u_t^1, u_t^2, \sigma_{12}, \sigma_{22}) du_t^{1,i} du^{2,i} \quad (20)$$

$$CS_t = (P_t^{i,CS=1;MS=0} = 1; 0) = \int_{-\infty}^{\varphi_t^i \cdot \beta_t^i} \int_{-\infty}^{\theta_t^i \cdot \gamma_t^i} \zeta_2(u_t^1, u_t^2, \sigma_{12}, -\sigma_{22}) du_t^{1,i} du^{2,i}$$

$$MS_t = (P_t^{i,CS=0;MS=1} = 1; 0) = \int_{-\infty}^{\varphi_t^i \cdot \beta_t^i} \int_{-\infty}^{\theta_t^i \cdot \gamma_t^i} \zeta_2(u_t^1, u_t^2, -\sigma_{12}, \sigma_{22}) du_t^{1,i} du^{2,i}$$

$$FST_t = (P_t^{i,FST=1} = 1; 0) = \int_{-\infty}^{\varphi_t^i \cdot \gamma_t^i} \zeta_1(u_t^2, \sigma_{12}) du_t^{1,i} du^{2,i}$$

$$FP_t = (P_t^{i,FP=1} = 1; 0) = \int_{-\infty}^{\varphi_t^i \cdot \gamma_t^i} \zeta_1(u_t^2, \sigma_{12}) du_t^{1,i} du^{2,i}$$

$$SA_t = (P_t^{i,SA=1} = 1; 0) = \int_{-\infty}^{\theta_t^i \cdot \gamma_t^i} \zeta_1(u_t^2, -\sigma_{12}) du_t^{1,i} du^{2,i}$$

where ζ_2 and ζ_1 denote the probability density function of bivariate standard normal distribution in the second level and first level equations regarding bank sustainability decisions. φ^i is the commercial motive of Islamic banks indicated by improving FP_t and FST_t , whereas θ^i is the sustainability motive of Islamic banks due to SA_t .

Equation 20 is solved with a maximum simulated likelihood estimator where this equation is robust from selection bias. We followed steps used by Semykina (2018) in order to conduct simulated maximum likelihood according to Equation 20. If we look at Equation 16 and Equation 17 as a binary condition and estimated with the conventional Heckman selection solution against Equation 20 that applied with panel data across countries and time. The ordinary Heckman solution will produce generally inconsistent results with fixed effect or first different estimation as noted in Equation 3. Therefore, Equation 20 will ensure that uncertainty and unobservable error are separated and not involved in decisions regarding bank sustainability or growth of financing. Each component in equation $P^{MS=1;CS=1}$ is interpreted as an ideal condition for sustainable performance where the whole conditions are

satisfied as stated in Equation 3. The second condition, where $P^{CS} = 1; MS = 0$, is not an ideal condition because financial sustainability is not achieved, otherwise, financing growth is a stable condition that is satisfied. $P^{CS} = 0; MS = 1$ shows that financing growth is supported by financial performance as distributed in Equation 20. As noted in Equation 15, the condition of bank sustainability is achieved while bank sustainability is defined as:

$$P_t(\theta_t^i) = \frac{e^{V_{t+1}^F + \delta V_{t+1}^S}}{e^{V_{t+1}^F + \delta V_{t+1}^S} + e^{V_t^F + \delta V_t^S}} > 0 = \theta_{t,t+1}^i = BS_t = 1[\beta_0 + \beta_1 \cdot SA_t + \beta_2 \cdot FEF_t + u_1 > 0] \quad (21)$$

where $1[\cdot]$ is the decision when an Islamic bank has achieved sustainability as stated in Equation 13, SA and FEF are exogenous vectors affecting bank sustainability and \widetilde{BS}_t is SA. We controlled that bank sustainability is achieved after FEF is achieved.

If we look at this condition, the sample selection of Islamic banks offering commercial financing is crucial. Self-selection of Islamic banks to perform this condition is motivated by a commercial concept and sustainability is achieved if the bank has met the two conditions that is FP (i.e. ROA) as a necessary condition prior to BS and FST. Therefore, FP will affect bank sustainability, and according to Equation 4 we have:

$$(22) P_t(\theta_t^i = 1) \Rightarrow \frac{e^{V_{t+1}^F + \delta V_{t+1}^S}}{e^{V_{t+1}^F + \delta V_{t+1}^S} + e^{V_t^F + \delta V_t^S}} > 0 = \theta_{t,t+1}^i = CS_t = 1[\gamma_0 + \gamma_1 \cdot FP_t + \gamma_2 \cdot FST_t + u_2 > 0]$$

where φ_t^i is equal to one when the growth of financial output is more than 0 at t and 0 otherwise. We calculated the FST index based on the Z-score as well as FP. s_t^i is observed characteristics, dt_t^i is the unobserved effect of the time constant, and ε_t^i are the error terms. The φ_t^i term is a factor that affects financial sustainability. For this equation we followed Cihák and Hesse (2010) and Beck, Demirgüç-Kunt, et al. (2013) with a decision model stating that FP should be larger than zero to perform CS. Equation 21 is a condition for Islamic banks that enter into the sustainability phase after achieving commercial financing (22).

Therefore, we can define the selection rule for Islamic banks to be sustainable according to Equation 20 and prior to financial sustainability is financing growth (Equation 22) that is empirically estimated with the Tobit model. We should note that Equations 21 and 22 are sensitive to selection bias due to their uncertainty correlation. The selection bias is produced through the correlation of unobservable errors of financing growth and financial sustainability. We should be aware that uncertainty should not affect financing growth or financial sustainability decisions if the uncertainty is associated with this selection decision; it produces a selection bias and hampers the estimation parameter of the model. Therefore, it is necessary to omit the uncertainty effect and for it not to be associated in the selection decision of financing growth and bank sustainability.

In order to avoid selection bias, we can achieve this by removing unobserved time-varying and time-constant factors between those equations that are correlated in the financing growth and bank sustainability equations. In the financing growth equation, it is clear that an endogeneity problem arises because the decision depends on two factors—deposit capacity and output capacity. These variables will ensure that financing growth will be achieved if Islamic banks have strong deposit capacity and output capacity performance that is indicated by an increase in NPM. We derive Equations 21 and 22 into Equation 20 to produce a modified Heckman selection estimation with simulated maximum likelihood.

Afterward, we estimated the motive probability of Islamic banks towards a sustainability motive by calculating the net effect between BS and CS given by:

$$\Delta BS_t = Prob(\overline{BS}_t) - Prob(\overline{CS}_t) \quad (23).$$

Equation 23 stated that the motive probability of BS is a net effect between BS motive in second level nesting stimulated by CS in first level nesting in Figure 1. The BS is determined by SA and CS motives that are determined by FP and FST factors. This equation inform us that the BS equation at the second level is also determined by the first level of CS. While BS is also estimated with CS, it is important to calculate the net effect without the CS motive. The net effect will estimate the BS motive without the CS motive to measure the probability effect of BS without the probability of the CS motive.

5. RESULTS AND DISCUSSION

According to the BS column Table 1, the value of BS's average of close to 1 indicates that the BS motive during the period from 2013 to 2019 is strong. Otherwise, when BS's average close to 0, this indicates a value of less than 0.5. These countries have less growth and indicate a strong motive for CS. The countries indicating positive growth are Bangladesh, Indonesia, Iran, Jordan and Malaysia. The countries with a BS value of less than 0.5 are Brunei, Kazakhstan, Oman, Pakistan and the United Arab Emirates. On the other hand, the countries with a strong motive for CS are also portrayed in the entire sample of Islamic banks. This means that the CS motive is stronger than the BS motive.

Table 1. The average of each variable across countries.

Country	No. Banks	BS	CS	NII	SG	ZQO	Cost to Income	ROA	Z-Score	NPM
Bangladesh	22	0.700	0.867	2.257	45.530	0.600	0.403	0.015	6.886	0.328
Brunei	1	0.333	0.867	0.013	39.475	0.000	0.422	0.016	25.524	0.496
Indonesia	29	0.800	1.000	1.334	46.952	0.600	0.866	0.012	12.072	0.131
Iran	25	0.850	1.000	1.345	37.586	0.433	0.550	0.014	29.170	0.134
Jordan	3	0.667	0.900	0.006	64.492	0.833	0.508	0.018	21.666	0.492
Kazakhstan	1	0.467	0.700	128.715	1.000	0.000	0.506	0.018	5.702	0.327
Malaysia	31	0.800	1.000	0.351	51.167	0.600	0.396	0.011	16.846	0.403
Oman	8	0.267	1.000	0.297	55.017	0.467	1.692	-0.018	9.962	-0.809
Pakistan	21	0.433	0.967	3.023	50.991	0.533	0.709	0.012	13.866	0.257
United Arab Emirates	18									
		0.433	0.667	0.463	43.177	0.467	0.701	0.014	106.748	0.299
Total	159	0.570	0.897	13.779	43.539	0.453	0.675	0.013	24.844	0.205

The country with one of highest motives of BS is Malaysia, which has low non-interest income (NII) (i.e., $0.351 < 13.779$), the lowest cost to income ratio (i.e., $0.396 < 0.675$), a higher than average SG (i.e., $51.167 > 43.539$), and largest ZQO (i.e., $0.60 > 0.453$). Islamic banks in Malaysia also have strong motives in CS, which is indicated by the highest CS score (i.e., $1 > 0.897$); they also produce a higher NPM than the average (i.e., $0.403 > 0.205$), a lower ROA (i.e., $0.011 < 0.013$) and have a less stable than average Z-score (i.e., $16.84 < 24.844$). We can summarize that Islamic banks in Malaysia are determined by a higher ZQO and SG but a lower NII and a more efficient cost to income. The CS is also support by higher NPM but has a less stable Z-score and less ROA. Apparently, Islamic banks in Malaysia are struggling to achieve BS and compensate with a lower ROA and less stable Z-scores, although the NPM is higher than average.

If we look at the heterogeneity of Islamic bank performance across countries, a higher Z-score such as Iran's has more BS than Malaysia but has a less efficient cost to income (i.e., $0.550 > 0.396$), and Iran's NII is larger than Malaysia's (i.e., $1.345 > 0.351$). As matter of fact, although Iran is less efficient in terms of cost of income, their ROA is higher than Malaysia's (i.e., $0.014 > 0.011$). According to this result it is hard to elucidate the heterogeneity

of Islamic bank behavior, although to some extent we can elucidate a pattern. Unfortunately, we could not test empirically without conducting a formal analysis.

Table 2. Heckman selection estimation and two-stage estimation.

Variables	Heckman Selection		Two-stage Equation	
	BS_t	CS_t	BS_t	CS_t
1	2	3	4	5
NII	-0.00111 (0.00143)		-0.00085*** (0.000)	
SG	0.00125 (0.00482)		-0.003*** (0.001)	
ZQO	0.113 (0.168)		0.037 (0.048)	
Cost to Income	-7.424*** (0.696)		-0.563*** (0.059)	
ROA		-38.45** (16.70)		-0.657*** (0.126)
Z-Score		1.053 (0.721)		-0.659*** (0.139)
NPM		-0.134 (0.880)		-0.009 (0.342)
Constant	0.696** (0.324)	1.850*** (0.274)	0.775* (0.459)	0.775* (0.4)
c21		0.984*** (0.0576)		0.987*** (0.0370)
Observations	300	300	300	300

Note: Standard errors in parentheses.

*** p < 0.01, ** p < 0.05, * p < 0.1.

We demonstrated a formal analysis of bank sustainability and determined the factors depicted in Table 2. Moreover, we compared two estimation techniques between conventional methodology (i.e., Heckman selection) and our methodology to produce similar equations to calculate a selection decision for both CS and BS motives. We produced a conventional Heckman selection estimation with panel data (see Table 2). The results showed that in the CS equation, the variable that is significantly affected is return on assets (ROA). In the BS equation, only the cost to income variable had a significant effect on bank sustainability; the other variables did not significantly affect BS.

If we look at this estimation, we find that the conventional Heckman selection estimation produced a higher standard error for ROA rather than the proposed two-stage equation method. It showed that there is a weak estimation parameter for the Heckman Selection Estimation to produce this result. A similar problem also arose in the second equation for bank sustainability where the estimation failed to produce a robust result and gave a higher standard error and less significant results. According to these results, we can say that employing this estimation technique will produce misleading information and biased results for interpreting the variables' effects on bank sustainability performance. On the contrary, the results are different according to the two-stage equation method in which the results were produced with a simulated maximum likelihood estimator. We conducted the simulated maximum likelihood with the 100 Halton Draws simulation, as noted by Train (2009), to solve Equation 20. It shows that the two-stage estimation produced more robust results in terms of a smaller standard error and improving more variables with better significance levels. The whole variables in the BS equations are in the significance range from 1% for NII (i.e., -0.00085), SG (i.e., -0.003), and cost to income (i.e., -0.563), but not ZQO. In the CS model, we got 1% for both ROA (i.e., -0.657) and Z-score (i.e., -0.659) and these parameters show that financial capacity as a basis for Islamic banks is crucial for the self-sustenance of Islamic banks' productivity on an operational basis. We also found that NPM is not significant at all.

According to the CS motive column in Table 2, the Islamic banks across predominantly Muslim countries have experienced a reduction in ROA and Z-score. The increase in CS has driven a decrease in NPM for providing finance in maqasid sectors. This condition reflects the instability of Islamic banks for operating efficiently, which was also noted by Aliyu et al. (2017), who stated that financial capacity is a major problem for Islamic banks to overcome in order to perform better on a financial operational basis. Furthermore, if we look at the bank sustainability equation, although some variables such as cost to income, NII and SG have a significance level, only cost to income has a negative sign that is similar to the theory. NII and SG decreased while sustainable activities have failed to contribute to the improvement of BS, otherwise CS is only financed by BS to promote Islamic moral economy.

According to Beck, De Jonghe, et al. (2013), Islamic banks have capitalized better in terms of asset quality and lower risk of failure than conventional banks. It demonstrates that in longer periods, ROA is a crucial factor for achieving bank sustainability. For other variables, it seems that most of the Islamic banks are unable to maintain sustainability (i.e., negative signs for NII and SG) and stability (i.e., negative Z-scores). These results are confirmed by Aliyu et al. (2017) and Platonova et al. (2016) who found that Islamic banks are unable to align institutional objectives with Islamic moral economy. On the other hand, according to our results, we can interpret that the inability of Islamic banks to achieve bank sustainability is because they have less on offer to attract more trust and apply shari'ah principles, such as ZQO. According to Beck, Demirgüç-Kunt, et al. (2013), in order for Islamic banks to achieve BS, they have to rely on CS financing that participates in risky trading activities. The ROA decreases and reduces profit while financing for both BS and CS increases the overall risk on banks' balance sheets as they take equity in addition to debt risk.

Last, but not least, we predicted the probability of BS and CS according to Equation 20 with selected parameters in Table 2, columns 4 and 5. The whole predictions are represented in Figure 2. According to these results, we can interpret that the probability of CS is higher than the probability of BS, therefore it is logical that Islamic banks maintain CS rather than BS. They will maintain their business and focus on commercial financing, whereas their financial sustainability will be lower than expected to achieve the basic objectives to deliver the moral economy of Islamic banks' motives. This result is supported by previous studies such as those by Platonova et al. (2016) and Aliyu et al. (2017). Although they have better capitalized in financial performance, they were unable to deliver improved mandating of Islamic moral economy to the maqasid sector.

Table 3. Average probability of Islamic banks for commercial motives and sustainable motives.

Country	CS_t Prob.	BS_t Prob	Δ Effect
Bangladesh	0.495	0.557	0.062
Brunei	0.494	0.543	0.049
Indonesia	0.496	0.556	0.059
Iran	0.496	0.541	0.044
Jordan	0.493	0.578	0.084
Kazakhstan	0.494	0.497	0.003
Malaysia	0.496	0.563	0.067
Oman	0.509	0.557	0.048
Pakistan	0.496	0.560	0.063
United Arab Emirates	0.495	0.550	0.055
Total	0.497	0.550	0.054

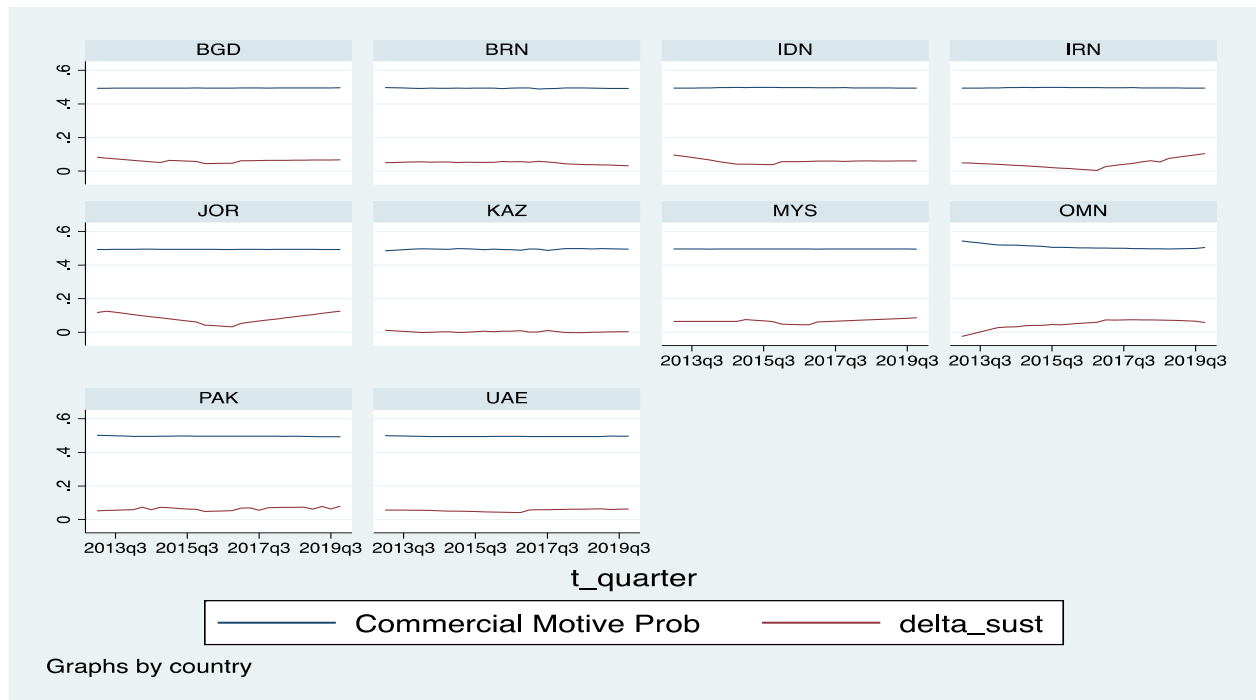


Figure 2. Predicting motive probability of Islamic banks towards commerciality and sustainability.

6. CONCLUSION

In this paper we proposed tools to investigate financial sustainability in Islamic banks across predominantly Muslim countries. The results mostly support and confirm previous studies that sustainability of Islamic banks is influenced by NII, SG and efficiency. The majority of Islamic banks in the countries studied failed to deliver Islamic moral economy. This strongly indicates that Islamic banks should focus more on the inclusive finance sector and better sustainability in the future. We have produced more comprehensive and robust results from our proposed methods than the conventional Heckman Selection Method to demonstrate the selection process of the sustainability performance in Islamic banks. We recommend further research that covers a longer period of time to provide more detail and micro data for both conventional and Islamic banks' financial performance, as conducted by Beck, De Jonghe, et al. (2013). We can then compare which financial factors for both conventional and Islamic bank most affects financial sustainability.

Our study was based upon the heterogeneity of Islamic bank behavior, which has not previously been explored in studies on Islamic banks. We can confirm that econometrics also is relatively powerful and provides robust estimations in the assessment of financial performance variables. We suggest adding macroeconomic variables to elaborate further in future research to assess how the macro policy affects bank performance.

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