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Impact of Green Banking Implementation, Financial Performance, and COVID-19 Crisis on Islamic Bank Profitability in Indonesia

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Abstract

The purpose of this research is to test empirically the impact of green banking implementation, financial performance, and Covid-19 crisis on Islamic bank profitability in Indonesia for the period of 2015-2021. This study uses two quantitative approaches, specifically static panel data method and dynamic panel data method (generalized method of moments or GMM). The secondary data used in this paper with a total sample of 10 Islamic commercial banks in Indonesia. This study finds that the implementation of Green Banking as the main determinant has a significant relationship to the profitability of Islamic Banks in Indonesia. The study also finds that financial performance variables such as CAR, NPF, and OEF show that contribution to the level of Islamic bank profitability in Indonesia. Further, other finding regarding the dummy crisis variable, Covid-19 crisis finds that a strong relationship to the Islamic bank profitability. It means that Covid-19 crisis will impact negatively to Islamic bank profitability in Indonesia. Based on the results of the robustness check, the model in this research is stated to be robust. The findings are expected to be useful for policy makers as well as for Islamic banking circles. Research results can be used as input in formulating policies in achieving sustainable development goals and economic and social recovery programs after the Covid-19 pandemic.

Keywords: Islamic Bank Profitability, Green Banking, Financial Performance, COVID-19, Indonesia.
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I. Introduction

1.1. Background

The problematic phenomena of Corona Virus Disease 2019, or COVID-19 as the current term for the virus, have been becoming a disease issue worldwide (Chamani et al., 2020). The COVID-19 outbreak has caused uncertainty in many economic sectors and led to a global economic recession. Wuryandani (2020) mentioned that the COVID-19 crisis has caused a domino effect of health and socio-economic problems in Indonesia. Also, In Indonesia, the COVID-19 pandemic greatly impacted economic conditions (Sulaeman, 2020). The COVID-19 crisis also reduced performance in essential sectors of the Indonesian economy (Tiara & Jayanti, 2022). Several sectors are affected by the COVID-19 pandemic, such as the tourism and hospitality sectors, airlines, oil and gas, automotive, customer product, electronics, and semiconductors (Ascarya, 2022).

Since the COVID-19 pandemic, the Indonesian government has begun to seek recovery and rebound in many vital sectors to re-boost the Indonesian economy, such as the banking industry. Banking institutions, including Islamic banking, are vital sectors in the national economic structure. Banks institutions actively distributed credit or financing to customers from the general public, small and medium-sized enterprises (SMEs), and large corporations or companies during the COVID-19 pandemic. Thus, banks must evaluate and ensure that the projects to be funded are in accordance with the objectives of economic recovery, including environmentally friendly projects, before disbursing loans or financing.

On the other hand, the problem of environmental damage, increased air pollution, and damage to land and sea ecosystems has become a concern of many countries for a long time, including Indonesia. Hence, sustainable development goals (SDGs) are a government commitment to achieve the global agenda by 2030. SDGs can lead to the rational and environmentally friendly use of natural resources so that development goals can meet current and future generations (Miroshnichenko & Brand, 2021). There are six essential elements: planet, people, dignity, prosperity, justice, and partnership (Ermelena, 2017 in Risanti et al., 2020). SDGs are also government policies that apply to all countries so that they are universal or comprehensive, including 1) No poverty; 2) Zero hunger; 3) Good health and well-being; 4) Quality education; 5) Gender equality; 6) Clean water and sanitation; 7) Affordable and clean energy; 8) Decent work and economic growth; 9) Industry, innovation, and infrastructure; 10) Reduced inequalities; 11) Sustainable cities and communities; 12) Responsible consumption and production; 13) Climate action; 14) Life below

water; 15) Life on land; 16) Peace, justice, and strong institutions, and 17) Partnerships for the goals (UNDP, 2021).

Therefore, a banking system is needed to support increasing the number of investments in low-carbon production and energy efficiency as well as other environmentally sound projects (Hasanah & Hariyono, 2022). The banking system plays a crucial role in achieving this goal by implementing the concept of green banking (Gunawan et al., 2022). It is where the purpose of the green banking system is to green the banking industry and support the green economy and green business movement at the corporate state level. Thus, green banking has received the attention of international banking and financial industry players.

The implementation of green banking practices is also one way for banks to contribute to minimizing environmental problems. In other words, the banking industry must prioritize every business activity supporting environmentally friendly programs (Setyoko & Wijayanti, 2022). In Indonesia, the green banking concept aligns with the Financial Services Authority Regulation (POJK) No. 51 of 2017 concerning the Implementation of Sustainable Finance for Financial Services Institutions, Issuers, and Public Companies aimed at clarifying the implementation of sustainable finance in Indonesia. The POJK also encourages establishing a contributive and inclusive financial service system to provide sustainable development funding (Hasanah & Hariyono, 2022).

Previously, Bank Indonesia, as a central bank, had issued Bank Indonesia Regulation (PBI) Number 14/15/PBI/2012 concerning Commercial Bank Asset Valuation. The regulation contains the obligation of national banks to consider environmental feasibility factors. Therefore, Bank Indonesia encourages all national banks, including Islamic banks in Indonesia, to consider factors related to environmental feasibility in conducting business assessments through the Environmental Impact Analysis (EIA) process. Anggraini et al., (2022) state that in the view of Islam, green banking activities have become a fundamental rule in accordance with the theory of *Maqashid Syariah* (Islamic goals), which reveals the benefit of humans, both in this world and in the hereafter. Consequently, Islamic banking should be at the forefront of implementing green banking, especially in providing targeted financing and not having a negative impact on the natural environment.

1.2. Objective

Several researchers have researched the determinants of banking profitability, both conventional banking and Islamic banking, in various countries, using various analytical methods, and the findings of previous studies expose different results (Anggraini et al., 2020; Anggraini et al., 2022; Anisa & Anwar, 2021; Hasanah & Hariyono, 2022; Iman & Umiyati, 2022; Imsar & Harahap,

2022; Isayas, 2022; Ken & Santioso, 2022; Laili & Bawono, 2022; Mondol & Wadud, 2022; Syahri & Harjito, 2020; Tumewang et al., 2019). Research on the determinants of Islamic banks, especially relating to the relationship between the implementation of green banking, financial performance, and the COVID-19 crisis on the profitability of Islamic banks in Indonesia, is also still minimal. Therefore, the authors discuss the empirical evidence about the determinants of profitability of Islamic banks in Indonesia.

The main objective is to analyze the impact of green banking disclosure, financial performance, and the COVID-19 crisis on the level of Islamic bank profitability in Indonesia. The research results are expected to be useful for policymakers and Islamic banking circles. (1) For Islamic banks, it can be used as input for policies in improving financial performance and risk management in dealing with various possible financial risks that will be faced so that the level of profitability can be achieved and maintained. (2) For the government, research results can be used to formulate policies to achieve sustainable development goals and economic and social recovery programs after the COVID-19 pandemic.

II. Literature Review

2.1. Background Theory

2.1.1 Concept and Measurement of Banking Profitability

The concept of profitability is the ability of a company to earn a level of profit. The more significant the profit obtained, the better the company management (Sutrisno, 2003). The theory of profitability reveals that financial performance can be an essential reference in measuring the amount of profit and how the company runs its operations efficiently. Syamsuddin (2000) defines profitability as the ability of a company's management to obtain profits related to sales, total assets, and long-term debt.

According to Hasanah and Hariyono (2022), profitability is the ability of a company to earn a profit through optimization and efficiency of the company's resources to assist in accelerating the company to achieve the desired level of profit and the expected level of efficiency. In assessing a company in obtaining profits, it can be seen from the value of the profitability ratio as an indicator. Profitability in a company is related to the description of its financial performance. Financial performance is a review or investigation showing to what extent an institution/corporation or company is operating (Iman & Umiyati, 2022).

In terms of measurement of banking profitability, the majority of previous research used return on asset or ROA, such as Achsani and Kassim (2021); Amin (2022); Anggraini et al., (2020); Anggraini et al., (2022); Anisa and Anwar (2021); Hasanah and Hariyono (2022); Iman and Umiyati (2022); Imsar and Harahap (2022); Isayas (2022); Ken and Santioso (2022); Laili and Bawono (2022); Mondol and Wadud (2022); Syahri and Harjito (2020); Syamlan et al., (2021); and Tumewang et al., (2019). Furthermore, ROA is the return on asset ratio to illustrate the efficiency of the company's performance and measure the value of a bank's profitability. The greater the value of the ROA ratio, the greater the level of profit or profit that a bank has obtained. ROA also shows the ability of management to manage assets or assets owned to get net income. Therefore, following the previous studies, the authors used ROA as Islamic bank profitability in this study.

2.1.2 Concept and Measurement of Green Banking

Green banking was first implemented in 1980 by a Dutch Bank called *'Tridos Bank,'* which has raised a 'Green Fund' to finance environmental projects (Chen et al., 2022). Green banking is generally defined as banking that applies the concept of green or environmentally friendly. Thus, it can be said that green banking has the concept of financing or lending that prioritize sustainable aspects from the economic, environmental, social, and technological (Choubey & Sharma, 2022; Hanif et al., 2018).

According to Lako (2014), in his book *"Green Economy,"* green banking is based on the principle of sustainability, which has four main joints: nature, well-being, economy, and society. Green banking is a concept that encourages banks to run their business based on the goal of reducing ecosystem or environmental pollution, such as providing development financing that pays attention to environmental aspects before channeling financing or credit (Setyoko & Wijayanti, 2022). Vishnu et al., (2022) mentioned that green banking is related to climate-friendly financing, social investment in hospitals and schools, and other programs with sustainable development goals. Green banking is crucial in policy-making, focusing on the environment, financial institutions, and socioeconomic growth (Chen et al., 2022).

Furthermore, indicators in calculating the green banking ratio are based on Nath et al., (2014). Six indicators in determining green banking are contained in a green coin rating (GCR), illustrated in Figure 1 below.

Figure 1. Green Coin Rating (GCR)
Source: Author's Illustration from Nath et al., (2014)

A detailed explanation of the six indicators of the GCR concept in banking follows. (1) Carbon emission: green banks are expected to use low-carbon technologies, such as incandescent lamps, making building walls weatherproof, using electronics wisely, and considering alternative energy. (2) Green building: banks are expected to have buildings using environmentally friendly materials, such as electricity, and spatial planning using natural materials. (3) Paperwork: banks are expected to reduce the use of paper made from tree fiber in their administration activities. It will have a bad impact if the massive use of paper causes a reduced population of tree plants and requires a long period to grow again. Banks can take advantage of technology in their activities, such as using paperless applications. (4) Green investment: banks focus on investment committed to conserving natural resources (SDA), implementing clean air and water projects, and other environmentally friendly investment activities. (5) Reuse/recycle/refurbish: banks are expected to be wise in using new items that can be reused either outside or in their operational activities. (6) Green rewards: banks are directly involved in protecting nature and its ecosystem to preserve the environment. Banking can contribute to giving awards to people or groups of people who have maintained a sustainable program.

2.2. Previous Studies

2.2.1 Green Banking and Profitability

Several previous studies related to the relationship between the implementation of green banking and banking profitability in both conventional and Islamic banks in Indonesia are Anggraini et al., (2020); Anggraini et al., (2022); and Hanif et al., (2018). Anggraini et al., (2022) studied the relationship

between the implementation of green banking on the profitability of Islamic commercial banks in Indonesia, indicating a positive relationship between green banking and the profitability of Islamic banking in Indonesia. Their research also concluded that all indicators measuring green banking are in accordance with Islamic principles. In addition, Hanif et al., (2018) conducted the same study to empirically analyze the relationship between green banking and Islamic banking in Indonesia in 2015-2018. Their research disclosed a positive and significant relationship between green banking and the profitability of Islamic commercial banks in Indonesia. From the perspective of conventional banking, as done by Anggraini et al., (2020), the implementation of green banking also unveiled a significant relationship to the profitability of nine conventional banks in Indonesia.

2.2.2 Financial Performance and Profitability

There are several previous research related to the relationship between financial performance (namely capital adequacy ratio or CAR, Non-Performing Financing or NPF, financing deposit ratio or FDR, and operational efficiency or OEF) and banking profitability in both conventional and Islamic banks in Indonesia, such as Anggraini et al., (2020), Anisa and Anwar (2021), Hasanah and Hariyono (2022), Imsar and Harahap (2022), and Laili and Bawono (2022).

Imsar and Harahap (2022) researched the relationship between CAR and the level of profitability of Islamic state-owned banks in Indonesia from 2011-2018. The results of their research found that CAR had a positive and significant relationship with Islamic bank profitability in Indonesia. Isayas (2022) and Mondol and Wadud (2022) also revealed that CAR positively affected a bank's profitability. Besides, Laili and Bawono (2022) showed results aligned with the existing theory that financing risk negatively and significantly influences profitability levels in Islamic banking in Indonesia.

Additionally, studies related to the relationship of FDR to the profitability level of banking have been carried out by Anisa and Anwar (2021), Iman and Umiyati (2022), Imsar and Harahap (2022), Isayas (2022), and Mondol and Wadud (2022) with the different study results. On the one hand, Imsar and Harahap (2022), and Isayas (2022) found a positive and significant influence between FDR and the banking profitability level. On the other hand, Mondol and Wadud (2022), and Pamuncak and Wijaya (2022) uncovered a negative and significant relationship between FDR and profitability.

Ken and Santioso (2022) mentioned that a high OEF value illustrates that the bank industries cannot optimally manage their internal resources to carry out business operations. Furthermore, a high OEF gives a bad signal for banks not carrying out their operational activities efficiently. Several previous studies have

also examined the relationship between OEF and profitability, such as Anggraini et al., (2020), Anggraini et al., (2022), and Hasanah and Hariyono (2022), Iman and Umiyati (2022), Imsar and Harahap (2022), and Mondol and Wadud (2022). Those studies showed different results, but most research found that OEF had a negative and significant relationship to the level of banking profitability in Indonesia or other countries.

2.2.3 COVID-19 Crisis and Profitability

For previous research related to the relationship COVID-19 crisis and profitability, Pamuncak and Wijaya (2022) investigated the relationship between the COVID-19 crisis and a firm's profitability. Their research found that COVID-19 negatively affected a firm's profitability in Indonesia. Thus, COVID-19 brings not only medical problems but also economic problems, especially in the banking industry, for many countries worldwide. Therefore, in Indonesia, the COVID-19 pandemic had a negative impact on banking industry conditions.

III. Methodology

3.1. Research Method and Stages

This study used the static and dynamic panel data estimation models Mondol and Wadud (2022) used. Thus, the research method applied two quantitative approaches:

(1) Static panel data is based on the econometrics guidelines by Gujarati and Porter (2012). There are three models of static panel data: Pooled Least Square (PLS), Fixed Effect Model (FEM), and Random Effect Model (REM). For selecting the best estimation, the Chow, Hausman, and LM tests were used to know the best estimation model in this study, following Pindyck and Rubinfield (1998), and Wooldridge (2001).

(2) Dynamic panel data or generalized method of moments (GMM) was developed by Arellano and Bond (1991), especially First-Difference GMM (FD-GMM). GMM is one of the panel data methods often used to analyze the relationship between dynamic economic variables. The variable itself influences the value of a variable in the previous period. Dynamic panel data is characterized by the lag of the dependent variable between the regressor variables. In addition, GMM is applied to test for robustness and analyze the validity of this study's panel data regression model.

Furthermore, as depicted in Figure 2, the steps of this research followed previous studies, such as Anggraini et al., (2020), Anisa and Anwar (2021), Hasanah and Hariyono (2022), Imsar and Harahap (2022), Laili and Bawono (2022), and Pamuncak and Wijaya (2022). The first step was determining proxy variables from green banking, financial performance, and the COVID-19 crisis.

All these variables have contributed to the profitability of Islamic banking in Indonesia. The second step was to analyze the significance of each independent variable to the dependent variable using the panel data regression approach, i.e., static panel data. The third step was to ensure the consistency of the initial estimation results by using a robustness check, namely dynamic panel data with the GMM approach. The fourth step was to analyze all the estimation results of the data. Moreover, the final step was to conclude and recommend policies based on the latest findings in this study.

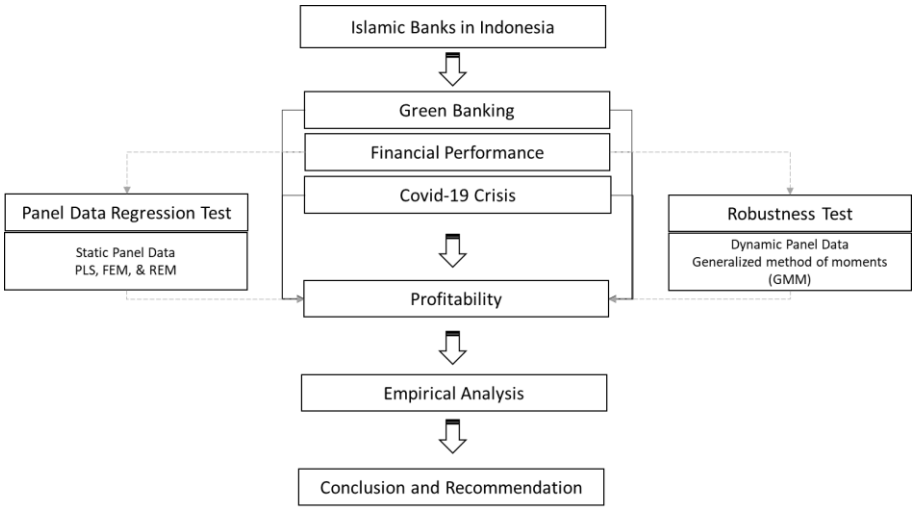

Figure 2. Research Steps

3.2. Data and Research Variables

The data used in this study were secondary data from the annual report of Islamic commercial banks in Indonesia from 2015 to 2021. The sample of this research was 10 (out of 14) Islamic commercial banks with complete data registered in Bank Indonesia. The ten Islamic commercial banks were Bank Mega Syariah, Bank Muamalat Indonesia, Bank Negara Indonesia (BNI) Syariah, Bank Nusa Tenggara Barat (NTB) Syariah, Bank Panin Dubai Syariah, Bank Rakyat Indonesia (BRI) Syariah, and Bank Syariah Mandiri (BSM). The authors followed Syahri and Harjito (2020) to select samples. The explanations of the individual variables are summarized in Table 1.

Table 1. Research Variables

Variables		Indicators		Exp. Sign
Islamic Bank Profitability Variables				
Return on Assets	ROA	Return on assets (ROA) is defined as the net profit after tax to total assets.	%	n/a

Variables		Indicators		Exp. Sign
Green Banking Variables				
Green Banking	GREEN	The green baking ratio is defined as the ratio of the green coin rating of total Islamic banks to total indicators of green coin rating.	%	(+)
Financial Performance Variables				
Capital Adequacy Ratio	CAR	Capital adequacy is defined as the ratio of shareholders' equity to total assets.	%	(+)
Non-Performing Financing	NPF	Non-performing financing is defined as the ratio of financial risk to total financing.	%	(-)
Financing Deposit Ratio	FDR	A financing deposit is defined as the ratio of financing to third-party funds.	%	(+)
Operational Efficiency	OEF	Operating efficiency is computed as the ratio of total operating cost to total operating income of banks.	%	(-)
COVID-19 Crisis Variables				
Dummy COVID-19 Crisis	DCOVID-19	Measuring Crisis 0 = Pre COVID-19 1 = Post COVID-19	Dummy	(-)

Sources: Indonesian Islamic Bank for Annual Report (2022)

3.3. Empirical Development Model

The empirical development model conducted by Isayas (2022), and Mondol and Wadud (2022) is one of the references for research on the determinants of banking profitability. Meanwhile, the determinants of the Islamic bank profitability using a static panel data regression approach have been investigated by Achsani and Kassim (2021), Anisa and Anwar (2021), Hasanah and Hariyono (2022), Iman and Umiyati (2022), Imsar and Harahap (2022), and Laili and Bawono (2022). In this study, the green banking variable was used as a determinant of the profitability of Islamic banks in Indonesia, as research was conducted by Hanif et al., (2018). Furthermore, this study also included an essential variable in influencing the profitability of Islamic banks in Indonesia, namely the dummy current crisis variable from the COVID-19 crisis, as research conducted by Pamuncak and Wijaya (2022). Moreover, the specification model of the panel data regression model in this study is as follows:

$$ROA_{it} = \alpha_0 + \alpha_1 GREEN_{it} + \alpha_2 CAR_{it} + \alpha_3 NPF_{it} + \alpha_4 FDR_{it} + \alpha_5 BOPO_{it} + \alpha_6 DCOVID - 19_{it} + \varepsilon_{it} \quad (1)$$

Meanwhile, the specification of the regression model using the generalized methods of the moment (GMM) is as follows:

$$ROA_{it} = \alpha_0 + \delta_1 ROA_{i,t-1} + \alpha_1 GREEN_{it} + \alpha_2 CAR_{it} + \alpha_3 NPF_{it} + \alpha_4 FDR_{it} + \alpha_5 BOPO_{it} + \alpha_6 DCOVID - 19_{it} + \varepsilon_{it} \quad (2)$$

Where α is intercept terms; tROA measures the profitability of Islamic banks; for the GMM model, ROA(t-1) is lag dependent variables; the internal variables of Islamic banks are GREEN and financial performance, specifically CAR, NPF, FDR, and BOPO; the dummy crisis variable is COVID-19, where a value of 0 indicates before the COVID-19 pandemic and a value of 1 during and after the COVID-19 pandemic.

IV. Results and Analysis

4.1. Descriptive Statistics

In this section, descriptive statistics for independent and dependent variables present mean, standard deviation, minimum, and maximum, as shown in Table 2. The authors used unbalanced panel data, and the total observation was 67. Islamic bank profitability was measured by return on assets or ROA. The mean ROA was 0.9034%. While the maximum value for ROA was 4.27%, the minimum value for ROA was -10.77%. In green banking variables, the mean value of GREEN was 0.5218, with the minimum and maximum values of 0.25 and 0.92. For the financial performance of Indonesian Islamic banks, the mean values of CAR, NPF, FDR, and OEF were 21.9799%, 3.2710%, 85.1824%, and 93.1330%, respectively. The maximum values of all internal factors were 45.30% (CAR), 12.52% (NPF), 196.73%(FDR), and 217.40% (OEF). In comparison, the minimum values were 11.51% (CAR), 0.32% (NPF), 38.33% (FDR), and 64.64% (OEF), respectively. In the case of the Islamic bank's external factor variable, the average values of DCOVID-19 were 0.2537. In addition, the DCOVID-19 has a maximum value of one and a minimum value of zero.

Table 2. Descriptive Statistics Results

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
ROA	67	0.9034	2.0097	-10.7700	4.2700
GREEN	67	0.5218	0.1847	0.2500	0.9200
CAR	67	21.9799	7.6294	11.5100	45.3000
NPF	67	3.2710	2.3826	0.3200	12.5200
FDR	67	85.1824	18.1374	38.3300	196.7300
OEF	67	93.1330	22.5334	64.6400	217.400
DCOVID-19	67	0.2537	0.4384	0.0000	1.0000

4.2. Correlations Matrix Results of Independent Variables

Table 3 discusses the correlation coefficient between the independent or explanatory variables in the panel data regression models. The correlation matrix results showed no multicollinearity problem in this model, as seen by the low degree of correlation coefficient between independent variables. Therefore, the results are efficient. According to Gujarati (2003), the multicollinearity problem can be considered if the pair-wise correlation coefficient between two regressions exceeds 0.8. Finally, since all independent variables had a correlation coefficient with a lower value than 0.8, it can be concluded that there was no existence of multicollinearity problems in the empirical model.

Table 3. Correlations Matrix Results of Independent Variables

	GREEN	CAR	FDR	NPF	OEF	DCOVID-19
GREEN	1.0000					
CAR	-0.0997	1.0000				
FDR	-0.1188	0.0918	1.0000			
NPF	0.2392	-0.5345	0.2312	1.0000		
OEF	0.1192	-0.2141	0.1867	0.4982	1.0000	
DCOVID-19	0.1851	0.2795	0.0039	-0.1497	0.0255	1.0000

4.3. Static Panel Data Regression Results

In this study, the panel data regression was estimated statically and dynamically by performing all tests on the model. In static panel data, three choices of methods can be used: (1) pooled least square (PLS), (2) fixed effect model (FEM), and (3) random effect model (REM). Table 4 shows the results of the Hausman, Chow, and Breusch-Pagan LM tests for the best estimation methods. LM test and Chow test revealed significant results. It denotes that the choice of the best method was the random effect model (REM). It is because the Hausman result was insignificant evidence (0.2936 > 0.05). However, the authors discuss all models in this study to provide a comprehensive research analysis.

Table 4 also displays the classical assumption test results. The classical assumption test results indicate that the model suffered from autocorrelation and heteroscedasticity. However, the authors resolved this problem with robust technical analysis. Further, Table 4 presents the result of all panel data regressions: PLS (1), FEM (2), and REM (3). In general, the PLS and REM presented similar results, where three variables, namely GREEN, NPF, and OEF, were significant at different levels of significant (1% and 5%). Meanwhile, the FEM model result stated that GREEN, CAR, NPF, OEF, and DCOVID-19, except

FDR, were the variables that significantly affected Islamic bank profitability at alpha 1% and 10%.

Furthermore, PLS (1), FEM (2), and REM (3) had R-square (R^2) values of 0.9477, 0.9313, and 0.9453, respectively. It denotes that the independent variables in this model could explain the dependent variables of 94.77%, 93.13%, and 94.53%. In comparison, 5.23%, 6.87%, and 5.47% were explained by other variables outside this model or due to error terms. In addition, the Wald Test or F-test value uncovered a significant value at the same degree of 5% (0.05). Thus, it explains that simultaneously, all variables, i.e., green banking, financial performance, and dummy crisis variables, affected the profitability of Islamic banking in Indonesia.

Table 4. Static Panel Data Regression Results

Dependent Variables		Islamic Bank's Profitability (ROA)		
Independent Variables		(1) PLS	(2) FEM	(3) REM
GREEN		-0.7113**	-1.0978***	-0.8504**
	p-value	(0.0450)	(0.0080)	(0.0170)
CAR		-0.0003	0.0268*	0.0087
	p-value	(0.9790)	(0.0990)	(0.4610)
NPF		-0.0828**	-0.1179***	-0.0987***
	p-value	(0.0240)	(0.0050)	(0.0070)
FDR		0.0029	0.0018	0.0018
	p-value	(0.4160)	(0.6180)	(0.6020)
OEF		-0.0815***	-0.0756***	-0.0781***
	p-value	(0.0000)	(0.0000)	(0.0000)
DCOVID-19		-0.1501	-0.2533*	-0.1899
	p-value	(0.3070)	(0.0770)	(0.1580)
Constant		8.9272***	8.2318***	8.6529***
R-Squared (R^2)		0.9477	0.9313	0.9453
Adj. R-Squared		0.9425	-	-
F/Wald Test		181.15(0.000)	130.34(0.000)	936.47(0.000)
Model Specification Test				
Chow Test				2.97(0.0064)
LM Test				4.32(0.0189)
Hausman Test				7.31(0.2936)
Diagnostic Checks				
Autocorrelation Test (LM Test)				10.124(0.0112)
Heteroscedasticity Test (Breusch-Pagan-Godfrey Test)				1413.77(0.000)

Notes: ***, **, and * denote the significance of coefficients at 1 %, 5 %, and 10 % levels, respectively.

4.4. Robustness Test

The dynamic panel data regression model was carried out as the second quantitative method: the generalized methods of the moment (GMM), especially first-difference GMM (FD-GMM or AB-GMM), for robustness checks in this study. The model robustness test was carried out to ensure the consistency of the previous model's estimation results. Further, the dynamic panel data approach can also be used to see the level of profitability in the previous period due to the influence of the level of profitability in the previous period. Thus, it is said to be a dynamic analysis model. Based on empirical findings on the FD-GMM model, the level of profitability of Islamic banking in the previous period (L1.ROA) did not show a significant relationship to the level of profitability of Islamic banking in the present (see Table 5).

Besides, the estimation results of the FD-GMM model were efficient based on the three criteria used. (1) Consistency: the consistency properties of the estimator obtained can be checked from the statistical value of the Arellano-Bond Test (AR1 and AR2). Since the value of AR2 showed an insignificant value, it can be said that the FD-GMM models in this study were consistent. In addition, the AR2 statistical test identified that the model was free from autocorrelation problems. (2) Instrument validity test: the instrument's validity can be seen based on the results of the Sargan test. (3) Unbiased test: this test can be seen from the estimation results using FD-GMM, showing results that tended to be unbiased or FE<FD-GMM<PLS or -0.0040<0.0252<0.0284. It suggests that the value of the coefficient of the lag variable of Islamic banking profitability (L1.ROA) in the FD-GMM model was between the value of L1.ROA and L1.ROE in the FE model and PLS model.

Furthermore, based on the estimation results of the FD-GMM (model 4), Table 5 shows that the variables affecting the level of profitability of Islamic banking in Indonesia were GREEN, NPF, OEF, and DCOVID-19 variables. The analysis results with this method showed similar results to the static panel data method in Table 4. Therefore, the estimation results in the static panel data model, specifically PLS (1), FEM (2), and REM (3) in this study confirm that they were robust. In other words, the analysis of empirical results in this study had the resilience or robustness of the model.

Table 5. Generalized Methods of Moment (GMM) Results

Dependent Variables		Islamic Bank Profitability (ROA)		
Independent Variables		(4) FE	(5) FD-GMM	(6) PLS
L1.ROA		-0.0040	0.0252	0.0284
	p-value	(0.9220)	(0.5670)	(0.4630)
GREEN		-1.5960***	-1.8113***	-0.9002**
	p-value	(0.0020)	(0.0020)	(0.0360)
CAR		0.0245	0.0209*	-0.0021
	p-value	(0.1420)	(0.0740)	(0.8420)
NPF		-0.1542***	-0.1505**	-0.0748*
	p-value	(0.0020)	(0.0110)	(0.0620)
FDR		0.0006	0.0003	0.0029
	p-value	(0.8760)	(0.9130)	(0.4430)
OEF		-0.0741***	-0.0753***	-0.0805***
	p-value	(0.0000)	(0.0000)	(0.0000)
DCOVID-19		-0.2626*	-0.2142**	-0.1544
	p-value	(0.0670)	(0.0460)	(0.3170)
Constant		8.6555***	8.9394***	8.9500***
F/Wald Test		102.35(0.000)	45824.41(0.000)	135.7(0.000)
AR1			0.55495(0.5789)	
AR2			-1.6192(0.1054)	
Sargan Test			21.45185(0.0906)	

Notes: ***, **, * denote the significance of coefficients at 1 %, 5 %, and 10 % levels, respectively.

4.4. Analysis

4.4.1 Green Banking Implementation (Green) and Islamic Bank Profitability

The implementation of green banking (GREEN) was significant at 1% (0.0080) to the profitability of Islamic banks in Indonesia, with a negative relationship and a coefficient of -1.0978. The increase of GREEN was associated with the decrease of 1.0978 ROA in Islamic banks. The finding indicates that the higher the value of green banking implementation, the lower Islamic banks' profitability level. The finding also confirms the notion that the implementation of green banking was still not optimally implemented by Islamic banking companies in Indonesia. It is because the value of green banking implementation in Islamic banking based on the Green Coin Rating (GCR) was still below the average of 60%. The results of this estimate contradict the results of research conducted by Hanif et al., (2018), concluding that green banking had a significant effect in increasing the Net Profit Margin (NPM) as the profitability of Islamic banking in Indonesia.

4.4.2 Capital Adequacy Ratio (CAR) and Islamic Bank Profitability

Capital Adequacy Ratio (CAR) becomes one of the indicators of financial performance in Islamic banks. Based on the panel data regression results, especially the FEM model, the CAR variable was significant at 10% (0.0990) to the Islamic bank profitability with a positive relationship and a coefficient value of 0.0268. The CAR increase was associated with the increase of 0.0268% of ROA in Islamic banks. The finding implies that the higher the CAR value means, the stronger the Islamic banks in bearing the risk of any productive assets that contain risks such as financing. The findings are consistent with the research conducted by Imsar and Harahap (2022), Isayas (2022), and Mondol and Wadud (2022), which found a significant relationship between CAR and profitability. In addition, CAR, as a capital adequacy ratio, Islamic banking has been able to carry out capital management well. However, it should be noted that too high a CAR ratio can cause Islamic banks to become unproductive, especially in the long term, reducing the level of profit in Islamic banks.

4.4.3 Non-Performing Financing (NPF) and Islamic Bank Profitability

The internal variables of other Islamic banks, namely the Non-Performing Financing (NPF) variable, exposed significant results on the level of profitability of Islamic commercial banks in Indonesia, with a value coefficient of -0.1179 at 1% (0.0050). The NPF increase was associated with a decrease of 0.1179% % in ROA in Islamic banks. The result indicates a strong relationship between financing risk and the level of profitability of Islamic banking in Indonesia. The theory explains that the level of Non-Performing Financing causes profits or profits obtained by Islamic banking corporations to decrease. The high level of Non-Performing Financing can cause the growth of Islamic banking in Indonesia to be small. Further, this finding aligns with research conducted by Laili and Bawono (2022), who found a negative and significant relationship between NPF and Islamic banks' profitability level in Indonesia.

4.4.4 Financing Deposit Ratio (FDR) and Islamic Bank Profitability

Financing to deposit ratio (FDR) is a measure of liquidity that determines the amount of funds placed in the form of financing originating from funds collected by banks. The higher of FDR value, the riskier the bank's liquidity conditions. However, the panel data estimation results revealed that FDR had an insignificant relationship with Indonesian Islamic banks' profitability. Therefore, the finding indicates that FDR is not the primary variable in determining the level of Islamic banking profitability in Indonesia. This study aligns with previous researchers, such as Anggraini et al., (2020) and Anisa and Anwar (2021), who found no effect of FDR on bank profitability.

4.4.5 Operational Efficiency (OEF) and Islamic Bank Profitability

Another financial performance variable is operational efficiency (OEF). OEF is a representation of operational cost efficiency. Based on the panel data regression model results, OEF had a significant relationship with Islamic bank profitability in Indonesia, with a coefficient of -0.0753 at 1% (0.0000). The increase in OEF was associated with a decrease of 0.0753% in ROA in Islamic banks. The finding is in accordance with the existing theory, stating that higher operational costs indicated the less efficient management of Islamic banks. Ascarya and Yumanita (2010) stated that a high level of operational costs could reflect the under quality of bank management. The findings are also in line with the research conducted by Anggraini et al., (2020), Anggraini et al., (2022), Hasanah and Hariyono (2022), Iman and Umiyati (2022), Imsar and Harahap (2022), and Mondol and Wadud (2022), who found a negative significantly relationship between OEF and bank's profitability.

4.4.6 COVID-19 Crisis (COVID-19) and Islamic Bank Profitability

For the dummy crisis variables, DCOVID-19 represents the current crisis. Based on the estimation results of the FEM model, the DCOVID-19 variable had a negative significant relationship with Islamic banks' profitability in Indonesia, with a coefficient value of -0.2533 and a significant level of 10% (0.0770). The increase of DCOVID-19 was associated with a decrease of 25.33% in ROA in Islamic banks. The finding suggests that the current crisis caused a slump in essential sectors in Indonesia, including the Islamic banking industry, which contributes to increasing national economic growth. It is evident that during the COVID-19 outbreak, the national economic growth level decreased negatively. The finding also aligns with the theory and previous studies, such as research conducted by Pamuncak and Wijaya (2022), which stated that the COVID-19 crisis negatively impacted Shariah firms' profitability in Indonesia. Therefore, it implies that Islamic banking is still vulnerable to crises that occur, especially the crisis caused by the global pandemic.

V. Conclusion and Recommendation

5.1. Conclusion

Based on the results of static and dynamic panel data regression models in previous chapters regarding the impact of green banking implementation, financial performance, and the COVID-19 crisis on the level of profitability of ten Islamic banks in Indonesia for the 2015-2021 period, the following conclusions can be drawn. (1) The primary determinant of Islamic banks' profitability in Indonesia is green banking (GREEN). (2) The financial performance of Islamic banks includes CAR, NPF, and OEF, showing a significant

relationship to the level of profitability of Islamic banks in Indonesia. Meanwhile, FDR did not show a significant relationship to the level of profitability of Islamic banking in Indonesia. (3) The other primary determinant in this study is COVID-19 (DCOVID-19) as a representation of the current crisis's impact. Empirical results uncovered a significant relationship between the COVID-19 crisis and the profitability of Islamic banks in Indonesia. This research has also checked the robustness of the model based on testing the FD-GMM estimation model. The FD-GMM results exposed that the estimation results were similar between static and dynamic panel data. Thus, the results of this study can be concluded as 'robust'.

5.2. Recommendation

The policy recommendations in this study are as follows. For Islamic bank management, the implementation of green banking should be increased, especially in providing financial support to environmental projects. It can be noted that all Islamic banks in Indonesia must implement all indicators of green banking from green coin rating (GCR). Further, the empirical study is expected to be a reference for improving the financial performance of bank management. Islamic bank management should maintain essential indicators of financial performance at a safe level because investors use financial performance to see the performance of Islamic banking in Indonesia. Islamic commercial banks should have good risk management to control any level of financing risk. Also, Islamic bank management needs to manage operational costs. Because operating efficiency will represent the efficiency of Islamic banks, Islamic bank management should be prepared to face uncertainty from other external risks, such as the recent crisis like the COVID-19 pandemic. For future research, adding other profitability level indicators apart from ROA that can measure Islamic banks' profitability levels is necessary. Further analysis is also needed by adding more samples to capture the analysis results and conduct research using qualitative methods based on primary data obtained from interviews with the management of all Islamic banking in Indonesia. Interviews can be conducted based on the points contained in the GCR indicator or other indicators that show the size of the implementation of green banking in the banking industry.

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