ANALYSIS OF FACTORS FULL-FLEDGED ISLAMIC USING DATA ENVELOPMENT ANALYSIS (DEA) FOR THE PERIOD OF 2015 – 2019

AN UNDERGRADUATE THESIS

Presented as a Partial Fulfillment of the Requirements to Obtain Bachelor Degree in Accounting Department

By:

MASIFA PRAMESTI
Student Number: 17312066

DEPARTMENT OF ACCOUNTING

INTERNATIONAL PROGRAM

FACULTY OF BUSINESS AND ECONOMICS

UNIVERSITAS ISLAM INDONESIA

YOGYAKARTA

2021

DECLARATION OF AUTHENTICITY

Herein I declare the originality of the thesis, I have not presented someone's work to obtain my university degree, nor have I presented anyone else's words, ideas, or expression without acknowledgement. All quotation is cited and listed in the bibliography of the thesis. If in the future this statement is proven to be false, I am willing to accept any sanction complying with the determined regulation or its consequences.

Yogyakarta, August 2nd 2021

Masifa Pramesti

APPROVAL PAGE

ANALYSIS OF FACTORS FULL-FLEDGED ISLAMIC USING DATA ENVELOPMENT ANALYSIS (DEA) FOR THE PERIOD OF 2015 – 2019

A Thesis
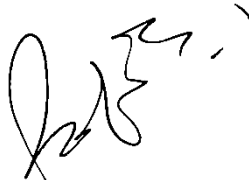
By

MASIFA PRAMESTI

Student Number: 17312066

Approved by

Content Advisor,

Rifqi Muhammad, S.E., M.Sc., Ph.D., SAS.   July 31st, 2021

Language Advisor,

Cithra Orisinilandari, SS., MA.   August 2nd, 2021

BERITA ACARA UJIAN TUGAS AKHIR/SKRIPSI

SKRIPSI BERJUDUL

Analysis of factors Full-fledged Islamic Bank using Data Envelopment Analysis (DEA) for the period of 2015 - 2019

Disusun oleh   : MASIFA PRAMESTI

Nomor Mahasiswa : 17312066

Telah dipertahankan didepan Tim Penguji dan dinyatakan Lulus
pada hari, tanggal: Jum'at, 20 Agustus 2021

Penguji/Pembimbing Skripsi : Rifqi Muhammad, SE., SH., M.Sc., Ph.D., SAS.

Penguji : Ayu Chairina Laksmi, SE., M.AppCom., M.Res.,
Ak., CA., Ph.D

Mengetahui
Dekan Fakultas Bisnis dan Ekonomika
Universitas Islam Indonesia

Prof. Jaka Sriyana, Dr., M.Si

LEGALIZATION PAGE

ANALYSIS OF FACTORS FULL-FLEDGED ISLAMIC USING DATA ENVELOPMENT ANALYSIS (DEA) FOR THE PERIOD OF 2015 – 2019

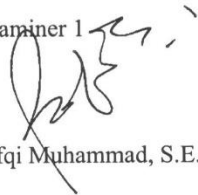**A BACHELOR DEGREE THESIS**
By
MASIFA PRAMESTI
Student Number: 17312066

Defended before the Board of Examiners
on August 20th, 2021 and Declare Acceptable

Board of Examiners

Examiner 1

Rifqi Muhammad, S.E., M.Sc., Ph.D.   August 20th, 2021
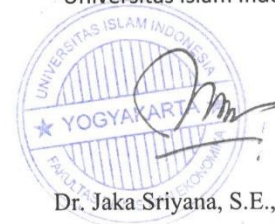
Examiner 2

Ayu Chairina Laksmi, S.E., M.App.Com., M.Res., Ak., Ph.D   August 20th, 2021

Yogyakarta, September 6th, 2021
International Program
Faculty of Business and Economics
Universitas Islam Indonesia
Dean

Dr. Jaka Sriyana, S.E., M.Si.

iv

ACKNOWLEDGEMENT

Bismillahirrahmanirrahim

Assalamualaikum Warahmatullahi Wabarakatuh

All praises and thanks be to Allah the Lord of the Worlds, who has given us mercy and blessing. Because of His blessing I am able to finish this thesis, the success is not but through Allah SWT. Sholawat and salam upon prophet Muhammad SAW, who has brought us from the darkness to the brightness.

This research entitled "Analysis of factors Full-fledged Islamic using Data Envelopment Analysis (DEA) for the period of 2015-2019" is a partial requirement to obtain the bachelor degree in Accounting Department of International Program, Universitas Islam Indonesia. My sincere appreciation and gratitude to my parents, teachers, friends and everyone who have supported me to finish this thesis:

1. **Allah Subhanahu wa Ta'ala** for his blessing along in my journey so that I can success this thesis.

2. My beloved parents, **Nur'aini** and **Aris Munandar** for the love, support, endless prayer and the sacrifices you made for me. Thank you for always being there for me. Thank you for always believing in me and pushing myself in every single thing I do. I couldn't have done this without you. I love you both.

3. My beloved siblings, **Hasma** and **Afkar**. Thank you so much for being my friends and my personal entertainer. I am lucky to have both of you.

4. **Mr Rifqi Muhammad, S.E., M.Sc., Ph.D.,** as my content advisor who always guided me by giving his constructive advices, ideas, lessons, motivation and his precious time in working on this research.

5. **Mrs Cithra Orisinilandari, SS., MA.,** as my language advisor, thank you for your kindness and assistance in guiding me writing this thesis.

6. **Mr Dr. Jaka Sriyana, S.E., M.Si.,** as the Dean of the Faculty of Economics, Universitas Islam Indonesia.

7. **Mr Dr. Mahmudi, S.E., M.Si.,** as the Head of the Accounting Department, Faculty of Economics, Universitas Islam Indonesia.

8. **Mrs Ayu Chairina Laksmi, S.E., M.App.Com., M.Res., Ak., Ph.D.,** as Secretary of Accounting Department International Program, Universitas Islam Indonesia.

9. **Academic staffs of International Program Faculty of Economics UII** (Mrs Alfi, Mr Ahmad, Mr Erwanto (Alm), Mr Tukimin) thank you for the help and care during my life in international program.

10. **All the lecturers**, the greatest thanks for all the things you have taught me during my college year.

11. My best friend **Ashri**, who always spent her time to accompany me strolling around the city and the one who sees each other struggle these past months.

Thanks for all our coffee talks, thanks for being a friend that I can always rely on, being a good companion and being a part of this journey! It means a lot to me.

12. My best friend **Asa,** thank you so much for all the conversations, and being such a wonderful and caring friend during these hard times.

13. My closest friends in college, **Sinta** and **Nadifa**, who gave me extraordinary moments and showed me how to see and understand things from a different perspective. I am so grateful to know you both, I hope our friendship will last long!

14. **My high school best friends**, who always give their support, reminder and motivation no matter how far you are. Love you guys!

15. **Rahma**, who have helped me in solving so many questions during my assistant journey.

16. **Febi,** the one and only friend who is under the same advisor, Thank you so much for your help and your support!

17. **All of my friends in Faculty of Economics, International Program UII 2017, especially the Accounting Department IP class of 2017**. Thank you for going all through this together, the ups and downs, and amazing journey. See you on top!

Finally, my appreciation to everyone who had not been mentioned for helping the researcher to finish this thesis. Hopefully, this thesis can be useful for the next researcher and reader.

Wassalamualaikum Warahmatullahi Wabarakatuh
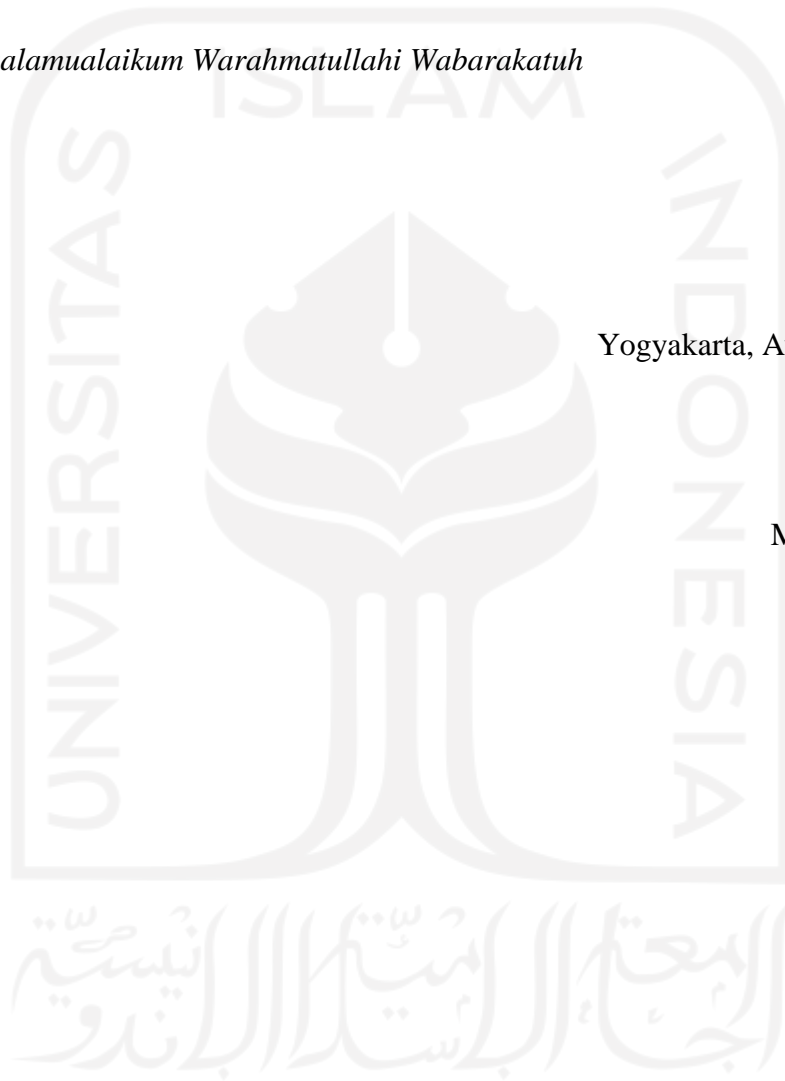
Yogyakarta, August 2nd, 2021

Masifa Pramesti

TABLE OF CONTENTS

LIST OF TABLES

ABSTRACT

This research aims to find out the effect of Return on Assets (ROA), Capital Adequacy Ratio (CAR), Non-performing Financing (NPF), Gross Domestic Product (GDP), and Inflation on the Efficiency of Full-fledged Islamic Banks in Indonesia. The sample of this research consists of 14 Full-fledged Islamic Banks in Indonesia from 2015 until 2019. This research used non-parametric methods, they are Data Envelopment Analysis (DEA) with Efficiency Measurement System (EMS) software to measure the efficiency performance, panel data regression analysis with EVIEWS 9.0 software to test the research model and hypothesis, and dynamic panel regression analysis with Generalized Method of Moment (GMM).

The result shows that based on Static Panel, CAR has positive and significant effect on Full-fledged Islamic Banks efficiency, while ROA, NPF, GDP and Inflation do not have significant effect. As for dynamic panel, only ROA that is significant and has a positive effect on Full-fledged Islamic Banks, while CAR, NPF, GDP and Inflation do not have significant effect on Full-fledged Islamic Banks.

Keywords: Return on Assets (ROA), Capital Adequacy Ratio (CAR), Non-performing Financing (NPF), Gross Domestic Product (GDP), Inflation, Islamic banking, Data Envelopment Analysis, Generalized Method of Moment

ABSTRAK

Penelitian ini bertujuan untuk mengidentifikasi pengaruh dari *Return on Assets (ROA), Capital Adequacy Ratio (CAR), Non-performing Financing (NPF), Gross Domestic Product (GDP),*dan terhadap Efisiensi Bank Umum Syariah di Indonesia. Sampel penelitian ini terdiri dari 14 Bank Umum Syariah pada periode 2015 sampai dengan 2019 yang ada di Indonesia. Penelitian ini menggunakan metode non-parametrik yaitu *Data Envelopment Analysis* (DEA) dengan *software Efficiency Measurement System* (EMS) untuk mengukur kinerja efisiensi, analisis regresi data panel dengan *software EVIEWS 9.0* untuk menguji model penelitian dan hipotesis, dan analisis regresi dinamis panel dengan *Generalized Method of Moment* (GMM).

Hasil dari penelitian menunjukan bahwa berdasarkan Panel Statik, CAR memiliki pengaruh yang positif dan signifikan terhadap Efisiensi Bank Umum Syariah, sedangkan ROA, NPF, GDP, and *Inflation* tidak memiliki pengaruh yang signifikan. Untuk Panel Dinamis, hanya ROA yang signifikan dengan pengaruh positif terhadap Efisiensi Bank Umum Syariah, sedangkan CAR, NPF, GDP dan *Inflation* tidak memiliki pengaruh yang signifikan terhadap efisiensi Bank Umum Syariah.

Kata kunci: *Return on Assets (ROA), Capital Adequacy Ratio (CAR), Non-performing Financing (NPF), Gross Domestic Product (GDP), Inflation,, bank Syariah*, *Data Envelopment Analysis, Generalized Method of Moment*

CHAPTER 1
INTRODUCTION

1.1 Background

The need for sharia-based transactions is something that a country with a massive Muslim population like Indonesia must consider. Based on the sharia statistic 2020 published by Indonesian Financial Services Authority (OJK), the number of Islamic banks in Indonesia consists of 14 Full-fledged Islamic Banks (BUS), 20 Islamic Windows (UUS) and 164 Islamic Rural Bank (BPRS). This amount increased when compared to the period of 2017. As the number of Full-fledged Islamic Banks rises, it is expected to be followed by an improvement in the Bank's performance. One of the well-known performances is the measurement of bank efficiency.

Solihin et al., (2016) defined efficiency as a circumstance when a company can produce greater output by using the same or fewer inputs to produce the same number of output as other companies. In the banking industry, bank efficiency can be identified by looking at their ability to use up resources at the lowest cost while still generate greater profit (Majdina et al., 2019).

Various studies have examined and discussed the efficiency of Full-fledged Islamic Banks. According to Rusydiana (2018), who examined the efficiency of Full-fledged Islamic Banks in Indonesia from 2007 to 2014, She found that by using the Constant Return to Scale (CRS) model, the efficiency is relatively low for 66%. The Bank indicated low efficiency if the score was under 70%, and the result showed 7 out

of 11 Full-fledged Islamic Banks is considered as having a low-efficiency score. While using the Variable Return to Scale (VRS) model, the efficiency is 81%, which is relatively high compared to the CRS model. Both models conclude that 5 Full-fledged Islamic Banks's efficiency score is fluctuating, 2 Full-fledged Islamic Banks is low, and the other 3 Full-fledged Islamic Banks's efficiency score is high.

Another research obtained from Candra & Yulianto (2015) showed all of the efficiency of Full-fledged Islamic Banks in Indonesia has fluctuating efficiency scores. It showed that the efficiency of Full-fledged Islamic Banks is not stable yet. Meanwhile, the Islamic banking industry becomes more competitive. If it continues, the Bank's ability to extant in the financial sector will be considered (Solihin et al., 2016). Thus, the management should find a way to solve this problem so that both the economy and the Bank will run efficiently and have the best performance to improve competitiveness and its market share (Maulidiyah & Laila, 2016).

In measuring bank efficiency, there are various factors should be considered. Demirguic-Kunt and Harry Huizinga (1998, as cited in Asngari, 2013), stated to assess the internal performance or the internal factors of a bank, several characteristics variable are used such as size, financial ratios starts from total financing, capitalization, back activities as well as productive assets. There is also external factors by considering macroeconomics indicator like GDP and inflation. This macroeconomics indicator related to the function of a bank as an intermediary. When the Bank succeeds in performing their self as an intermediary function, then the

country's economy will develop more rapidly and it reflects on the collection and distribution of fund (Asngari, 2013).

Several studies have been conducted to assess the efficiency using a choice of different factors. Prior research by Havidz & Setiawan (2015) found ROA, OER, FDR, and inflation have a significant negative impact on Islamic bank efficiency while CAR and GDP have a positive but insignificant impact. The same result for ROA also found by Ramly & Hakin (2016) that ROA has a significant negative effect while FDR is also significant but positive. NPF is insignificantly negative, and on the contrary to Havidz & Setiawan (2015), CAR significantly has a positive effect on Islamic bank efficiency. Other studies by Candra & Yulianto (2015) found ROA, CAR, NPF, BOPO and PPAP have no effect on Full-fledged Islamic Banks and FDR significantly affecting Full-fledged Islamic Banks.

Based on the background description related to an increasing number of Full-fledged Islamic Banks with their fluctuated efficiency score and the differentiation on studies that used the same variables, the result may give a different effect on Bank's efficiency. It is critical to conduct a research to examine how efficient Full-fledged Islamic Banks is in other periods and identify indicators that affects Bank's efficiency. Thus, it will be used to update knowledge and information in this field for both academic and public information.

Despite many factors that may affect the efficiency of Islamic banking, this research will focus on ROA, CAR, NFP and included GDP and inflation which is the

macroeconomics indicator as the independent variables. This research is entitled "Analysis of factors Full-fledged Islamic using Data Envelopment Analysis (DEA) for the period of 2015-2019".

1.2   Research Problem Formulations

Based on the previous background, the problems formulations for this research are:

1. What is the effect of ROA on the efficiency of Full-fledged Islamic Banks?

2. What is the effect of CAR on the efficiency of Full-fledged Islamic Banks?

3. What is the effect of NPF on the efficiency of Full-fledged Islamic Banks?

4. What is the effect of GDP on the efficiency of Full-fledged Islamic Banks?

5. What is the effect of inflation on the efficiency of Full-fledged Islamic Banks?

1.3   Research Objectives

The following is research objective based on the problem formulation:

1. To analyze and identify the effect of ROA on the efficiency of Full-fledged Islamic Banks

2. To analyze and identify the effect of CAR on the efficiency of Full-fledged Islamic Banks

3. To analyze and identify the effect of NPF on the efficiency of Full-fledged Islamic Banks

4. To analyze and identify the effect of GDP on the efficiency of Full-fledged Islamic Banks

5. To analyze and identify the effect of Inflation on the efficiency of Full-fledged Islamic Banks

1.4   Research Limitations

The research limitations are this research will focus only on Full-fledged Islamic Banks and not include other Islamic financial body like Islamic Windows and Islamic Rural Bank. Furthermore, the period also will be limit for the period of 2015 – 2019.

1.5   Research Contributions

1. For academician, this research are expected to give knowledge and additional information as well as contribution in the field of Islamic banking that can be used for future researchers.

2. For Islamic bank, this research can be used as a tool for evaluating the management performance so that the Islamic bank would be perform better in the next future.

1.6   Systematics of Writings

CHAPTER I: INTRODUCTION

Chapter I consists of study background, research problem formulation, research objectives, research limitation and research contribution of the research.

CHAPTER II: LITERATURE REVIEW

Chapter II consists of theory for several subjects used in the research, the previous research as an overview for this research and the research hypothesis.

CHAPTER III: RESEARCH METHOD

Chapter III contains the population and sample used in this research, explanation of research variables such as independent, dependent, input and output variables. Then, how the data will be collected and analyzed.

CHAPTER IV: DATA ANALYSIS AND DISCUSSION

Chapter IV consists the process and the result of the data that previously have been collected and analyzed by using the proposed research method which are panel data regression model selection, classic assumption test, and significant test.

CHAPTER V: CONCLUSION

Chapter V contains the conclusion and recommendation for future research.

CHAPTER II
LITERATURE REVIEW

2.1   Theoretical Review

2.1.1   Agency Theory

Agency Theory addresses the agency relationship, which defines a contract wherein one person (the principal) employs another person (the Agent) to perform the work on their behalf. Agency theory is used to minimize the Agency problem which occurs because of the contract between the principal and the Agent. There are two problems that arise in the agency relationship. First, by delegating the work to another person, the principal needs to spend the cost in monitoring the Agent's activities to verify what he is actually doing. Second, the Agent will not always do the work as the principal expects to achieve the goals, because in many ways, the Agent may have their own interest that is different from the principal's (Eisenhardt, 1989; Jensem & Meckling, 1976). The problems in Agency theory are called as Agency problems. Those problems can be resolved by monitoring the Agent's activities and making a maximum contribution by management to the principal even though the manager has his interest.

In the banking industry, the bank is an agent of development. It means the absence of a bank will impact the slow and even stagnant economic growth because no subject can transfer the funds between the owner and those who need funds for business turnover. Thus, a relationship between people as the principal and

management as the Agent can be reflected as an Agency relationship, in which the management has a responsibility to protect the funds from depositors (Sari & Saraswati, 2017).

2.1.2 Islamic Bank

Islamic bank is a body in which all banking activities comply with Islamic law and are guided by Islamic economics (Anwar, 2016). This bank carries out its banking activity consistently with Islamic law, which is based on Al-Qur'an and Al-Hadits, by paying attention to the commands and prohibitions of both as well as the sunnah of the prophet Muhammad SAW (Budisantoro & Triandaru, 2006). Complying with Islamic law does not mean only conducting the transaction based on Islamic law but it also provides the correct manner of Islamic ethics and its goal, *Rahmatan Lil-Alamin* (Anwar, 2016).

Budisantoro & Triandaru (2006) defined an Islamic bank as a bank that applies profit and loss sharing and buy and sell principles as a reward and charge in conducting banking activities. The profit and loss sharing principle means that the bank will share its profit or loss for both the investors and debtor. Since interest is *riba* and haram, this concept is called interest-free based transaction, which means there is no additional amount on paying debts (Anwar, 2016).

According to Undang-Undang Republik Indonesia Nomor 21 Tahun 2008, Islamic bank consist of three types which are Full-fledged Islamic Banks (BUS), Islamic Windows (UUS), and Islamic Rural Bank (BPRS).

1. Full-fledged Islamic Banks is an Islamic bank that provides payment services, and it can be both foreign exchange bank and non-foreign exchange bank (Soemitra, 2018)

2. Islamic Windows is a work unit of a Commercial conventional bank that functions as the main office of that unit or a work unit in a branch office of a bank domiciling abroad that carries out Islamic transaction. While conventional bank activities are the main activities

3. Islamic Rural Bank is Islamic bank that does not provide payment services.

In line with the definition of Islamic banking, there are three principles mentioned regarding Islamic banking operations. First, the prohibition of interest (*riba*) is considered as exploitation and injustice to society because the lender gains money from the needs of the borrowers (Iriani & Yuliadi, 2015). Second, the prohibition of *gharar* (risk of uncertainty). *Gharar* is prohibited because there is uncertainty in the business. Then the last is the prohibition of financing illegal activities, such as financing for a business that involves goods prohibited by Islamic law (Othman et al., 2017).

2.1.3   The Role of Islamic Banking

A bank is a financial institution that works as an intermediary function that channeling a fund from the party who has a surplus fund to the party who lacks of fund. As for Islamic banking, the optimum intermediary function will also improve community welfare, which is in line with Islamic banking's role in promoting

economic growth (Majdina et al., 2019). The intermediation function has a relation with economic efficiency. The better the intermediation level of a bank means that the development of a country will be faster, and it is reflected from its collecting and distributing of funds. However, in general, there are three functions of Islamic bank, to collect deposits of money, provide financing or lend the fund, and provide money transfer service (Asngari, 2013).

2.1.4   Islamic Banking Instruments

As a conventional bank, an Islamic bank also performs as an intermediary institution. The difference is Islamic banks carried out their intermediation role by applying tools by following sharia law. For instance, they rely on *Mudarabah* and *Musharakah* as instruments for the practice of risk-sharing or profit and loss sharing. Moreover, the other instruments used in business and investment operations include *Murabaha, Ijarah, Bai salam, Bai istisna*, and *Qard-e-hasanah* for free cost loans (Khan, 2019).

According to Ahmed (2014), the primary financial key instruments are outlined below:

1. *Mudarabah* (Join venture): Mudarabah is a partnership in which financial capital is provided by one partner (rabul mal) or bank. The work is carried out by the other partner *mudarib* or borrower, by providing the labor and management. It is considered as profit and loss sharing. The *mudarib* or

borrower gets the profit while the financier carried both the loss and profit according to the share capital (Othman et al., 2017).

2. *Musharakah* (Partnership): *Musharakah* is a partnership between two or more parties in which financial capital or labor act as shared inputs and output is distributed according to the capital share of the partners. Similar to *mudarabah*, it is also profit and loss sharing. The partners have equal rights to manage the business (Khan, 2019). The distributed output is in the form of profit as well as loss based on the share capital.

3. *Ijarah* (Lease): *Ijarah* is an operating lease for using an asset where the lessee pays its rent to the lessor. The ownership and the right to use the asset are separated. The lessor will hold the assets' ownership and bear all the costs relating to its assets like repairs, insurance, and depreciation. Furthermore, it is prohibited to sell except there is an agreement about the sale of the leased assets or until the lease contract expires (Khan, 2019).

4. *Bai salam/ Bai istisna*: *Salam* sale is an advance payment purchase of a generic good, for instance, agricultural products. It applied a contract in which the buyer pays the product in advance, that will be produced and delivered later. In contrast, *istisna* is a contract in which the good is made based on orders or specifications of the buyer, and the goods can be paid in installment.

5. *Murabahah/Bai muajjal* (Deferred payment sale): *Murabahah* is a sale on an installment basis in which the seller use mark-up price (Khan, 2019). Mark-up

price is that the cost of the products adding with mark-up (profit). *Bai muajjal* is when the purchase is on credit, and the payment for goods is delayed. *Murabahah* creates a debt. However, it is different from an interest-bearing loan.

2.1.5   Data Envelopment Analysis

Data Envelopment Analysis (DEA) is a linear programming model that can combine many inputs and outputs without choosing each variable and the need to explain the relationship between input and output. It is a non-parametric technique developed by Charnes et al. (1978) (Alqahtani et al., 2017). According to Sari & Saraswati (2017), DEA is a non-parametric method that use linear program to measure and compare the inputs and outputs of Decision Making Unit (DMU) in a population. As a frontier approach, DEA combines all input and output in an integrated manner (Solihin et al., 2016).

According to Bogetoft and Otto (2011), there are four basic DEA models. However there are two models that frequently used in measuring bank's efficiency performance:

1. Charnes, Cooper and Rhodes (CCR) Model

This model was proposed by Charnes et al. (1978). It stated that the production technology indicates constant returns to scale (CRS) with two orientations namely input and output orientations. The orientation correlate with improvement of inefficient units, by reducing excess inputs or maximize the output produced.

2. Banker, Charnes and Cooper (BCC) Model

This model was proposed by Banker et al. (1984). They explained that the production technology indicates variable returns to scale (VRS). The VRS model will give additional insights from the application of CRS model from the same dataset.

Suzuki and Sastrosuwito (2011, as cited in Anwar, 2016) stated, the advantages of applying DEA as efficiency methods are the DEA is a mathematical linear programming model. It does not need pre-specification in the model (function), the flexibility for choosing multiple outputs and inputs in estimating the efficiency, and it works in research with a small sample. Moreover, it gives a comprehensive, objective numerical value, ranking and suggests how to improve the inefficient units (Marjanović et al., 2018).

2.1.6 Efficiency

The concept of efficiency came from the microeconomics concept, which is the Production Theory. It describes the relationship between input and output in the production process (Rusydiana, 2018). According to Pass and Lowes (1997, as cited in Solihin et al, 2016), efficiency is a relationship between rare input with output which can be measured physically (technical efficiency) or on a cost basis (economic efficiency). From economic theory, efficiency consists of two types—first, economic efficiency, which describes macroeconomic. Second, technical efficiency with an overview of microeconomic and its measurement only for technical and operational input and output (Rusydiana, 2018).

2.1.7   Bank Efficiency

Efficiency is often used as a performance measurement of a bank. It is used to assess how the company generates its output based on the amount of input. Based on Farrel's efficiency, the concept is like how reducing the input without changing the output (Bogetoft & Otto, 2011). This assessment helps the bank act rationally to minimize the risk involved in operational activities and assess the bank profitability (Hidayati et al., 2017).

Farrel and Coelli stated that efficiency can be measured by using three criteria (Solihin et al., 2016):

1. Pure Technical Efficiency (PTE)

Pure Technical Efficiency (PTE) is called as Technical Efficiency (TE). It is a measure of technical efficiency without the efficiency scale with an assumption of variable return-to-scale (VRS). PTE is reflecting managerial performance in producing input to maximize output.

2. Scale Efficiency (SE)

Scale Efficiency (SE) is also called as allocative efficiency. It shows the number of reduced inputs that the bank uses to produce output in optimal scale with the assumption of constant return-to-scale (CSR).

3. Overall Technical Efficiency (OTE)

Overall Technical Efficiency (OTE), also called Total Economic Efficiency, compares how well their production input to generate its output with the maximum potential to achieve its output. OTE is related with input productivity.

The bank Efficiency method that is mainly used can be distinguished into two kinds, they are traditional approach and frontier approach. The traditional approach is based on the amount of investment or capital to produce a product using financial ratios. In comparison, the frontier approach uses input and output as an additional and applies DEA, SFA, to calculate the efficiency level (Sari & Saraswati, 2017). In selecting the input and output, three approaches to measure the efficiency of financial institution are selected, which outlined below (Solihin et al., 2016):

1. A production approach is an approach by looking at the process production of service of fund owner (*shahibul mal*) and fund manager (*mudharib*)

2. An intermediation approach is an approach that is looking at the function of a bank as intermediation between the saver (*depositor*) and borrower (*investor*). How they transform the fund from *wadiah* current/demand account, savings, and deposits *mudarabah* to distribute it to the third parties who need financing or fund

3. An asset approach is an approach by looking at the bank as a primary function of financial institution as loan creator

Performing efficiency measurement for both government and company, can gain many things. It will help to notify government policy by evaluating the effects of

deregulation, mergers, or market structure on efficiency. It will provide a ranking of firms or check how evaluated efficiency may be related to the various efficiency techniques employed for the company. It will also improve management performance by detecting 'best practices' and 'worst practices' related to a high and low-efficiency level. The tendency is to achieve the former practices while discouraging the latter (Berger & Humprey, 1997, as cited in Marjanović et al., 2018).

2.1.8 ROA

Return On Assets (ROA) as one of the Profitability ratio is used to assess the ability of the company in generating profit (Simatupang & Franzlay, 2016). It is also defined similarly according to BI form letter No.9/24/DPbs that ROA aims to evaluate the success in generating profit. The lower the ratio, the less the ability of bank management to manage its assets to generate revenue and reduce costs (Rahmawaty & Yudina, 2015). By that means, ROA can represent the efficiency level of an institution or company.

2.1.9 CAR

Simatupang & Franzlay (2016) stated CAR reflects the capital adequacy of a bank to support assets that generate risks. According to PBI No. 15/12/PBI/2013, CAR is the obligation to provide minimum capital for commercial banks. The ratio is computed as Tier 1 capital plus Tier 2 capital divided by risk-weighted assets and off-balance sheet exposure (Bitar et al., 2019). A risk-weighted asset is a measure of the amount of bank assets adjusted for risks, wherein bank sharia assets are funded by

their own capital or sharing capital (Asngari, 2013; Fatima, 2014). According to Fatima (2014), Capital Adequacy Ratio (CAR) is a ratio to measure the financial soundness of a bank in absorbing its loss by looking at the bank's capacity to meet the liabilities and other risks such as credit risk, market risk, and operational risk. An appropriate CAR will increase public trust to deposit their money in those banks because it shows that the bank has the ability to absorb risk without becoming insolvent (Fatima, 2014; Simatupang & Franzlay, 2016).

2.1.10   NPF

In conventional banks, NPF is called Non-performing loans because it is related to past loans that make the bank deal with additional managerial effort and expense. Due to poor senior managerial practices or bad management, the internal system is not working proportionally (Havidz & Setiawan, 2015). NPL measured as NPL gross and NPL net, which also applies to NPF (Widiarti et al., 2015). This ratio describes the inability of borrowers to pay back the fund and how the ability of management to manage those financing so that the NPF ratio will not go higher every period. If the ratio becomes higher, the financing risk will also be higher, and it hampers the bank financing, then affects the quality of a bank's performance (Pravasanti, 2018).

2.1.11   GDP

Gross Domestic Product (GDP) is a measurement tool commonly used to measure the community's economic welfare. There are two items in GDP: first, the

17

total income earned by each person during economic activity. Second, the total expense to produce goods and services during economic activity. The definition of GDP itself is the market value of goods and services produced by a country in a certain period. All goods and services included in GDP must be legal and created domestically regardless of the producer's nationality. On the side of expenditure, several items are determined domestic production, and it is considered as the components of GDP, namely consumption, investment, government purchases, and net export (Mankiw, 2018).

According to Indonesian Central Bureau of Statistics (BPS), three approaches are proposed to calculate GDP. The production approach refers to goods and services produced in a country or region which consist of nine sectors: agriculture, farm, forestry and fisheries; mining and excavation; processing industry; construction; transport and communication; electricity; gas, and water; trading, hotel, and restaurant; finance, real estate and corporate services; other services such as government service.

The income approach consists of remuneration for production factors such as wages and salaries, land lease, capital interest, and profit before tax. The last is the expenditure approach which consists of items that have already been mentioned before, namely consumption, investment, government purchases, and net export.

2.1.12 Inflation

Inflation is a circumstance when the price level of goods and services is increased and may be divided into two sides namely demand and supply side (Iriani &

Yuliadi, 2015). It signifies the stability in a country's economy that the economic growth of its country is experiencing a decline. Because the higher level of inflation will decline the society's income then automatically decline their standard of living since they spend less on money (Firmansari & Suprayogi, 2015). It also creates distortions, increases the rent-seeking activity, raises *premia* risk, and then expects central bank independence to improve economic performance (Korkmaz, 2015).

Theoretically, inflation affects the banking industry through the Loonable Fund Theory, which explained that if the amount of money requested exceeds the amount provided, there will be an increase in the price of money or interest rate (Asngari, 2013). Kassim (2016) mentioned that inflation affects consumption, savings, investment decisions, the level of deposits, bank's financing as well as economic growth. The increase in the price of money or interest rate may decrease the levels of deposits and force the bank to limit the supply of credit in order to reduce their spending. In relation to the bank's long-run financial activity, they will limiting the amount of loan that will cause less credit, smaller and less liquid of equity market, and less effective capital allocation (Korkmaz, 2015)

2.2   Previous Research

Islamic bank efficiency has become the object of research studies in various countries with various variables applied by the researcher. Previous research investigates the efficiency between Islamic banks and conventional banks before the global financial crisis, during, and after the Gulf Cooperation Council (GCC) region.

The research was conducted by (Alqahtani et al., 2017), it was found that the profitability proxied by ROA is not significant at the 10% significance level, capital risk proxied by CAR negatively affected cost and profit efficiency, and credit risk proxied by NPL positively increase cost and profit efficiency. Then, the Islamic Bank efficiency performance was more cost-efficient during the global financial crisis but experienced a decrease in profit and cost efficiency post global financial crisis than conventional banks. The bank efficiency comparison research was also carried out between Full-fledged Islamic Banks and conventional bank in Indonesia by (Rahmawati et al., 2019). This research found that, on average, Full-fledged Islamic Banks is more efficient than conventional bank even though the Full-fledged Islamic Banks is relatively considered as a small bank.

Still, in the same scope, Hidayati et al. (2017) analyzed Full-fledged Islamic Banks's efficiency and Islamic Windows using DEA and found that Full-fledged Islamic Banks efficiency shows fluctuating conditions and not optimal in managing their resources. This result supported a research conducted by Candra & Yulianto (2015) that used the two-stage Stochastic Frontier Approach (SFA). They found that Full-fledged Islamic Banks experienced a fluctuating trend during the research period. The determinant factors used are ROA, CAR, FDR, BOPO, PPAP, and NPF, with the result that only FDR has a significant and positive effect on Full-fledged Islamic Banks Efficiency.

Solihin et al. (2016) identified the Overall Technical Efficiency (OTE), Pure

Technical Efficiency (PTE), and Scale Efficiency (SE) of the Islamic Bank in ASEAN.

Full-fledged Islamic Banks was almost classified as efficient, but the score showed

that it was below the average on ASEAN. Operational Cost towards Operational

Income (BOPO) and total assets were found to be the determinant of Full-fledged

Islamic Banks. On the other research by Havidz & Setiawan (2015), using the same

assumption of OTE, PTE, and SE, was found that, on average, the Full-fledged Islamic

Banks during this research period is not fully efficient. Thus, both result from Solihin

et al. (2016) and Havidz & Setiawan (2015) gave the same conclusion.

Based on the previous research in Islamic banking efficiency, mainly Full-

fledged Islamic Banks was considered having a different result both in the efficiency

performance measurement and its determinant factors. Therefore, it detects that there

is a gap in the research. Therefore, this research use combination of previous research

of internal and external factors as a part of research variables.

No	Researcher	Research Method	Research Variable	Results
1	Alqahtani, F., Mayes, D. G., & Brown, K. (2017)	DEA	Inputs: labor and deposits Outputs: loans and other earning assets Input prices: price of funds and price of labor Output prices: price of loans, price of OEA, price of capital	In terms of cost efficiency both conventional and Islamic banks in GCC region were found have no significant difference. While on profit efficiency, Islamic banks were found to be less efficient. For the period of GFC, Islamic banks were more cost efficient than conventional banks.

2	Banna, H., & Alam, M. R. (2020)	DEA	Inputs: short-term funding, deposits and staff expenses, fixed assets Outputs: other earning assets and loans	The efficiency of Islamic banks in most countries are inconsistent post-GFC. For Islamic banks in Bangladesh, Malaysia, Mauritia, Qatar, Tunisia and Sudan were efficient. Then, Islamic banks in Iraq and Palestine have shown an improved in efficiency.
3	Candra, S., & Yulianto, A. (2015)	SFA	Independent: ROA, CAR, FDR, BOPO, PPAP, NPF Inputs: deposits, assets, labor cost Outputs: financing	The efficiency of Full-fledged Islamic Banks in the first quarter 2011 – third quarter 2014 were still fluctuating. For the independent variable, FDR was found to be significant and positive. ROA, CAR, BOPO, PPAP, and NPF were found have no influence on bank efficiency.
4	Fadilah, F., & Yuliafitri, I. (2018)	SFA	Independent variables: size, CAR, NPF, FDR, BOPO Inputs: third parties funds, total assets, operational cost Outputs: total financing	The independent variables test showed that size, CAR, NPF, and FDR have a relationship with bank's efficiency. While ROA and BOPO have no relationship with bank's efficiency.
5	Hadhek, Z., Frifita, M., & Lafi, M. (2018)	SFA	Dependent: total cost Independent: size, capital adequacy (EQAS), profitability (ROAA), credit risk (LOAS), operational costs (CTIR), GDP	The cost efficiency of Islamic banking institutions during 2005 – 2014 were found that the score is mixed and difficult to conclude because it is linked to bank-specific variables as to external factors. However, the average of cost efficiency levels were 66%.

			per capita, inflation, population density Inputs: labor, funds, physical capital Outputs: net loans, other earning assets Price of inputs: price of labor, price of fund, price of physical capital	
6	Havidz, S. A. H., & Setiawan, C. (2015)	DEA	Dependent: bank efficiency, NPF Independent: ROA, FDR, CAR, size, OER, GDP, Inflation	This research examined three efficiency measures (OTE, PTE and SE) on Indonesian Islamic banks. It was found that technical is inefficient due to scale inefficiency if compared to pure technical inefficiency. The determinant factors for ROA and OER have a negative and significant effect on bank efficiency. Inflation has positive and significant effect while FDR, CAR, and GDP have a positive but insignificant effect. Then, size has a insignificant and negative effect on bank efficiency.
7	Majdina, N., Munandar, J. M., & Effendi, J. (2019)	DEA	Dependent: Scores of DEA Independent: ROA, CAR, and NPF Inputs: assets, third party funds, and labor costs	There is an efficiency difference between commercial banks and Islamic commercial banks. The finding is commercial banks are more efficient compared to Islamic commercial banks. As for Islamic commercial banks,

			Outputs: bank revenues and bank financing	CAR is the only variable that has influence on the efficiency of the bank. While commercial banks indicate no single variable has influence on the efficiency of the bank.
8	Rahmawati, A. K., Sari, S. R. K., & Hernawan, H. (2019)	DEA	Inputs: assets, deposits, labor cost Outputs: total credit and operational income	Full-fledged Islamic Bankss was found to be more efficient compared to conventional banks. It shows that even though Full-fledged Islamic Bankss are small banks compared to conventional banks, the Full-fledged Islamic Bankss are more efficient because the output used by conventional bank is bigger since their bank size is bigger than the Full-fledged Islamic Bankss.
9	Ramly, A. R., & Hakim, A. (2016)	DEA	Dependent: the scale of banking efficiency Independent: ROA, CAR, LDR/FDR, NPL/NPF. Inputs: total assets, third party fund, price of labor Output: total financing (loans) and total operational expenses	There is a difference level of efficiency between Islamic banks and conventional banks. However, on average, the Islamic banks are relatively efficient. The result indicates that the determinant factors in Islamic banks are ROA, FDR, and CAR. Further, for conventional banks are ROA, NPL, LDR, and CAR. This means all independent variables have influence on the conventional banks efficiency.
10	Solihin, S., Achsani, N. A.,	DEA	Independent variables: total assets, ROA, BOPO,	The efficiency level of Islamic banks in Indonesia were found to be under average compared

			ETA, market power 1, market power 2, inflation Inputs: deposits, loan to other bank, Operational expense Outputs: productive financing, placement with other bank, securities	in ASEAN. They should try to suppress human resource and operational expenses.
	& Saptono, I. T. (2016)			
11	Bitar, M., Pukthuanthong, K., & Walker, T. (2019)	DEA	Inputs : deposits and short-term funding, fixed assets, overhead (as a proxy for general and administrative expenses), loan loss provisions (as a proxy of risk) Outputs : total loans, other earning assets, other operating income	Islamic banks on Basel II were found to be more efficient than conventional banks. Furthermore, the capital ratio and liquidity ratio of Islamic banks are significant and positive. Even though, it is significant, the effect of capital ratio and liquidity ratio are not as strong as conventional banks.

2.3   Hypothesis Formulation

2.3.1   The Effect of Return on Assets (ROA) on Full-fledged Islamic Banks

Return on Assets (ROA) is a profitability ratio. This ratio is one of the banking financial performances that allows the bank to measure how well the company generates profits by utilizing its assets (Rahmawaty & Yudina, 2015). Banks with more profitability are considered more efficient than those with less profitability (Banna & Alam, 2020). It means the higher the ROA, the more efficient the bank is.

In the agency theory, the higher profitability produce by the bank indicates that the bank has a good performance and make the client (principal) have a positive view on the bank and believe to deposit their funds in this bank.

Sari & Saraswati (2017) proved that ROA has a positive and significant effect on bank efficiency. They found implications that a bank's profitability level will affect its efficiency level, and the greater the profits, the greater the bank's efficiency will be. Conversely, Havidz & Setiawan (2015) and Ramly & Hakin (2016) stated that ROA has significant but negatively affect Full-fledged Islamic Banks efficiency.

H1: ROA has a positive effect on the Full-fledged Islamic Banks efficiency

2.3.2 The Effect of Capital Adequacy Ratio (CAR) on Full-fledged Islamic Banks

Capital Adequacy Ratio or CAR is a ratio to measure financial soundness indicator for bank by comparing capital with risk-weighted assets (ATMR) (Sari & Saraswati, 2017). It indicated the ability of banks to cover the decline in their assets as a result of losses caused by risk-weighted assets. The higher the ratio, the higher the capital and the more capable a bank to cover its risks. Thus, they can maintain the bank's stability performance as a whole.

In the previous research by Majdina et al. (2019), CAR was discovered to be positive and significantly related to the Islamic banking efficiency. This finding is similar to Bitar et al. (2019) and Hidayati et al. (2017) who stated that CAR positively affects Islamic banking efficiency. While according to Alqahtani et al. (2017) CAR

negatively affects cost and profit efficiency. The lower the CAR, the greater the Full-fledged Islamic Banks efficiency. This research concluded that from the previous research and considering the theoretical review, it is determined that CAR has a positive relationship.

H2: CAR has a positive relationship on Full-fledged Islamic Banks efficiency

2.3.3 The Effect of Non-Performing Financing (NPF) on Full-fledged Islamic Banks

Non-Performing Financing and bank efficiency are essential components in measuring bank performance (Havidz & Setiawan, 2015). Non-Performing Financing is a ratio to measure the level of risk in Financing. This ratio compares the level of financing risk that is sub-standards with the total Financing given by banks. NPF indicates the ability of management to manage the Risk-weighted Assets. It can affect the bank's performance if the customers are not able to pay back the amount of its Financing (Pravasanti, 2018).

The higher the NPF, the more it will disrupt the bank's operations, especially their bank liquidity and this will affect the efficiency to the bank. As Fadilah & Yuliafitri (2018) stated, NPF has a negative and significant effect on Full-fledged Islamic Banks efficiency. The other research by Asngari (2013) found the negative influence of NPF but on operational efficiency. It is inconsistent with Majdina et al. (2019) and Ramly & Hakin (2016) that it is negative but insignificant towards Full-fledged Islamic Banks efficiency. Regarding the previous research, mixed results

indicated the effect of NPF on the Islamic Bank. Thus, to determine the hypothesis, the fundamental theory will be used as a consideration as well, and the following is the hypothesis:

H3: NPF has a negative effect on the Full-fledged Islamic Banks efficiency

2.3.4 The Effect of Gross Domestic Product (GDP) on Full-fledged Islamic Banks

Gross Domestic Product or GDP is a measurement to identify the economic growth of a country as well as the primary indicator of macroeconomics in the banking industry (Purwono & Yasin, 2018). In a country, when their banks become more efficient, it escalates their economic growth (Banna & Alam, 2020). The increase in GDP means the income of its society increases, the bank's deposits will show growth (Purwono & Yasin, 2018) and improve the debtor's ability to pay its financing back (Firmansari & Suprayogi, 2015).

A research by Asngari (2013) in operational efficiency and Bitar et al. (2019), stated that GDP is positively associated with Islamic bank efficiency. In addition, Hadhek et al. (2018) found that GDP per capita statistically has a significant negative effect on profit efficiency.

H4: GDP has positive effects on Full-fledged Islamic Banks efficiency

2.3.5   The Effect of Inflation on Full-fledged Islamic Banks

Inflation is a phenomenon of continuous increase in the price of goods and services (Firmansari & Suprayogi, 2015). Inflation and economic growth are interrelated. As it increased, the bank will be more cautious relating to the credit because the ability of companies and household to fulfill the credit obligation is reduced. This linked to the decrease of purchasing power from society which results in decreased production. Therefore, it might be a failure when the financing given by the bank that should be collected, might not be collectible because the society experiences a decrease in income (Purwono & Yasin, 2018).

In prior research conducted by Hadhek et al. (2018), it was found that the inflation rate has a negative and significant influence on the profit efficiency of Islamic banks. This indicates that an increase in inflation rate will decrease the Islamic bank efficiency. Banna & Alam (2020) and Alqahtani et al. (2017) also proved that the inflation rate has a negative and significant effect on the efficiency of the Islamic bank. In operational efficiency, Asngari (2013) proved a similar finding that inflation is negative and significant. Meanwhile, different findings regarding the effect of inflation rate, shows a positive and significant influence on Islamic banks found by Havidz & Setiawan (2015) and is rarely significant based on Bitar et al. (2019).

H5: Inflation has a negative effect on Full-fledged Islamic Banks efficiency

2.4   Theoretical Framework

This research analyzes the Full-fledged Islamic Banks efficiency with determinant factors as independent variable consists of Return on Assets (ROA), Capital Adequacy Ratio (CAR), Non-Performing Financing (NPF), Gross Domestic Product (GDP), and Inflation. The combination of internal and external factors is used because it is assumed that external factors influence Full-fledged Islamic Banks efficiency. Moreover, dealing with banks means to relate to the economic condition of its country.

The dependent variable is the efficiency score of Full-fledged Islamic Banks obtained from labor cost and deposits as Input variable, financing and operational income as output variable. Both input and output variables are used based on several previous studies. Further, it is also viewed as an intermediary function that acts as a mediator that provides financial services to channel funds from lenders to borrowers (Hughes & Mester, 2012).

The agency theory in this research will be pictured with the bank as an agent and the client or people as a principal. The Full-fledged Islamic Banks as an agent will be responsible to manage the client's funds through the annual or quarter financial report of the bank. This financial report represents the performance of the bank, like how they maximize their resources and manage the funds so that the performance will be achieved according to the client's interest (Candra & Yulianto, 2015).

```
┌─────────────────────────────┐        ┌─────────────────────────────┐
│          Input:             │        │          Output:            │
│                             │        │                             │
│         Labor cost          │        │         Financing           │
│                             │        │                             │
│          Deposit            │        │     Operational income      │
└─────────────────────────────┘        └─────────────────────────────┘
                        │                   │
                        └─────────┬─────────┘
                                  │
                                  ▼
                  ┌───────────────────────────┐      ┌────────────────────────┐
                  │    Bank Efficiency Level   │      │   Dependent variable   │
                  └───────────────────────────┘      └────────────────────────┘
                                  ▲
                                  │
                       ┌──────────────────────┐
                       │         ROA          │
                       │         CAR          │
                       │         NPF          │
                       │         GDP          │
                       │         INF          │
                       └──────────────────────┘
                       ┌──────────────────────┐
                       │ Independent variable │
                       └──────────────────────┘
```
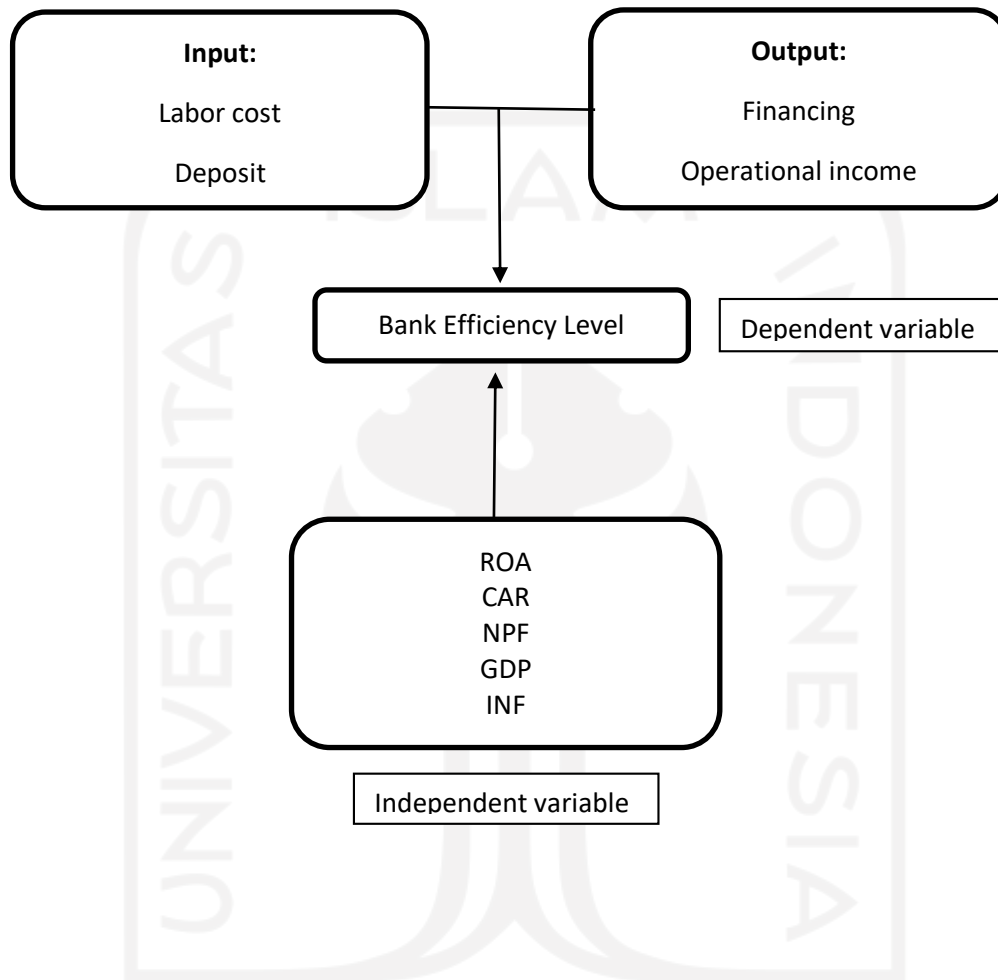
CHAPTER III
RESEARCH METHOD

3.1   Population and Sample

In this research, the population is Islamic banks in Indonesia that are registered as Full-fledged Islamic Banks in 2020. The population is defined as an area consisting of an object or subject with specific qualities and characteristics that the researcher will research (Sugiyono, 2015). This research uses the purposive sampling technique as the method in choosing sample based on the following criteria:

1. Islamic banks that fulfill the definition of Full-fledged Islamic Banks based on the Indonesian Financial Services Authority (OJK) and listed in Bank Indonesia in 2020.

2. Full-fledged Islamic Banks that published their annual financial report in 2015 to 2019.

3. Full-fledged Islamic Banks that have completed information in their annual financial report during 2015 to 2019 regarding the variables that will be examined in this research.

According to the criteria given above, fourteen Full-fledged Islamic Banks fulfilled the requirements.

3.2   Data Collection Method

There are two types of data namely, primary data and secondary data, and to perform this research, the researcher uses a quantitative method. The data for this research use secondary data, consisting of the company's annual financial report

obtained from the company's website and published report by the Indonesian Central Bureau of Statistics. Since secondary data are used, the documentation method is applicable in collecting the data from the annual financial report.

3.3   Research Variables

3.3.1   Independent Variables

1. Return On Assets (ROA)

Return on Assets (ROA) is a calculation of profit or loss before tax using annualized calculations. This calculation aims to measure the level of profitability of assets owned by the bank (Surat Edaran Otoritas Jasa Keuangan, 2014).

$$Return\ On\ Assetes = \frac{Earning\ Before\ Tax\ (EBT)}{Total\ Assets}$$

2. Capital Adequacy Ratio (CAR)

Capital Adequacy Ratio (CAR) is a ratio to measure the adequacy of capital to absorb losses and compliance with the Minimum Capital Adequacy Requirement (KPMM). The higher the ratio means the more solvable the bank is (Surat Edaran Otoritas Jasa Keuangan, 2014)

$$Capital\ Adequacy\ Ratio = \frac{Core\ capital + Supplementary\ capital}{Risk\ Weighted\ Assets\ (RWA)\ for\ Financing\ Risk}$$

3. Non-Performing Financing (NPF)

Non-performing Financing (NPF) is the number of credit loss that has the possibility for not being paid or billed (Asngari, 2013). This ratio measures the proportion of financial problems, which are considered as sub-standard, doubtful and loss to total financing.

$$Non\ Performing\ Financing\ = \frac{Total\ of\ Non-performing\ financing}{Total\ Financing}$$

4. Gross Domestic Product (GDP)

Gross Domestic Product (GDP) is a measure of total income and total expenditure on goods and services in the economy (Firmansari & Suprayogi, 2015). This research used GDP rill with base year prices to determine the economy's value of goods and services. The objective of measuring GDP is to assess how well the country's economic performance as a whole (Mankiw, 2018).

5. Inflation

Inflation refers to a situation when the price level in the economy is increasing. The inflation rate is the percentage of changing price level from the previous period (Mankiw, 2018).

$$Inflation\ rate = \frac{IHK\ second\ year - IHK\ first\ year}{IHK\ first\ year} \times 100$$

3.3.2 Dependent Variables

The dependent variable in this research is the bank efficiency of Full-fledged Islamic Banks (BUS). The efficiency level will be calculated using Data Envelopment Analysis (DEA) tools, namely Efficiency Measurement System (EMS) software. The range of level efficiency is 0 – 1, the bank has higher efficiency if the level of efficiency is closer to 1 and efficiency is lower if it is closer to 0.

3.3.3 Input Variables

1. Deposit

According to Fatwa DSN No: 03/DSN-MUI/IV/2000, a deposit is defined as saving that can only be withdrawn at a certain time based on the agreement between *shahibul mal* (fund owner) and *mudarib*. Deposit in this research included *wadiah* current/demand accounts, *wadiah* savings, deposits from other banks, *mudarabah* current/demand deposits, *mudarabah* saving deposits, and *mudarabah* time deposits.

2. Labor cost

Labor cost includes salaries expense, remuneration, allowance, education, and training, etc. incurred for Full-fledged Islamic Banks.

3.3.4 Output Variables

1. Financing

Financing or usually called a loan in a conventional bank, will include Islamic contracts such as buying and selling principles consisting of *Murabaha*, *Salam*, and

Istisna. The lease principle consists of *Ijarah*. The loss and sharing principle consist of *Mudarabah* and *Musharakah*. Then, financing with a complementary contract consists of *Qardh* (Alqahtani et al., 2017; Maulidiyah & Laila, 2016).

2. Operating income

Operating income is income that is derived from the main activities or operational activities of the company which is known as *mudarib* and other operating income deducted with operational expenses.

3.4 Data Analysis Method

3.4.1 Descriptive Statistics Analysis

Descriptive statistics is a statistical analysis to describe the data, and the conclusion does not apply to general or generalization. It is provided in the form of a table, graphic, diagram, pictogram, measures of percentage, measures of spread that consist of standard deviation, range, variances, and interquartile range, and measures of central tendency that consists of mean, median, and mode (Sugiyono, 2015).

3.4.2 Panel Data Regression Model

Data panel regression is a regression model that combined data cross section and time series into the data called panel pooled data. There are three regression models commonly used namely common effects model, fixed effects model, and random effects model.

2.4.3.1 Common Effect Model

Common Effects Model (CEM) is a regression model assuming that intercept and slope remain the same between individuals and time. The same in individuals and time means there is no value differences in intercept and the slope in regression result. It combines time series and cross-section data into the pool data to estimate the regression model that used Pooled Least Square (OLS), also known as CEM (Sriyana, 2014).

2.4.3.2 Fixed Effect Model

Fixed Effect Model (FEM) is a regression model assuming that the slope remains the same for both individuals and time. However, the intercept is different. The differences occurred because every data for each company or country has various scales and capacities, resulting in a different behavior between variables that will show the difference in intercepts and regression coefficients. Then, it is appropriate to include a dummy variable to explain that there is a difference in the intercept. This regression model is also known as Least Squares Dummy Variables (LSDV) technique. However, the weakness of this assumption is there might be a possibility that the model is not appropriate for the actual condition (Sriyana, 2014).

2.4.3.3 Random Effect Model

Random Effect Model (REM) is a regression model assuming that both intercept and slope are different between individuals and time. The error terms (variable interference) consist of two components. Error term included time series and

cross-section and the individual error term. Therefore, REM is also known as Error Component Model (ECM) (Sriyana, 2014)

3.4.3 Panel Data Regression Model Selection

3.4.3.1 Chow Test (F-Statistical Test)

Chow test or F-statistical test is used to determine which one is the best model between common effects and fixed effects with the following hypotheses:

Ho: Common Effects Model

H1: Fixed Effects Model

If the probability value (F-statistic) is bigger than (>) F-table, the level of significance is 0,05. It indicates that hypothesis null (Ho) is rejected and Fixed effects model will be chosen as the panel data regression model. Conversely, if the probability value (F-statistic) is less than (<) F-table, the hypothesis null (Ho) is accepted, and common effects will be chosen as the model (Sriyana, 2014).

3.4.3.2 Lagrange Multiplier Test

Lagrange Multiplier Test is used to select the model between common effects model with a random-effects model with Bruesch Pagan method. The followings are the hypothesis:

Ho: Common Effects Model

H1: Random Effects Model

This test is based on the distribution of chi-squares of the degree of freedom, which equals to the amount of independent variable. The null hypothesis (Ho) will be accepted if the probability value of Lagrange Multiplier is greater than (>) 0.05. Then, Common effect model is appropriate. Otherwise, the first hypothesis (H1) will be accepted if the probability value of Lagrange Multiplier is smaller than (<) 0.05 and Random effect model will be selected (Widarjono, 2018).

3.4.3.3 Hausman Test

Hausman Test is used to determine which model is the best between random effects and fixed effects with the following hypotheses:

Ho: Random Effects Model

H1: Fixed Effects Model

The null hypothesis (Ho) is accepted if the probability value is greater than (>) significant value which in this research is 0.05. Random effect model will be selected over Fixed effect model. Conversely, the null hypothesis (Ho) is rejected if the probability value is smaller than (>) 0.05.

3.4.4   Significant Test

4.4.3.1   F-Test

F test is to test the effect of all independent variables used in the study simultaneously or to test the model significance. The hypothesis is hypothesis null (Ho) is rejected if the value of F-count is more than (>) the value of F table. The

hypothesis null (Ho) is accepted if the value of F-count is less than (<) F table. The value of F table can be calculated from the amount of a numerator of df (k-1) and numerator of df (n-k) (Sriyana, 2014).

4.4.3.2 Determination Coefficient (R2)

The determination coefficient measures the proportion and describes how the independent variable can explain the dependent variable. It also measures how good the regression line is from this model. The determination coefficient will increase as the independent variable increases. So, a higher determination coefficient means the research consists of many independent variables. This has a range value of 0 to 1, indicating that the higher the value, the closer the relationship between independent variables and dependent variables (Sriyana, 2014).

4.4.3.3 Independent Sample T-test

Independent sample t-test is an individual coefficient test. This test was carried out to determine the individual relation of the independent variable to the dependent variable. With the assumption of the value of a=5%, the decision of hypothesis will be if the value of t-count is more than (>) the value of t table, then the Hypothesis null (Ho) is rejected. Conversely, if the value of t-count is less than (<) t table, then the Hypothesis null (Ho) is accepted (Sriyana, 2014; Widarjono, 2018).

3.4.5 Dynamic Panel Regression

5.4.3.1 Generalized Method of Moment

Generalized Method of Moment (GMM) is a dynamic panel regression method proposed by Arellano and Bond (1991) to solve the endogeneity problem between independent and dependent variables. It is solved by including the lag dependent variable (Yt-1) (Widarjono et al., 2020). Lag means a lapse of time in which the dependent variable (Y) responds to the independent variable (X) with a lapse of time (Gujarati, 2004).

Two approaches provided in GMM consist of the first difference method by Arellano and Bond (1991) and the System GMM method by Arellano and Bover (1995). This research will use the two-step system GMM because it is more reasonable and suitable for the application of panel data (Widarjono et al., 2020). The hypotheses will be:

Ho: Valid instrument

H1: Invalid instrument

Ho is rejected if p-value is less than (<) significant value, in which significant value in this research is 0.05. Conversely, H1 is rejected if p-value greater than (>) significant value.

5.4.3.2 Autocorrelation Test

Autocorrelation test will be performed using Arallano-Bond test (AR2) to check second-order autocorrelation. It ensures if there is no indication of autocorrelation in the model (Widarjono et al., 2020). The followings are the hypotheses:

Ho: There is no autocorrelation

H1: There is autocorrelation

Ho is rejected if p-value is smaller than (<) significant value which in this research is 0.05. Then, H1 is rejected if p-value is greater than (>) significant value.

CHAPTER IV

DATA ANALYSIS AND DISCUSSIONS

4.1   Research Object Description

This is a research of Full-fledged Islamic Banks in Indonesia for the period of 2015 – 2019. There are fourteen Full-fledged Islamic Banks registered by the Indonesia Financial Services Authority (OJK). Based on purposive sampling method, the fourteen Full-fledged Islamic Banks fulfilled the requirements for the research. Several tools are used to support the data analysis such as Microsoft Excel 2013, Efficiency Measurement System (EMS), and Eviews 9.

4.2   Descriptive Statistics

Descriptive Statistics contains four points which will be analyzed, they are mean, minimum, maximum, and standard deviation to describe the data. The result of descriptive statistic of each variable will be displayed in Table 4.2 below:

Table 4.1 Descriptive Statistics

	ROA	CAR	NPF	GDP	INF	Efficiency
Mean	0.012930	0.209547	0.021661	0.050340	0.031660	0.670567
Maximum	0.136000	0.446000	0.049700	0.051700	0.036100	1.571200
Minimum	-0.107700	0.115100	0.000200	0.048800	0.027200	0.067100
Std. Dev.	0.034307	0.073460	0.015796	0.000942	0.003030	0.214977
Observations	70	70	70	70	70	70

Source: secondary data processed by Eviews 9, 2020

43

The result of data statistics in Table 4.2 showed that the sample observations is 70. The first independent variable is Return On Assets (ROA), that has an average value of 0.012930. The maximum value is 0.136000 and the minimum value is -0.107700. While the standard deviation is 0.034307.

The second independent variable is Capital Adequacy Ratio (CAR) that has an average value of 0.209547. The maximum value is 0.446000 and the minimum value is 0.115100, while the standard deviation is 0.073460.

The third independent variable is Non-Performing Financing (NPF) that has an average value of 0.021661 with the maximum result value is 0.049700 and the minimum value is 0.000200, whereas the standard deviation is 0.015796.

The fourth independent variable is Gross Domestic Product (GDP), the result of this variable is an average value of 0.050340, the maximum value is 0.051700, the minimum value is 0.048800, and the standard deviation is 0.000942.

The last independent variable is Inflation that has an average value of 0.031660. Following with the maximum result value is 0.036100, the minimum value is 0.027200, and standard deviation is 0.003030.

On the other hand, the dependent variable, that is efficiency, shows that the mean or an average value is 0.670567, the maximum and minimum value is 1.571200 and 0.067100, and the standard deviation is 0.214977.

4.3   Panel Data Regression Model

a.   Common Effect Model

Common Effect Model is a model that combines the time series data with cross section data, which will be the information discussed in this model that may reflect any changes in each subject (Sriyana, 2014).

Table 4.2 Common Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	0.696726	1.213005	0.574380	0.5677
ROA	0.457530	0.862193	0.530659	0.5975
CAR	1.437140	0.374996	3.832417	0.0003
NPF	-1.408022	1.802987	-0.780939	0.4377
GDP	-9.418652	23.467990	-0.401340	0.6895
INF	5.414123	7.263432	0.745395	0.4588
R-squared	0.347335			
Adjusted R-squared	0.296345			
F-statistic	6.811891			
Prob (F-statistic)	0.000038			

Source: secondary data processed by Eviews 9, 2020

ROA has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 0.4575 which means, every additional return on assets ratio of 1, will increase 0.4575 of sharia bank efficiency

CAR has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 1.4371 which means every additional capital adequacy ratio of 1, will increase 1.4371 of Full-fledged Islamic Banks efficiency.

NPF has a negative effect on Full-fledged Islamic Banks efficiency with a regression coefficient of -1.4080 which means every increase of 1 in the non-performing financing, will decrease -1.4080 in Full-fledged Islamic Banks.

GDP has a negative effect on Full-fledged Islamic Banks efficiency with a regression coefficient of -9.4186 which means if gross domestic product increases by 1, the Full-fledged Islamic Banks efficiency decreases for -9.4186.

Inflation has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 5.4141 which means if the inflation increases by 1, then the Full-fledged Islamic Banks efficiency increases for 5.4141.

b. Fixed Effect Model

Fixed effect model is a model that can show the difference of constant in each object with the same regression coefficient (Sriyana, 2014).

Table 4.3 Fixed Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	0.578173	0.975225	0.592861	0.5559
ROA	0.120654	1.155826	0.104388	0.9173
CAR	1.457977	0.539095	2.704489	0.0093
NPF	0.518339	2.653937	0.195309	0.8459
GDP	-6.799601	19.471800	-0.349203	0.7284
INF	3.676022	5.984014	0.614307	0.5417
R-squared	0.688356			
Adjusted R-squared	0.578364			
F-statistic	6.258245			
Prob (F-statistic)	0.000000			

Source: secondary data processed by Eviews 9, 2020

ROA has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 0.1206 which means every addition return on assets of 1 will increase the Full-fledged Islamic Banks efficiency for 0.1206.

CAR has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 1.4579 which means addition of capital adequacy ratio of 1 will increase the Full-fledged Islamic Banks efficiency for 1,4579.

NPF has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 0.5183 which means if the non-performing financing increases by 1 then, the Full-fledged Islamic Banks efficiency will increase for 0.5183.

GDP has a negative effect on Full-fledged Islamic Banks efficiency with a regression coefficient of -6.7996 which means if the gross domestic products of a country increases by 1 then, the Full-fledged Islamic Banks efficiency will decrease for -6.7996.

Inflation has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 3.6760 which means if the inflation increases by 1 then, the Full-fledged Islamic Banks efficiency will increase for 3.6760.

c. **Random Effect Model**

Random effect model is named as Error component model (ECM) which summarizes the difference in intercept and constant caused by the error of differentiation in each unit and a time that occurred randomly (Sriyana, 2014).

Table 4.4 Random Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	0.664023	0.954693	0.695536	0.4892
ROA	0.224659	0.984348	0.228231	0.8202
CAR	1.527176	0.426511	3.580624	0.0007
NPF	-0.498568	2.061204	-0.241882	0.8096
GDP	-9.034357	18.691970	-0.483328	0.6305
INF	4.712993	5.760171	0.818204	0.4163
R-squared	0.231076			
Adjusted R-squared	0.171004			
F-statistic	3.846634			
Prob (F-statistic)	0.004138			

Source: secondary data processed by Eviews 9, 2020

ROA has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 0.2246 which means every addition in return on assets ratio for 1, there will be increase of 0.2246 in the Full-fledged Islamic Banks efficiency.

CAR has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 1.5271 which means every addition in capital adequacy ratio for 1, the Full-fledged Islamic Banks efficiency will increase 1.5271.

NPF has a negative effect on Full-fledged Islamic Banks efficiency with a regression coefficient of -0.4985 which means every increase of 1 in non-performing, will decrease the Full-fledged Islamic Banks efficiency of -0.4985.

GDP has a negative effect on Full-fledged Islamic Banks efficiency with a regression coefficient of -9.0343 which means if the gross domestic products of a country increases by 1 then, the Full-fledged Islamic Banks efficiency decreases for -9.0343.

Inflation has a positive effect on Full-fledged Islamic Banks efficiency with a regression coefficient of 4.7129 which means if the inflation increases by 1 then, the Full-fledged Islamic Banks efficiency increases by 4.7129.

4.4 Panel Data Regression Model Selection

4.4.1 Chow Test (F-Statistical Test)

Chow test or F-statistical test is used to determine which one is the best model between common effects and fixed effects.

Table 4.5 Chow Test

Effect test	Statistic	d.f	Prob
Cross-section F	4.292894	(13,51)	0.0001
Cross-section Chi-square	51.744258	13	0.0000

Source: secondary data processed by Eviews 9, 2020

From the result above, it shows the value of probability cross-section F is 0.0001 which lower than 0.05. It concludes that Ho is rejected and Ha is accepted then, Fixed effects model is selected over Common effect model.

4.4.2 Hausman Test

Hausman Test is used to determine between random effects and fixed effects.

Table 4.6 Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob
Cross-section random	0.0000	5	1.0000

Source: secondary data processed by Eviews 9, 2020

The probability value of Hausman test was found to be 1.0000 and it indicates that the probability value is bigger than 0.05. Therefore, Ho is accepted with the selected model is Random effect model.

4.4.3 Lagrange Multiplier Test

Lagrange Multiplier Test is used to select between common effects model and random effects model.

Table 4.7 Lagrange Multiplier Test

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	21.42023	0.789357	22.20959
	0.0000	-0.3743	0.0000

Source: secondary data processed by Eviews 9, 2020

The Breusch-Pagan has probability value of 0.0000 which lower than 0.05, so the null hypothesis (Ho) is rejected and Ha is accepted. It means Random effect model is selected over Common effect model.

4.5   Significant Test

According to model selection from Chow test, Hausman test, and Lagrange multiplier test, the final results show that the selected model for this research is Random Effect Model.

Table 4.8 Random Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	0.664023	0.954693	0.695536	0.4892
ROA	0.224659	0.984348	0.228231	0.8202
CAR	1.527176	0.426511	3.580624	0.0007
NPF	-0.498568	2.061204	-0.241882	0.8096
GDP	-9.034357	18.691970	-0.483328	0.6305
INF	4.712993	5.760171	0.818204	0.4163
R-squared	0.231076			
Adjusted R-squared	0.171004			
F-statistic	3.846634			
Prob (F-statistic)	0.004138			

Source: secondary data processed by Eviews 9, 2020

4.5.1   F-test

F test is to test the effect of all independent variables used in the study simultaneously. The hypothesis is when the value of probability (F-statistic) is lower than 5% then, the independent variables simultaneously affect the dependent variable. However, if the value of probability (F-statistic) is higher than 5% then, the independent variables simultaneously have no effect on the dependent variable (Sriyana, 2014).

Based on the Table 4.9, the probability (F-statistic) value is 0.004138. It means that the probability value is lower than 0.05. Thus, the independent variables of ROA, CAR, NPF, GDP, and Inflation simultaneously affect the bank efficiency as dependent variables.

4.5.2   Determination Coefficient

Determination coefficient is used to measure the proportion and describe how independent variables can explain the dependent variables. Also, it measures how well regression line we have from this model. From the Table 4.9, it can be seen that the adjusted R-squared is 0.1710. This result implies that only 17,10% of Full-fledged Islamic Banks efficiency can be explained by independent variable which consists of Return on assets (ROA), Capital adequacy ratio (CAR), Non-performing financing (NPF), Gross domestic product (GDP), and inflation. Then the other 82,90% is explained by the other variables outside the study.

4.5.3   Independent sample t-test

Independent sample t-test is an individual coefficient test. This test was carried out to determine the individual relation of the independent variable to the dependent variable with the assumption that if the p-value is less than 5%, the independent variable has a significant effect on the Full-fledged Islamic Banks efficiency. However, if the p-value is greater than 5%, the independent variable has no significant effect on Full-fledged Islamic Banks efficiency.

The probability value of Return on assets (ROA) is 0.8202 which is bigger than the significant value of 0.05. The result signifies that Return on asset has no relationship with Full-fledged Islamic Banks efficiency.

The probability value of Capital adequacy ratio (CAR) is 0.0007 which is smaller than the significant value of 0.05. The result signifies that Capital adequacy ratio has relationship with Full-fledged Islamic Banks efficiency.

The probability value of Non-performing financing (NPF) is 0.8096 which is bigger than the significant value of 0.05. The result shows that Non-performing financing has no relationship with Full-fledged Islamic Banks efficiency.

The probability value of Gross domestic product (GDP) is 0.6305 which is bigger than the significant value of 0.05. The result shows that Gross domestic product has no relationship with Full-fledged Islamic Banks efficiency.

The probability value of Inflation is 0.4163 which is bigger than significant value of 0.05. The result implies that Inflation has no relationship with Full-fledged Islamic Banks efficiency.

4.6   Hypothesis Test

4.6.1   The effect of ROA on Full-fledged Islamic Banks efficiency

H1: ROA has a positive effect on Full-fledged Islamic Banks

The result in this study shows that there is no relationship between ROA and Full-fledged Islamic Banks efficiency. It is reflected on the result of coefficient which

is positive and the probability value that is 0.8202 bigger than 0.05. From this analysis, it shows that the H1 which stated ROA has a positive effect on Full-fledged Islamic Banks is rejected.

4.6.2   The effect of CAR on Full-fledged Islamic Banks efficiency

H2: CAR has a positive effect on Full-fledged Islamic Banks

The result in this study shows that there is a relationship between CAR and Full-fledged Islamic Banks efficiency. This is supported by the statistical result of positive coefficient and the probability value of 0.007 which is greater than 0.05. Thus, it can be concluded that H2 which stated CAR has a positive effect on Full-fledged Islamic Banks is accepted.

4.6.3   The effect of NPF on Full-fledged Islamic Banks efficiency

H3: NPF has a negative effect on Full-fledged Islamic Banks efficiency

This research found that there is no relationship between NPF and Full-fledged Islamic Banks efficiency. This is supported by the statistical result of negative coefficient and the probability value of 0.8096 which is bigger than 0.05. From this analysis, it can be concluded that H3 which stated NPF has a negative effect on Full-fledged Islamic Banks efficiency is rejected.

4.6.4   The effect of GDP on Full-fledged Islamic Banks efficiency

H4: GDP has a positive effect on Full-fledged Islamic Banks efficiency

The result of this study found that there is no relationship between GDP and Full-fledged Islamic Banks efficiency. It is reflected on the result of negative coefficient and the probability value of 0.6305 which is greater than 0.05. This analysis shows that H4 which stated GDP has a positive effect on Full-fledged Islamic Banks efficiency is rejected.

4.6.5 The effect of Inflation on Full-fledged Islamic Banks efficiency

H5: Inflation has a negative effect on Full-fledged Islamic Banks efficiency

This research found that there is no relationship between Inflation and Full-fledged Islamic Banks efficiency. This is supported by the statistical result of positive coefficient and the probability value of 0.4163 which is greater than 0.05. Thus, it can be concluded that that H5 which stated Inflation has a negative effect on Full-fledged Islamic Banks efficiency is rejected.

4.7 Dynamic Panel Regression

4.7.1 Generalized Method of Moment

Table 4.9 Generalized Method of Moment

Variable	Coefficient	Std. Error	t-statistic	Prob
Bank Efficiency (-1)	-1.0855	0.1584	-6.8527	0.0000
ROA	2.3981	0.6256	3.8331	0.0005
CAR	1.3078	0.6534	2.0015	0.0529
NPF	0.6156	2.1141	0.2912	0.7726
GDP	-21.9123	24.3070	-0.9015	0.3733
INF	-4.7963	3.6097	-1.3287	0.1923

J-statistic	4.4570
Prob(J-statistic)	0.4856
Instrument rank	11

Source: secondary data processed by Eviews

The hypothesis null will be accepted if p-value is greater than (>) significant value. The probability value of GMM is 0.4856. This value indicates that 0.4856 > 0.05, therefore H1 is rejected and Ho is accepted. Therefore, the instrument for this model is valid.

4.7.2 Autocorrelation Test

Table 4.10 Arellano-Bond Test

Test order	m-Statistic (2)	Prob
Arellano-Bond Test	-1.1317	0.2578

Source: secondary data processed by Eviews

Autocorrelation test which is performed using Arrelano-Bond test found that the probability value is 0.2578. This value is greater than 0.05 which means Ho is accepted and there is no autocorrelation.

4.7.3 Independent T-test

The probability value of Return on assets (ROA) is 0.0005 which is smaller than the significant value of 0.05. The result signifies that Return on asset has relationship with Full-fledged Islamic Banks efficiency.

The probability value of Capital adequacy ratio (CAR) is 0.0529 which is bigger than the significant value 0f 0.05. The result signifies that Capital adequacy ratio has no relationship with Full-fledged Islamic Banks efficiency.

The probability value of Non-performing financing (NPF) is 0.7726 which is bigger than the significant value of 0.05. The result shows that Non-performing financing has no relationship with Full-fledged Islamic Banks efficiency.

The probability value of Gross domestic product (GDP) is 0.3733 which is bigger than the significant value of 0.05. The result shows that Gross domestic product has no relationship with Full-fledged Islamic Banks efficiency.

The probability value of Inflation is 0.1923 which is bigger than the significant value of 0.05. The result implies that Inflation has no relationship with Full-fledged Islamic Banks efficiency.

4.7.4   Estimation Result

This part will present the estimation result of independent variables to verify the effect of each individual variables on Full-fledged Islamic Banks based on static panel and dynamic panel.

Table 4.11 The Static Panel and Dynamic Panel Result

Variable	Static panel		Dynamic panel	
	Coefficient	Prob	Coefficient	Prob
Bank Efficiency (-1)			-1.0855	0
ROA	0.2247	0.8202	2.3981	0.0005

CAR	1.5272	0.0007	1.3078	0.0529
NPF	-0.4986	0.8096	0.6156	0.7726
GDP	-9.0344	0.6305	-21.9123	0.3733
INF	4.7130	0.4163	-4.7963	0.1923
R2		0.2311		
Prob(F-statistic)		0.0041		
Prob(J-statistic)				0.4856
AR (2)				0.2578

Source: secondary data processed by Eviews

4.7.4.1   The effect of ROA on Full-fledged Islamic Banks efficiency

Based on Table 4.12 of The Static Panel shows that ROA indicates has no relationship towards Full-fledged Islamic Banks efficiency. Conversely, it was found there is relationship between ROA and Full-fledges Islamic Banks in the dynamic panel.

4.7.4.2   The effect of CAR on Full-fledged Islamic Banks efficiency

The static panel result shows that CAR has relationship with Full-fledged Islamic Banks efficiency. As for the dynamic panel, CAR was found has no relationship which shows the opposite result of the static panel.

4.7.4.3   The effect of NPF on Full-fledged Islamic Banks efficiency

Both The static panel and the dynamic panel results show that NPF was found has no relationship with Full-fledged Islamic Banks efficiency.

4.7.4.4   The effect of GDP on Full-fledged Islamic Banks efficiency

Based on Table 4.12, the static panel and the dynamic panel showed that GDP has no relationship with Full-fledged Islamic Banks efficiency.

4.7.4.5 The effect of Inflation on Full-fledged Islamic Banks efficiency

Based on Table 4.12, the static panel and the dynamic panel showed that inflation has no relationship with Full-fledged Islamic Banks efficiency.

4.7.4.6 The lagged dependent variable

In dynamic panel, the lagged dependent variable, Bank efficiency (-1) was found statistically significant.

In conclusion, most of the independent variables have different results in static panel and dynamic panel. The independent variable which appears to have relationship with Full-fledged Islamic Banks efficiency in static panel is CAR while in dynamic panel is ROA. Then, for NPF, GDP, and Inflation are appear to have no relationship with Full-fledged Islamic Banks efficiency and it is consistent in both static and dynamic panel.

4.8 Discussions

The effect of ROA on Full-fledged Islamic Banks efficiency

Return on Asset (ROA) is one of the measurements of profitability in the percentage. Based on the result, the static panel regression shows that there is no relationship between Return on Assets (ROA) and Full-fledged Islamic Banks efficiency, with the significant value of $0.8202 > 0.05$. This result is supported by Solihin et al. (2016) and Candra & Yulianto (2015). As for the dynamic panel regression result, it shows that there is relationship between ROA and Full-fledged

Islamic Banks Efficiency, with a significant value of $0.0005 < 0.05$. Higher ROA will increase Full-fledged Islamic Banks efficiency by using the previous year's ROA assumption.

The probable reason for this result is because ROA is the ratio to analyze the company's profitability. Bank with higher profit indicate to be more efficient (Bayunya & Haronb, 2017). The higher the ratio reflects the management's capability to manage the assets to increase the income while suppressing the cost. That is why the bank is expected to have a high ROA or at least have a minimum level of ROA of 1.5%, as determined by *Bank Indonesia*. Thus, the higher the profitability generated by the bank, will increase the Islamic bank's efficiency, and their performance will be also getting better or close to the 100% efficiency level (Sari & Saraswati, 2017).

In addition, based on the dynamic panel, it can be concluded that this regression result supported the agency theory which describe the agency relationship between the bank as an agent and the client or people as a principle. The reason is the client will believe more in the bank that report higher profitability, because it portrays that the bank is more safety and has a low liquidity risk to propose credit application and to deposit the funds (Sari & Saraswati, 2017).

The effect of CAR on Full-fledged Islamic Banks efficiency

The static panel regression result shows that there is relationship between Capital Adequacy Ratio (CAR) and Full-fledged Islamic Banks efficiency, with the

significant value of 0.0007 < 0.05. This result indicates that the higher the CAR, the higher the Full-fledged Islamic Banks efficiency will be. There were probable reasons regarding this finding. First, capital is an important aspect to evaluate a company's performance because it is included as one of the ratios in CAMELS. It is focused on the soundness of a company and how to create an effective performance within the Islamic bank activities. Therefore, the higher the capital, the healthier the bank will be. Second, CAR is the ratio to measure capital adequacy, which portrays a company's capital strength. Thus, higher CAR means the Islamic Bank has sufficient capital that can be used in the future to against risks, in which they are more sustainable and will have more efficient performance (Majdina et al., 2019). The result of this research is consistent with the previous research by Majdina et al. (2019) and Bitar et al. (2019). They stated that CAR significant positively influence Islamic Bank efficiency.

The dynamic panel regression result shows that there is no relationship between CAR and Full-fledged Islamic Banks efficiency, with the significant value of 0.0529 > 0.05. It means that higher CAR will not affect the Full-fledged Islamic Banks efficiency by using the previous year's CAR assumption.

The effect of NPF on Full-fledged Islamic Banks efficiency

The static regression result shows that there is no relationship between Non-performing Financing (NPF) and Full-fledged Islamic Banks efficiency, with the significant value of 0.8096 > 0.05. The same result in dynamic panel showed that NPF has no relationship with Full-fledged Islamic Banks efficiency, with the significant

value of 0.7726 > 0.05. It means that higher NPF will not affect the Full-fledged Islamic Banks efficiency by using the assumption of previous year's NPF.

NPF is the ratio of bad financing, in which the client cannot pay back the financing given by the bank. A high level of NPF puts the bank in dangerous circumstances because it disrupts bank operations. Berger & Deyoung (1997, as cited in Majdina et al. 2019) stated that low efficiency is correlated with poor management, which can be reflected in the increasing number of bad credits and lower credit quality from inadequate credit supervision. This result is consistent with Majdina et al. (2019), Ramly & Hakin (2016), and Candra & Yulianto 2015).

The positive correlation in dynamic panel result between NPF and Full-fledged Islamic Banks efficiency indicates that the company has already known that the NPF of the previous year is high, so they will try to reduce the NPF to improve the bank's efficiency in the following year. For instance, it can be resolved by improving their credit quality in terms of monitoring and controlling the financing.

The effect of GDP on Full-fledged Islamic Banks efficiency

GDP is a macroeconomic indicator to measure total economic activity. The macroeconomic indicators are mainly used to measure the influence of economic activity to both demand and supply of service banking. Therefore, the development of a country's economic activity has a strong correlation with the banking industry. If the soundness of a bank is poor, it will decrease the economy of a county. So that is why

it is necessary to keep the bank's soundness by subsequently improving the efficiency performance.

However, both static and dynamic regression panel results show that there is no relationship between Gross Domestic Product (GDP) and Full-fledged Islamic Banks. The significant value of static panel is $0.6305 > 0.05$ and for dynamic panel is $0.3733 > 0.05$. In addition, the dynamic panel is using the assumption of the previous year's GDP. The result contradicts with the previous studies by Asngari (2013), Hadhek et al. (2018), and Bitar et al. (2019). The negative association between GDP and Full-fledged Islamic Banks efficiency indicates that if GDP increases, the Full-fledged Islamic Banks efficiency will decrease. The negative correlation might happen because the bank has predicted that GDP of the country will be depressed so that the bank has changed their plan and target of their performance to ensure that the efficiency still can be achieved with the following adjusted target.

The effect of Inflation on Full-fledged Islamic Banks efficiency

Inflation is a proxy for the economic conditions of a country, where at the same time, it will gradually affect the banking industry as well. High inflation is often correlated with weaker growth and reflects the poor quality of economic policies. Based on the theory, when the economy is accelerated, inflation is normal and increasing the bank's profitability. Otherwise, if the economy is experiencing depression, the inflation is high, and it will decrease the bank's profitability, in which lower bank's profitability indicates the lower efficiency performance. It might reduce

their demand for bank deposits for the banking industry, then cause the bank to be more restricted about financing or supply of credit.

The static regression panel shows that there is no relationship between inflation and Full-fledged Islamic Banks efficiency, with the significant value of $0.4163 > 0.05$. The correlation between inflation and Full-fledged Islamic Banks efficiency is positive based on static panel. The probable reasons might happen because the banks' management has anticipated that there will be inflation for this period, so they adjust the interest rate to increase the revenue faster than costs which will give a positive effect on the performance (Mohd Noor et al., 2020). As for the dynamic regression panel result also shows that there is no relationship between Inflation and Full-fledged Islamic Banks efficiency, with a significant value of $0.1923 > 0.05$. The assumption for the dynamic regression panel is using the previous year's inflation to evaluate the influence of current year Full-fledged Islamic Banks Efficiency. In contrast, with the static panel regression result, the dynamic panel shows a positive correlation. The probable reason might because the inflation is non-anticipated by the banks' management, making them difficult to adjust the interest rate that results in increasing costs faster than revenues.

CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This research is conducted to find out the effect of internal factors and external factors in Full-fledged Islamic Banks Efficiency. It is focused on analyzing the Return on Assets (ROA), Capital Adequacy Ratio (CAR), Non-performing Financing (NPF), Gross Domestic Product (GDP), and Inflation that are chosen as internal factors and external factors—using Panel data regression in both static panel and dynamic panel of Generalized Method of Moment (GMM).

The finding of this research is based on The Static Panel, and there is only one significant independent variable. The followings are the conclusions:

1. There is no relationship between Return on Assets (ROA) and Full-fledged Islamic Banks efficiency.

2. There is a relationship between Capital Adequacy Ratio (CAR) and Full-fledged Islamic Banks efficiency. This indicates that higher CAR will increase the Full-fledged Islamic Banks efficiency.

3. There is no relationship between Non-performing Financing (NPF) and Full-fledged Islamic Banks efficiency.

4. There is no relationship between Gross Domestic Product (GDP) and Full-fledged Islamic Banks efficiency.

5. There is no relationship between Inflation and Full-fledged Islamic Banks efficiency.

Based on The Dynamic Panel, there is only one independent variable that is examined to be significant. The followings are the conclusions:

1. There is a relationship between Return on Assets (ROA) and Full-fledged Islamic Banks efficiency. This indicates that higher ROA will increase the Full-fledged Islamic Banks efficiency.

2. There is no relationship between Capital Adequacy Ratio (CAR) and Full-fledged Islamic Banks efficiency.

3. There is no relationship between Non-performing Financing (NPF) and Full-fledged Islamic Banks efficiency.

4. There is no relationship between Gross Domestic Product (GDP) and Full-fledged Islamic Banks efficiency.

5. There is no relationship between Inflation and Full-fledged Islamic Banks efficiency.

5.2   Research Implications

1. For academicians, they can increase the number of independent variables used in the study to get broader analysis of Full-fledged Islamic Banks efficiency. Because the adjusted R in this research is still low, that is only 17,10%. It means that the contribution of independent variables to explain the bank's

efficiency is only as big as 17,10% and the rest is contributed by the other variables that are not used in this research.

2. For Islamic banks, the bank management can improve their bank's efficiency performance by using the factors that have been proven in this research to have a significant effect on Full-fledged Islamic Banks efficiency, such as Capital Adequacy Ratio (CAR) and Return on Assets (ROA).

5.3   Research Limitations

This research has several limitations as explained in the following points:

1. The period of this research is only limited to five years, from 2014 to 2019, and it cannot be used to examine the long-term effects of Full-fledged Islamic Banks efficiency factors.

2. Subjectivity in disclosing and measuring all the factors of independent variables cannot be avoided, thus there is a possibility of bias.

3. This research only examines the Full-fledged Islamic Banks and does not include other types of Islamic Bank Indonesia such as Islamic Windows (UUS) and Islamic Rural Bank (BPRS).

5.4   Recommendations

 The followings are recommendations for future researcher:

1. Future researcher is expected to use different independent variables to examine the relationship between the independent variables that are chosen in the research and Full-fledged Islamic Banks efficiency.

2. Future researcher is expected to apply other method like Stochastic Frontier

   Analysis (SFA).

REFERENCES

Ahmed, H. (2014). Islamic Banking and Sharia'ah Compliance: A Product Development Perspective. *Journal of Islamic Finance*, *3*(2), 015–029.

Alqahtani, F., Mayes, D. G., & Brown, K. (2017). Islamic Bank efficiency compared to conventional banks during the global crisis in the GCC region. *Journal of International Financial Markets, Institutions and Money*, *51*, 58–74.

Anwar, M. (2016). the Efficiency of Banks in Indonesia: Sharia Vs. Conventional Banks. *Buletin Ekonomi Moneter Dan Perbankan*, *18*(3), 307–332.

Asngari, I. (2013). *Pengaruh Kondisi Ekonomi Makro dan Karakteristik Bank Terhadap Efisiensi Industri Perbankan Syariah di Indonesia*. *11*(2), 91–110.

Badan Pusat Statistik. (2021). *Indeks harga konsumen dan inflasi bulanan indonesia.* Retrieved March, 2021, from https://www.bps.go.id/statictable/2009/06/15/907/indeks-harga-konsumen-dan-inflasi-bulanan-indonesia-2005-2019.html

Badan Pusat Statistik. (2021). *Produk domestik bruto.* Retrieved May, 2021, from https://www.bps.go.id/subject/11/produk-domestik-bruto--lapangan-usaha-.html#subjekViewTab2

Banna, H., & Alam, M. R. (2020). Islamic Banking Efficiency and Inclusive Sustainable Growth: the Role of Financial Inclusion. *Journal of Islamic Monetary Economics and Finance*, *6*(1).

Bayunya, A. F. R., & Haronb, R. (2017). Determinants of Efficiency of Islamic Banks : Indonesian Evidence. *Journal of Islamic Finance*, *6*(1), 1–15.

Bitar, M., Pukthuanthong, K., Walker, T., Pukthuanthong, K., & Walker, T. (2019). Efficiency in Islamic vs. Conventional Banking: The Role of Capital and Liquidity. *Global Finance Journal*, *46*.

Budisantoro, A. T., Triandaru, S. (2006). *Bank dan lembaga keuangan lain* (2). Jakarta: Salemba Empat.

Bogetoft, P., & Otto, L. (2011). *Benchmarking with dea, sfa, and r*. New York: Spinger-Verlag

Candra, S., & Yulianto, A. (2015). Analisis Rasio Keuangan Terhadap Tingkat Efisiensi Bank Umum Syariah (Two Stage Sfa). *Accounting Analysis Journal*, *4*(4), 1–9. https://doi.org/10.15294/aaj.v4i4.9105

Fatwa Dewan Syariah Nasional No: 03/DSN-MUI/IV/2000. *Deposito*. 1 April 2000. Dewan Syari'ah Nasional Majelis Ulama Indonesia. Jakarta.

Eisenhardt, K. M. (1989). Agency Theory: An Assessment and Review. *Academy of Management Review*, *14*(1), 57–74. https://doi.org/10.1159/000169659

Fadilah, F., & Yuliafitri, I. (2018). Analisis Efisiensi Bank Umum Syariah Hasil Pemisahan Dan Non Pemisahan Serta Faktor-Faktor Yang Mempengaruhinya (Studi Pada Bank Umum Syariah Yang Terdaftar Di Otoritas Jasa Keuangan Pada Periode 2011-2016). *Islamiconomic: Jurnal Ekonomi Islam*, *9*(1), 69–98.

Fatima, N. (2014). Capital adequacy: a financial soundness indicator for banks. *Global Journal of Finance and Management*, *6*(8), 975–6477.

Firmansari, D., & Suprayogi, N. (2015). Pengaruh Variabel Makroekonomi dan Variabel Spesifik Bank Terhadap Non Performing Financing pada Bank Umum Syariah dan Unit Usaha Syariah di Indonesia Periode 2003-2014. *Jurnal Ekonomi Syariah Teori & Terapan*, *2*(6).

Gujarati, D. (2004). *Basic Econometrics* (Fourt edit). The McGraw-Hill Companies.

Hadhek, Z., Frifita, M., & Lafi, M. (2018). The Determinants of Profit Efficiency of Islamic Banks Using Stochastic Frontier Analysis Approach. *International Journal of Economics and Financial Issues*, *8*(6), 20–29.

Havidz, S. A. H., & Setiawan, C. (2015). Bank Efficiency and Non-Performing Financing (NPF) in the Indonesian Islamic Banks. *Asian Journal of Economic Modelling*, *3*(3), 61–79. https://doi.org/10.18488/journal.8/2015.3.3/8.3.61.79

Hidayati, N., Siregar, H., & Pasaribu, S. H. (2017). Determinant of Efficiency of the Islamic Banking in Indonesia. *Buletin Ekonomi Moneter Dan Perbankan*, *20*(1), 29–48. https://doi.org/10.21098/bemp.v20i1.723

Hughes, J. P., & Mester, L. J. (2012). Efficiency in Banking: Theory, Practice, and Evidence. *The Oxford Handbook of Banking*, *April 2018*, 1–23.

Iriani, L. D., & Yuliadi, I. (2015). The Effect of Macroeconomic Variables on Non Performing Financing of Islamic Banks in Indonesia. *Economic Journal of Emerging Market*, *7*(2), 120–134. https://doi.org/10.5220/0008439002500257

Jensem, M. C., & Meckling, W. H. (1976). Theory of The Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, 305–360. https://doi.org/10.1177/0018726718812602

Kassim, S. (2016). Islamic finance and economic growth: The Malaysian experience. *Global Finance Journal*, *30*, 66–76. https://doi.org/10.1016/j.gfj.2015.11.007

Khan, M. M. (2019). *Islamic Banking and Finance : Shariah Governance in Theory and Practice*. *11*(2), 1–17. https://doi.org/10.5296/jmr.v11i2.14141

Korkmaz, S. (2015). Impact of Bank Credits on Economic Growth and Inflation. *Journal of Applied Finance & Banking*, *5*(1), 57–69.

Majdina, N., Munandar, J. M., & Effendi, J. (2019). The determinant factors of efficiency on Islamic banking and conventional banking in Indonesia. *Jurnal Keuangan Dan Perbankan*, *23*(3), 454–468.

Mankiw, N.G. (2018). *Pengantar ekonomi makro* (7th ed.). (C. Sungkono, Trans.). Jakarta: Salemba Empat.

Marjanović, I., Stanković, J. J., & Popović, Ž. (2018). Efficiency Estimation of Commercial Banks Based on Financial Performance: Input Oriented DEA CRS/VRS Models. *Economic Themes*, *56*(2), 239–252.

Maulidiyah, H., & Laila, N. (2016). Membandingkan Efisiensi Bank Syariah di Indonesia dan Malaysia Dengan Metode Data Envelopment Analysis (DEA). *Jurnal Ekonomi Syariah Teori & Terapan*, *3*(4), 333–345.

Mohd Noor, N. H. H., Bakri, M. H., Wan Yusof, W. Y. R., Mohd Noor, N. R. A., & Zainal, N. (2020). The Impact of the Bank Regulation and Supervision on the Efficiency of Islamic Banks. *Journal of Asian Finance, Economics and Business*, *7*(11), 747–757. https://doi.org/10.13106/jafeb.2020.vol7.no11.747

Soemitra, A. (2018). *Bank dan lembaga keuangan syariah*. Jakarta: Kencana.

Surat Edaran Otoritas Jasa Keuangan Nomor 10/SEOJK.03/2014. *Penilaian Tingkat Kesehatan Bank Umum Syariah dan Unit Usaha Syariah*. 11 Juni 2014. Berita Negara Republik Indonesia Tahun 2014 Nomor 51. Jakarta.

Othman, N., Abdul-Majid, M., & Abdul-Rahman, A. (2017). Partnership financing and bank efficiency. *Pacific Basin Finance Journal*, *46*, 1–13. https://doi.org/10.1016/j.pacfin.2017.08.002

Otoritas Jasa Keuangan. (2021). *Statistik perbankan syariah*. Jakarta: Departemen Perizinan dan Informasi Perbankan Deputi Direktur Publikasi dan Administrasi.

Pravasanti, Y. A. (2018). Pengaruh NPF dan FDR Terhadap CAR dan Dampaknya Terhadap ROA Pada Perbankan Syariah Di Indonesia. *Jurnal Ilmiah Ekonomi Islam*, *4*(03), 148. https://doi.org/10.29040/jiei.v4i03.302

Purwono, R., & Yasin, M. Z. (2018). the Convergence Test of Indonesia Banking Inefficiency: Do Macroeconomic Indicators Matter? *Buletin Ekonomi Moneter Dan Perbankan*, *21*(1), 123–137. https://doi.org/10.21098/bemp.v21i1.946

Rahmawati, A. K., Sari, S. R. K., & Hermawan, H. (2019). Analisis Perbandingan Efisiensi Bank Umum Konvensional dan Bank Umum Syariah di Indonesia. *Akuntabilitas*, *12*(2), 191–200. https://doi.org/10.15408/akt.v12i2.12600

Rahmawaty, R., & Yudina, T. A. (2015). Pengaruh Return On Asset (ROA) dan Financing To Deposit Ratio (FDR) terhadap Tingkat Bagi Hasil Deposito Mudharabah pada Bank Umum Syariah. *Jurnal Dinamika Akuntansi Dan Bisnis*, *2*(1), 92–103. https://doi.org/10.24815/jdab.v2i1.3623

Ramly, A. R., & Hakin, A. (2016). Comparison of Efficiency and Modelling of Islamic Banks and Conventional Banks in Indonesia. *Global Review of Islamic Economics and Business*, *4*(2), 102–114.

Rusydiana, A. S. (2018). Efisiensi Dan Stabilitas Bank Umum Syariah Di Indonesia. *Akuntabilitas*, *11*(2), 203–222. https://doi.org/10.15408/akt.v11i2.7033

Sari, P. Z., & Saraswati, E. (2017). The Determinant of Banking Efficiency in Indonesia (DEA Approach). *Journal of Accounting and Business Education*, *1*(2), 208. https://doi.org/10.26675/jabe.v1i2.8489

Simatupang, A., & Franzlay, D. (2016). Capital Adequacy Ratio(CAR), Non Performing Financing (NPF), Efisiensi Operasional (BOPO) dan Financing to Deposit Ratio (FDR) Terhadap Profitabilitas Bank Umum Syariah di Indonesia. *Administrasi Kantor*, *4*(2), 466–485.

Solihin, S., Achsani, N. A., & Saptono, I. T. (2016). The Islamic Banking and the Economic Integration in ASEAN. *Buletin Ekonomi Moneter Dan Perbankan*, *19*(1), 81–106. https://doi.org/10.21098/bemp.v19i1.601

Sriyana, J. (2014). *Metode Regresi Data Panel (Dilengkapi Analisis Kinerja Bank Syariah di Indonesia)* (1). Yogyakarta: Ekonesia.

Sugiyono. (2015). *Metode Penelitian Pendidikan.* Bandung: Alfabeta.

Undang-Undang Republik Indonesia Nomor 21 Tahun 2008. *Perbankan Syariah*. 16 Juli 2008. Lembaran Negara Republik Indonesia Tahun 2008 Nomor 94. Jakarta

Widarjono, A. (2018). *Ekonometrikan Pengantar dan Aplikasinya Diserati Panduan Eviews* (5). Yogyakarta: UPP STIM YKPN.

Widarjono, A., Mifrahi, M. N., & Perdana, A. R. A. (2020). Determinants of Indonesian Islamic Rural Banks' Profitability: Collusive or Non-Collusive Behavior?*. *Journal of Asian Finance, Economics and Business*, *7*(11), 657–668.

Widiarti, A. W., Siregar, H., & Andati, T. (2015). The Determinants of Bank's Efficiency in Indonesia. *Buletin Ekonomi Moneter Dan Perbankan*, *18*(2).

Zarrouk, H., Ben Jedidia, K., & Moualhi, M. (2016). Is Islamic Bank Profitability Driven by Same Forces As Conventional Banks? *International Journal of Islamic and Middle Eastern Finance and Management*, *9*(1), 46–66.

APPENDICES

Appendix 1

Full-fledged Islamic Banks List

No	Name	
1	Bank Aceh Syariah	
2	Bank Negara Indonesia Syariah	
3	Bank Rakyat Indonesia Syariah	
4	Bank Syariah Bukopin	
5	Bank BJB Syariah	
6	Bank Mandiri Syariah	
7	Bank Mega Syariah	
8	Bank Muamalat	
9	Bank NTB Syariah	
10	Bank Panin Dubai Syariah	
11	Bank Victoria Syariah	
12	Bank Central Asia Syariah	
13	Bank Tabungan Pensiunan Nasional Syariah	
14	Maybank Syariah	

Appendix 2

Input and Output Variable

Name	Labor cost {I}	Deposits {I}	Financing {O}	Operational income {O}
BAS2015	546,135,380,762	15,380,319,693,743	11,592,767,835,420	515,060,745,957
BAS2016	408,231,697,450	16,996,137,292,823	11,796,139,611,400	388,526,372,891
BAS2017	608,882,232,870	18,661,815,249,822	12,667,746,595,080	491,423,601,934
BAS2018	592,809,311,090	18,415,375,604,884	13,096,642,053,023	528,467,067,342
BAS2019	632,744,089,703	20,947,917,873,813	14,177,052,500,469	543,452,539,021
BNI2015	669,585,000,000	19,825,239,000,000	17,136,313,000,000	287,599,000,000
BNI2016	750,910,000,000	24,753,299,000,000	19,816,886,000,000	367,661,000,000
BNI2017	707,690,000,000	29,920,996,000,000	23,644,117,000,000	422,913,000,000
BNI2018	937,794,000,000	38,224,332,000,000	27,236,279,000,000	567,781,000,000
BNI2019	1,061,323,000,000	44,137,111,000,000	31,299,969,000,000	842,481,000,000
BRI2015	509,098,000,000	21,014,510,000,000	16,244,038,000,000	158,979,000,000
BRI2016	538,227,000,000	22,991,786,000,000	17,256,787,000,000	239,232,000,000
BRI2017	522,067,000,000	26,373,417,000,000	17,274,399,000,000	139,494,000,000
BRI2018	510,828,000,000	29,683,515,000,000	19,620,703,000,000	157,473,000,000
BRI2019	583,292,000,000	34,153,001,000,000	25,039,894,000,000	118,378,000,000
BUKOPIN2015	73,144,943,291	5,005,598,329,075	4,237,585,412,459	44,704,532,304
BUKOPIN2016	91,293,862,388	6,018,095,735,836	4,702,203,106,031	52,959,798,389
BUKOPIN2017	100,073,030,921	6,088,258,230,909	4,304,255,527,344	4,941,481,876
BUKOPIN2018	80,902,521,553	5,248,347,231,720	4,086,924,745,611	2,984,692,583
BUKOPIN2019	71,977,784,348	5,120,155,606,032	4,520,214,885,368	2,099,379,461
BJB2015	134,460,027,000	5,681,362,318,000	4,783,120,783,000	16,913,103,000
BJB2016	161,005,131,000	6,451,648,632,000	4,650,935,666,000	(547,031,413,000)
BJB2017	188,209,274,000	6,570,386,294,000	4,360,981,153,000	(427,940,707,000)
BJB2018	177,048,252,000	5,422,854,301,000	4,502,885,319,000	35,457,525,000

BJB2019	164,396,048,000	6,119,032,181,000	5,198,956,859,000	40,665,525,000
MANDIRI2015	1,370,214,646,997	62,691,966,033,931	48,486,705,626,459	369,915,228,906
MANDIRI2016	1,485,174,807,624	70,697,396,469,955	52,837,460,058,288	442,987,340,488
MANDIRI2017	1,599,262,000,000	78,417,816,000,000	57,977,439,000,000	470,206,000,000
MANDIRI2018	1,805,975,000,000	87,983,699,000,000	64,901,059,000,000	839,990,000,000
MANDIRI2019	2,084,091,000,000	100,322,891,000,000	73,207,485,000,000	1,809,264,000,000
MEG2015	265,509,022,000	4,354,545,853,000	4,099,425,607,000	6,760,373,000
MEG2016	160,896,637,000	4,476,340,839,000	4,670,113,689,000	137,774,727,000
MEG2017	144,873,542,000	5,103,099,894,000	4,618,164,921,000	91,042,958,000
MEG2018	147,619,489,000	5,723,208,035,000	5,149,866,613,000	50,512,750,000
MEG2019	154,841,148,000	6,578,208,091,000	6,042,247,886,000	57,925,200,000
MUA2015	924,521,476,000	50,372,869,934,000	38,825,318,016,000	167,132,794,000
MUA2016	880,811,834,000	53,717,805,903,000	38,370,896,244,000	85,766,468,000
MUA2017	802,492,698,000	52,387,640,199,000	39,964,560,634,000	43,491,969,000
MUA2018	845,632,021,000	48,129,074,198,000	32,360,823,446,000	68,869,922,000
MUA2019	770,738,563,000	42,369,648,795,000	29,147,735,932,000	19,508,636,000
NTB2015	148,879,153,847	4,854,128,508,936	4,556,235,278,877	292,655,441,878
NTB2016	163,150,191,300	6,150,188,663,805	5,039,542,599,466	301,136,425,594
NTB2017	140,945,085,931	7,252,701,217,601	5,321,170,003,550	223,450,589,574
NTB2018	29,672,521,131	5,442,955,950,326	4,806,608,298,301	53,908,407,813
NTB2019	140,778,274,900	6,908,611,062,436	5,530,412,061,155	224,376,543,065
PANIN2015	76,656,350,000	5,939,057,437,000	5,620,679,669,000	77,926,610,000
PANIN2016	92,253,397,000	6,695,262,990,000	133,051,421,000	27,495,027,000
PANIN2017	131,487,855,000	7,850,360,942,000	5,983,221,832,000	(962,121,876,000)
PANIN2018	101,872,152,000	6,386,337,576,000	5,881,921,500,000	4,082,879,000
PANIN2019	94,411,525,000	8,992,826,679,000	148,007,244,000	18,550,506,000
VICTORIA2015	26,233,362,090	1,201,057,146,657	1,012,520,443,706	(32,532,740,961)

VICTORIA2016	27,161,821,136	2,612,611,700,720	1,167,112,708,707	(38,619,411,020)
VICTORIA2017	29,903,114,028	1,680,743,479,838	1,241,834,836,721	6,255,267,632
VICTORIA2018	30,695,088,533	1,816,141,285,048	1,215,735,316,339	6,217,851,235
VICTORIA2019	29,160,838,463	1,893,985,000,877	1,207,309,673,126	347,695,840
BCA2015	65,056,163,952	3,255,714,910,645	2,759,192,119,714	31,813,576,569
BCA2016	80,702,641,655	3,845,665,209,327	3,126,253,860,459	48,455,075,366
BCA2017	88,267,780,815	4,738,910,404,582	3,589,554,108,153	61,896,068,467
BCA2018	92,148,860,031	5,698,826,351,563	4,307,057,078,464	81,173,396,971
BCA2019	100,182,148,789	6,210,799,636,435	4,988,060,631,161	85,437,303,706
BTPN2015	621,813,000,000	3,809,967,000,000	3,657,777,000,000	250,084,000,000
BTPN2016	771,058,000,000	5,387,564,000,000	4,940,873,000,000	554,829,000,000
BTPN2017	833,539,000,000	6,545,879,000,000	5,970,728,000,000	908,261,000,000
BTPN2018	899,148,000,000	7,612,114,000,000	7,143,353,000,000	1,302,549,000,000
BTPN2019	1,099,025,000,000	9,446,549,000,000	8,797,056,000,000	1,881,064,000,000
MAY2015	2,330,531,000,000	118,384,898,000,000	110,489,907,000,000	1,457,717,000,000
MAY2016	2,038,504,000,000	121,722,559,000,000	113,735,765,000,000	2,585,183,000,000
MAY2017	2,386,679,000,000	125,152,933,000,000	123,298,102,000,000	2,504,221,000,000
MAY2018	2,460,991,000,000	121,030,310,000,000	131,071,704,000,000	3,032,936,000,000
MAY2019	2,570,918,000,000	113,735,065,000,000	120,018,768,000,000	2,576,866,000,000

Regression Data

Name	Year	Efficiency	ROA	CAR	NPF	GDP	Inflation
BANKACEH	2015	65.27%	2.83%	19.44%	0.81%	4.88%	3.35%
BANKACEH	2016	62.95%	2.48%	20.74%	0.07%	5.03%	3.02%
BANKACEH	2017	58.01%	2.51%	21.50%	0.04%	5.07%	3.61%
BANKACEH	2018	61.87%	2.38%	19.67%	0.04%	5.17%	3.13%
BANKACEH	2019	59.26%	2.33%	18.90%	0.04%	5.02%	2.72%
BNI	2015	60.10%	1.43%	15.48%	1.46%	4.88%	3.35%
BNI	2016	57.94%	1.44%	14.92%	1.64%	5.03%	3.02%
BNI	2017	60.29%	1.31%	20.14%	1.50%	5.07%	3.61%
BNI	2018	55.87%	1.42%	19.31%	1.52%	5.17%	3.13%
BNI	2019	60.12%	1.82%	18.88%	1.44%	5.02%	2.72%
BRI	2015	53.62%	0.76%	13.94%	3.89%	4.88%	3.35%
BRI	2016	54.39%	0.95%	20.63%	3.19%	5.03%	3.02%
BRI	2017	47.30%	0.51%	20.29%	4.72%	5.07%	3.61%
BRI	2018	49.28%	0.43%	29.72%	4.97%	5.17%	3.13%
BRI	2019	54.76%	0.31%	25.26%	3.38%	5.02%	2.72%
BUKOPIN	2015	65.81%	0.79%	16.31%	2.74%	4.88%	3.35%
BUKOPIN	2016	60.20%	0.76%	17.00%	2.72%	5.03%	3.02%
BUKOPIN	2017	53.30%	0.02%	19.20%	4.18%	5.07%	3.61%
BUKOPIN	2018	59.68%	0.02%	19.31%	3.65%	5.17%	3.13%
BUKOPIN	2019	69.37%	0.04%	15.25%	4.05%	5.02%	2.72%
BJB	2015	58.65%	0.25%	22.53%	4.93%	4.88%	3.35%
BJB	2016	49.73%	-8.09%	18.25%	4.92%	5.03%	3.02%
BJB	2017	44.73%	-5.69%	16.25%	2.85%	5.07%	3.61%
BJB	2018	54.86%	0.54%	16.43%	1.96%	5.17%	3.13%
BJB	2019	57.87%	0.60%	14.95%	1.50%	5.02%	2.72%
MANDIRI	2015	54.71%	0.56%	12.85%	4.05%	4.88%	3.35%
MANDIRI	2016	53.30%	0.59%	14.01%	3.13%	5.03%	3.02%
MANDIRI	2017	53.05%	0.59%	15.89%	2.71%	5.07%	3.61%
MANDIRI	2018	54.33%	0.88%	16.26%	1.56%	5.17%	3.13%
MANDIRI	2019	63.39%	1.69%	16.15%	1.00%	5.02%	2.72%
MEGA	2015	58.07%	0.30%	18.74%	3.16%	4.88%	3.35%
MEGA	2016	80.09%	2.63%	23.53%	2.81%	5.03%	3.02%
MEGA	2017	67.36%	1.56%	22.19%	2.75%	5.07%	3.61%
MEGA	2018	61.72%	0.93%	20.54%	1.96%	5.17%	3.13%
MEGA	2019	64.05%	0.89%	19.96%	1.49%	5.02%	2.72%

MUAMALAT	2015	56.60%	0.20%	12.36%	4.20%	4.88%	3.35%
MUAMALAT	2016	53.89%	0.22%	12.74%	1.40%	5.03%	3.02%
MUAMALAT	2017	58.56%	0.11%	13.62%	2.75%	5.07%	3.61%
MUAMALAT	2018	49.88%	0.08%	12.34%	2.58%	5.17%	3.13%
MUAMALAT	2019	50.62%	0.05%	12.42%	4.30%	5.02%	2.72%
BANKNTB	2015	114.82%	4.37%	27.59%	0.47%	4.88%	3.35%
BANKNTB	2016	90.89%	3.95%	31.17%	0.41%	5.03%	3.02%
BANKNTB	2017	80.81%	2.45%	30.87%	0.25%	5.07%	3.61%
BANKNTB	2018	157.12%	1.92%	35.42%	0.57%	5.17%	3.13%
BANKNTB	2019	84.79%	2.56%	35.47%	0.61%	5.02%	2.72%
PANINDUBAI	2015	80.91%	1.14%	20.30%	1.94%	4.88%	3.35%
PANINDUBAI	2016	10.99%	0.37%	18.17%	1.86%	5.03%	3.02%
PANINDUBAI	2017	57.20%	-10.77%	11.51%	4.83%	5.07%	3.61%
PANINDUBAI	2018	69.97%	0.26%	23.15%	3.84%	5.17%	3.13%
PANINDUBAI	2019	6.71%	0.25%	14.46%	2.80%	5.02%	2.72%
VICTORIA	2015	75.16%	-2.36%	16.14%	4.82%	4.88%	3.35%
VICTORIA	2016	60.96%	-2.19%	15.98%	4.35%	5.03%	3.02%
VICTORIA	2017	73.10%	0.36%	16.14%	4.82%	5.07%	3.61%
VICTORIA	2018	68.09%	0.32%	22.07%	3.46%	5.17%	3.13%
VICTORIA	2019	68.30%	0.05%	19.44%	2.64%	5.02%	2.72%
BCA	2015	78.94%	1.00%	34.30%	0.52%	4.88%	3.35%
BCA	2016	73.90%	1.10%	36.70%	0.21%	5.03%	3.02%
BCA	2017	73.15%	1.20%	29.40%	0.04%	5.07%	3.61%
BCA	2018	78.77%	1.20%	24.30%	0.28%	5.17%	3.13%
BCA	2019	83.82%	1.20%	38.30%	0.26%	5.02%	2.72%
BTPN	2015	58.97%	5.24%	19.96%	0.17%	4.88%	3.35%
BTPN	2016	67.48%	8.98%	23.80%	0.20%	5.03%	3.02%
BTPN	2017	79.19%	11.20%	28.90%	0.10%	5.07%	3.61%
BTPN	2018	91.88%	12.40%	40.90%	0.02%	5.17%	3.13%
BTPN	2019	117.26%	13.60%	44.60%	0.26%	5.02%	2.72%
MAYBANK	2015	87.60%	1.01%	15.17%	2.42%	4.88%	3.35%
MAYBANK	2016	95.52%	1.60%	16.77%	2.28%	5.03%	3.02%
MAYBANK	2017	93.98%	1.48%	17.53%	1.72%	5.07%	3.61%
MAYBANK	2018	106.29%	1.74%	19.04%	1.50%	5.17%	3.13%
MAYBANK	2019	92.55%	1.45%	21.38%	1.92%	5.02%	2.72%

Appendix 4

Common Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.696726	1.213005	0.574380	0.5677
X1	0.457530	0.862193	0.530659	0.5975
X2	1.437140	0.374996	3.832417	0.0003
X3	-1.408022	1.802987	-0.780939	0.4377
X4	-9.418652	23.46799	-0.401340	0.6895
X5	5.414123	7.263432	0.745395	0.4588

R-squared	0.347335	Mean dependent var	0.670567
Adjusted R-squared	0.296345	S.D. dependent var	0.214977
S.E. of regression	0.180332	Akaike info criterion	-0.506221
Sum squared resid	2.081250	Schwarz criterion	-0.313493
Log likelihood	23.71773	Hannan-Quinn criter.	-0.429667
F-statistic	6.811891	Durbin-Watson stat	1.524022
Prob(F-statistic)	0.000038		

Appendix 5

Fixed Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.578173	0.975225	0.592861	0.5559
X1	0.120654	1.155826	0.104388	0.9173
X2	1.457977	0.539095	2.704489	0.0093
X3	0.518339	2.653937	0.195309	0.8459
X4	-6.799601	19.47180	-0.349203	0.7284
X5	3.676022	5.984014	0.614307	0.5417

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.688356	Mean dependent var	0.670567
Adjusted R-squared	0.578364	S.D. dependent var	0.214977
S.E. of regression	0.139592	Akaike info criterion	-0.873996
Sum squared resid	0.993784	Schwarz criterion	-0.263690
Log likelihood	49.58986	Hannan-Quinn criter.	-0.631575
F-statistic	6.258245	Durbin-Watson stat	3.034531
Prob(F-statistic)	0.000000		

Appendix 6

Random Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.664023	0.954693	0.695536	0.4892
X1	0.224659	0.984348	0.228231	0.8202
X2	1.527176	0.426511	3.580624	0.0007
X3	-0.498568	2.061204	-0.241882	0.8096
X4	-9.034357	18.69197	-0.483328	0.6305
X5	4.712993	5.760171	0.818204	0.4163

Effects Specification		
	S.D.	Rho
Cross-section random	0.131332	0.4695
Idiosyncratic random	0.139592	0.5305

Weighted Statistics			
R-squared	0.231076	Mean dependent var	0.287880
Adjusted R-squared	0.171004	S.D. dependent var	0.150516
S.E. of regression	0.137044	Sum squared resid	1.201983
F-statistic	3.846634	Durbin-Watson stat	2.569026
Prob(F-statistic)	0.004138		

Unweighted Statistics			
R-squared	0.341027	Mean dependent var	0.670567
Sum squared resid	2.101365	Durbin-Watson stat	1.469485

Appendix 7

Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	4.292894	(13,51)	0.0001
Cross-section Chi-square	51.744258	13	0.0000

Appendix 8

Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

* Cross-section test variance is invalid. Hausman statistic set to zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
X1	0.120654	0.224659	0.366993	0.8637
X2	1.457977	1.527176	0.108712	0.8338
X3	0.518339	-0.498568	2.794821	0.5430
X4	-6.799601	-9.034357	29.761026	0.6821
X5	3.676022	4.712993	2.628859	0.5225

Appendix 9

Lagrange Multiplier Test

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	21.42023	0.789357	22.20959
	(0.0000)	(0.3743)	(0.0000)
Honda	4.628200	-0.888458	2.644397
	(0.0000)	(0.8129)	(0.0041)
King-Wu	4.628200	-0.888458	1.468073
	(0.0000)	(0.8129)	(0.0710)
Standardized Honda	5.372897	0.059732	0.436813
	(0.0000)	(0.4762)	(0.3311)
Standardized King-Wu	5.372897	0.059732	-0.532031
	(0.0000)	(0.4762)	(0.7026)
Gourieroux, et al.*	--	--	21.42023
			(0.0000)

Appendix 10

Generalized Method of Moment

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Y(-1)	-1.085527	0.158408	-6.852709	0.0000
X1	2.398132	0.625639	3.833090	0.0005
X2	1.307839	0.653445	2.001450	0.0529
X3	0.615632	2.114061	0.291208	0.7726
X4	-21.91230	24.30701	-0.901480	0.3733
X5	-4.796301	3.609678	-1.328734	0.1923

Effects Specification

Cross-section fixed (first differences)

Mean dependent var	0.014438	S.D. dependent var	0.219520
S.E. of regression	0.171112	Sum squared resid	1.054059
J-statistic	4.457077	Instrument rank	11
Prob(J-statistic)	0.485647		

Appendix 11

Arallano-Bond Test

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-0.545093	-0.231647	0.424967	0.5857
AR(2)	-1.131654	-0.075344	0.066578	0.2578