



Yarmouk University

Faculty of Economics and Administration

Department of Banking and Finance

***Measuring Islamic Banks' Efficiency Using Data  
Envelopment Analysis (DEA) and Financial Ratio Analysis  
(FRA): The Case of Jordanian Islamic Banks During the  
Period 2005-2009***

"قياس كفاءة البنوك الإسلامية باستخدام "تحليل البيانات المغلفة" والنسب  
المالية: دراسة حالة البنوك الإسلامية في الأردن خلال الفترة 2005-2009"

**By:**

**Hamed Omar Omari**

**Supervisor:**

**Dr. Moh'd Ajlouni**

***Submitted in partial fulfillment of the requirements of the Master's degree in Banking and  
Finance at Yarmouk University***

**July 2011**

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**Approved By**

Dr. Moh'd M. Ajlouni .....Supervisor

Prof. Said Hallaq .....Member

Dr. Dima Alrabadi .....Member

July, 2011

**Dedication**

*To my parents*

*To all the family*

*To Elaf*

*And to all who helped me in achieving this study*

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*I would like to thank my supervisor, Dr. Mohammad Ajlouni, for guiding my study and introducing me to many interesting and important issues. I have really enjoyed working with him.*

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### **List of Abbreviations**

CA	Current asset
CAR	Current Asset Ratio
CCR	Charnes, Cooper and Rodes
CDR	Cash Deposit Ratio
CL	Current Liability
CR	Current Ratio
DEA	Data Envelopment Analysis
DER	Debt-Equity Ratio
DMU	Decision Making Units
DR	Debt Ratio
EM	Equity Multiplier
FRA	Financial Ratio Analysis
IIAB	Islamic International Arab Bank
I/O	Input-Output Ratio
JIBFI	Jordan Islamic Bank for Finance and Investment
JD	Jordanian Dinar
LDR	Loan-Deposit Ratio
PER	Price Expense Ratio
ROA	Return on Assets
ROE	Return on Equity



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## **Abstract**

### **Measuring Islamic Banks Efficiency Using Data Envelopment Analysis (DEA) and Financial Ratios Analysis (FRA): The Case of Jordanian Islamic Banks During the Period 2005 – 2009**

**By: Hamed O. Omari**

**Supervisor: Dr. Moh'd M. Ajlouni**

The purpose of this study is to measure the efficiency of Jordanian Islamic banks using Data Envelopment Analysis (DEA) and Financial Ratio Analysis (FRA) during the period 2005-2009, because there are studies before this period.

The importance of the study is to help the managers of Jordanian Islamic banks to achieve high performance and help the investors interested in Islamic banks transactions. The sample of the study consists of all Jordanian Islamic banks excluding only one Islamic bank due to unavailable financial statements, since it has been established recently.

The results of this study reveal that Jordanian Islamic banks are efficient in term of its inputs to produce actual outputs, by using DEA and FRA, during the study period. We recommend the Jordanian Islamic banks managers to increase the efficiency and improve inputs to produce actual outputs.

**Key words:** Efficiency, Islamic Banks, Jordanian Islamic Banks, Data Envelopment Analysis, DEA, Financial Ratio Analysis, FRA.

# *Chapter One*

## *Introduction*

## **Chapter One**

### **Introduction**

#### **1-1 Preface**

Islamic banking has started three decades ago in Jordan. The first was the Jordan Islamic Bank for Finance and Investment (JIBFI) which was established in 1978. Islamic banks do not pay any interest on deposits, and do not receive any interest on loans. They make equity investments in companies, share their venture's profits or losses. And then pass a Part of them to the depositors ([cbj.gov.jo](http://cbj.gov.jo)).

Currently, there are three Islamic banks in Jordan: Jordan Islamic Bank for Finance and Investment (JIBFI), 1978, Islamic international Arab Bank (IIAB), 1997 and Jordan Dubai Islamic Bank (JDIB), 2010 ([ase.com.jo](http://ase.com.jo)).

Measuring the relative efficiency of financial institutions has gained a lot of importance over years. Various approaches have been used to determine the efficiency. These approaches broadly fall under two types—nonparametric approaches, such as DEA and parametric approaches, such as FRA.

Since there have been limited studies in the case of Islamic banks efficiency in Jordan, the objective of this study is to measure and analyze

the Jordanian Islamic banks' efficiency by evaluating their performance during the period 2005-2009.

### **1-2 Objectives of the Study**

The main objective of this study is to measure the efficiency of Jordanian Islamic banks, and to compare between efficiency level in two performance techniques FRA and DEA.

### **1-3 Importance of the Study**

The importance of this study arises from the fact that it is very important for Jordanian Islamic banks to know how efficient they are because of the new challenges that they will be a part of. This study is important for managers because the ultimate responsibility of managers is to achieve high performance, which is the attainment of organizational goals by efficient use of resources. This study helps investors interested in Islamic banking transactions to make an informed decision when they come to deal with Islamic banks.

While most of previous studies adopted conventional tools to evaluate the efficiency of Islamic banks in Jordan, while this study adopts technical tools (FRA and DEA) to do so.

#### **1-4 Problem of the Study**

The problem of the study can be best described in terms of the following questions:

1. How efficient are the Islamic banks in term of DEA?
2. How efficient are Islamic banks in term of FRA?
3. Does the Islamic banks efficiency level varies by methodology used (DEA or FRA)?

#### **1-5 Methodology**

This study is based on two efficiency measures, first is a: non-parametric approach that uses Data Envelopment Analysis (DEA). It is utilized to analyze the technical and scale efficiencies of Islamic banking, by specifying input-output variables of Islamic banks. Furthermore, banks are bordered between zero and one scores; with completely efficient bank has an efficiency score of one. In DEA, the most efficient bank (with score of one) does not necessarily generate the maximum level of output from the given inputs. Rather, this bank generates the best practice level of output among other banks in the sample. The second measure of efficiency is a parametric approach that uses Financial Ratio Analysis (FRA). Financial ratios are popular for a number of reasons; they are easy to calculate and interpret and can evaluate efficiency from various perspectives including costs, revenues and profit (Johnes, Izzeldin and Pappas, 2009).

## **1-6 Study Hypotheses**

H1: Jordanian Islamic banks are efficient in term of its inputs to produce the actual output, by using FRA.

H1A: JIBFI is efficient in term of its inputs to produce the actual output, by using FRA.

H1B: IIAB is efficient in term of its inputs to produce the actual output, by using FRA.

H2: Jordanian Islamic banks are efficient in term of its inputs to produce the actual output, by using DEA.

H2A: JIBFI is efficient in term of its inputs to produce the actual output, by using DEA.

H2B: IIAB is efficient in term of its inputs to produce the actual output, by using DEA.

## **1-7 Structure of the Study**

The remainder of this study is organized as follows: Chapter two introduces a brief review of the related literatures. Chapter three presents basic study concepts, including concepts of Islamic banks, fund resources, financial services, the relationship with the Central bank and the relationship among Islamic banks. Chapter four presents an institutional background about banks included in the sample. Chapter five presents the data and the methodology used in the study which consists of two

techniques the FRA and the DEA. Chapter six presents the analysis and the empirical results, while the last chapter summarizes and concludes the main results.



# *Chapter Two*

## *Literature Review*

## **Chapter Two**

### **Literature Review**

#### **2-1 Introduction**

Over the past decade there has been a considerable growth in studies addressing efficiency and productivity in the banking sector. But a few of these studies have linked between the DEA and financial ratios. This study will try to measure the efficiency of Islamic banks in Jordan using both financial ratios and DEA approach. This chapter reviews previous studies that are related to this study. It is sub divided into two segments: the first segment reviews the international literature while the second one reviews the Arabic studies.

#### **2-2 International Studies**

**Kamaruddin, Safa and Mohd (2008)** present new perspectives on performance evaluation of Islamic banking operations in Malaysia (1998-2004). They investigate, for the first time, both cost and profit efficiency of full-fledged Islamic banks and Islamic window operations of domestic and foreign banks. The application of (DEA) technique has provided several efficiency measures such as allocative, pure technical and scale efficiency that explain cost and profit efficiency differentials among banks. The findings of the study show that Islamic banking operators are relatively more efficient at controlling costs than at generating profits. The main

contributor for cost efficiency of domestic and foreign banks comes from resource management and economies of scale, respectively. These findings have implications on the reform process carried out in the aftermath of Asian financial crisis, particularly the Financial Sector Master Plan (FSMP).

**Despic, Despic and Paradi (2007)** propose a new mathematical model for efficiency analysis, which combines DEA methodology with an old idea—Ratio Analysis. Their model, called DEA-R, treats all possible ratios “output/input” as outputs within the standard DEA model. Although DEA and DEA-R generate different summary measures for efficiency, the two measures are comparable. The mathematical and empirical comparisons establish the validity of DEA-R model in its own right. The key advantage of DEA-R over DEA is that it allows effective integration of the model with experts’ opinions via flexible restrictive conditions on individual “output/input” pairs.

**Viverita, Brown and Skully (2007)** examine the efficiency change or improvement of Islamic banks over 1998 – 2002 on country and regional basis (Africa, Asia and the Middle East) using Malmquist DEA methodology. The resulting Malmquist Total Factor Productivity (TFP) index is then decomposed to consider changes in their productive and technical efficiency components. Indonesia and Yemen proved the most improved countries over the period, and Asia was the best region. In

contrast, the United Arab Emirates, as a country, and the Middle East, as a region, had the best use of inputs and outputs for efficiency change. For technical change efficiency, Indonesia and Yemen were the most improved countries and Asia was once again the best performing region. Finally, efficiency change and TFP change was negatively related to the banks' age. Therefore, policy-makers might look well to Islamic banks in the United Arab Emirates for their use of inputs and outputs, and to Indonesian or Yemeni banks for their use of technology. However, the study ignores Bahrain Islamic banks, which is considered a hub for Islamic banks.

**Howland and Rowse (2006)** use DEA to assess the efficiency of branches of a major Canadian bank ("Canbank"). First, a DEA model of American branch bank efficiency is utilized to build a model with Canbank data, then the model outcomes are compared to the outcomes of the US study and the differences explained. Subsequently, the model is revised to represent the particular circumstances of Canbank's western, urban branches. Differences in outcomes between the revised model and the initial model are identified, and then an analysis with the revised model is conducted. Observations on implementing DEA in a work environment are also provided.

DEA models should include as many branches as possible. Comparing branches from different regions and divisions of the company should help to break down organizational barriers and encourage the spreading of best

practices. Restricting the number of branches could result in branches appearing efficient in the restricted model that are not efficient in the full model.

Finally, if some branch managers are given large efficiency improvement challenges, dysfunctional behavior may result the branches are not also supported with appropriate policy changes by bank management.

**Kazaj and Sadeqi (2003)** examine the ability of Islamic banks in financing monetary. Some people believe that, Islamic Banking cannot satisfy the requirements of monetary sections of economy, while others are talking on the success of Islamic banking. It is important to note that, the comparison of these methods of banking system should be done at the same conditions. To do this comparison, efficient Islamic banks must be found, and then compared with commercial banks. This is because that the experience of conventional banking system is more than Islamic ones. Therefore the introduction of efficient Islamic banks is necessary. To this reason, the research introduced efficient Islamic banks throughout the world in years 2000-2001. The methodology of the study based on using DEA that is an instrument to achieve the efficiency of Decision Making Units (DMU). Their study identified (41-46) efficient Islamic banks in (2000-2001) around the world. The study covered a short analysis period, and also used one analytical model.

**Yudistira (2003)** provides new evidence on the performance of 18 Islamic banks over the period 1997-2000. It is based on a non-parametric approach to measure efficiency. DEA is utilized to analyze the technical and scale efficiencies of Islamic banking. In specifying input-output variables of Islamic banks, the intermediation approach is selected as it is in line with the principle of Islamic financial system. Overall, the results suggest that Islamic banks have suffered slight from inefficiencies during the global crisis 1998-1999. Efficiency differences across the sample data appear to be mainly determined by country specific factors.

**Samad and Hassan (2000)** evaluate the intertemporal and interbank performance of the Bank Islam Malaysia Berhad (BIMB) in terms of profitability, liquidity, risk and solvency and community involvement for the period 1984-1997. They applied the financial ratio analysis in measuring the performance, and used ANOVA T-test and F-test to determine the significance. The study found that BIMB is relatively more liquid and less risky compared to a group of 8 commercial banks. Their analysis of the primary data identified reasons why the supply of loans under profit sharing and joint venture profit sharing is not popular in Malaysia. 40% to 70% of bankers were surveyed and indicated that lack of knowledgeable bankers in selecting, evaluating and managing profitable project is a significant cause. They find that, the examination of various performance

measures and the inter-temporal comparison of BIMB's performance reveal that Islamic bank made (statistically) significant progress on return on assets (ROA) and return on equity (ROE) during 1984-1997. The average ROA, profit expense ratio (PER) and ROE during this period were 0.43, 21.5 and 8.07, respectively. The comparison of BIMB with a group of conventional bank on ROA and ROE does not show (statistically significant) any differences in performance. However, the interbank comparison of liquidity performance suggests that Islamic bank appears to be significantly more liquid compared to a group of 8 commercial banks at least in cash-deposit measure. Also, they found that BIMB risk increased and is statistically significant in debt-equity (DER) and equity multiplier (EM). However, the comparison indicated that Islamic bank is still less risky and more solvent measured by DER, Debt Ratio, EM and Loan-Deposit Ratio LDR. The difference in risk measured in debt-equity is statistically significant. Although the means of other measures such as EM and LDR of the Islamic bank are lower compared to the conventional banks, they are not statistically significant. This study compared between Islamic banks and commercial banks in an easily and understandable manner by using the FRA, but it ignored other analytical methods.

## **2-3 Arabic Studies**

**Al-Maghaireh (2005)** examines the performance of Islamic banks in terms of profitability, liquidity, risk and solvency and efficiency in United Arab Emirates (UAE) over the period 2000-2004. Financial ratios are applied in measuring these performances. The study found that the UAE Islamic banks are relatively more profitability, less liquid, less risky, and more efficient compared to the UAE commercial banks. Data used in the study are a bank-level data, compiled from income statements and balance sheets of 3 Islamic banks and 5 non-Islamic banks during the period 2000-2004. In order to see how Islamic banks performed in comparison with the conventional banks over 5 years, the study uses 11 financial ratios for bank's performance. These ratios are grouped under four broad categories, profitability, liquidity, risk and solvency, and efficiency. The results showed that Islamic banks in the UAE are different from conventional banks from the perspective of the financial performance. The alleged benefits of Islamic banking do not exist in theory only. There are two important implications associated with this finding: First, the key reason for the rapid growth in Islamic banking in the UAE during the past decade is likely to be associated with the attributes of the Islamic profit -and-loss sharing banking paradigm. Second, the UAE Islamic banks in practice are different from the UAE conventional banks, and, as such, should be



regulated and supervised in a different fashion. However, the study applied FRA and ignored other analysis models in measuring performance.

**Abdel-Hameed and Bashir (2001)** examined the determinants of Islamic banks' performance across eight Middle Eastern countries between 1993 and 1998. A variety of internal and external banking characteristics were used to predict profitability and efficiency. Data used in the study are cross-country bank-level data. It consists from income statements and balance sheets of 14 Islamic banks in eight countries over the period (1993-1998). The model introduced a set of variables that are expected to affect the performance of Islamic banks. Capital ratios, leverage, overhead, loan and liquidity ratios, and foreign ownership are used as proxies for internal performance while controlling for macroeconomic environment, financial market structure, and taxation. The results indicated that high leverage and large loans to asset ratios lead to higher profitability. The results also indicated that foreign-owned banks are more profitable than their domestic counterparts. The results allowed shedding some light on the relationship between banking characteristics and performance measures in Islamic banks. First, the Islamic banks' profitability measures respond positively to the increases in capital and loan ratios. Second, the results also indicate the importance of customer and short-term funding, non-interest earning assets, and overhead in promoting banks' profits. Third, the results suggest that the tax factors are much more important in

the determination of bank performance. The negative effect of the reserve tax indicates the opportunity cost of holding reserves. However, it should be acknowledged that the scope of the study is limited as several Islamic banks are not included. The size of the sample is small and there are many missing observations. Thus, the results should be interpreted cautiously. The study interested with the efficiency rather than performance, also it has some weaknesses such as using one analysis model.

#### **2-4 Summary of the Literature and Significance of this study**

Most previous studies investigated the performance of Islamic banks in comparison with the commercial banks. But all these studies focused on one analytical method either FRA or DEA. Therefore, this study investigates the performance of Jordanian Islamic banks and it applied DEA technique in addition to FRA in measuring efficiency. Also this study is among the pioneering studies that investigate the efficiency of Islamic banks in Jordan.

# *Chapter Three*

## *Theoretical*

## *Framework*

## **Chapter Three**

### **Theoretical Framework**

#### **3-1 Introduction**

In the current time, there is no doubt that banks have become one of necessities for economic life. They collect and attract funds from people and meet investors' need in financing their economic projects. This is the main and basic function of banks. However, there are other functions of the banks as complimentary role in facilitating economic life affairs.

It has been agreed that some activities practiced by commercial banks nowadays are prohibited in the Islamic principle (not Halal). This led to the establishment of Islamic banks, which operate according to Islamic Sharia' instead of Ribawaya banks. This chapter will introduce the concepts of Islamic banking as well as outlining its main sources and uses of funds.

#### **3-2 Concept of Islamic Banks**

An Islamic bank is defined as a financial intermediary that carries out financial businesses and financial services, attracts financial resources and employs them effectively to boost them and to achieve the maximum outcome from their employment. Furthermore, it aims to achieve the objectives of economic and social development under the frame of the Islamic law (Al-Shammari, 2011, p.178).

An Islamic bank is a financial and banking organization that collects, and uses money to build up complementary Islamic society and sets up justice distribution of money in economy. This organization does it is financial work while avoiding dealing with Riba or interest because it's prohibited in Islam, and avoiding any work breaking Sharia' principles (Obada, 2008, p.25).

Islamic banking refers to a system of banking or banking activity that is consistent with the principles of Islamic law (*Sharia*) and its practical application through the development of Islamic economics. Sharia prohibits the payment of fees for the renting of money (*Riba*) for specific terms, as well as investing in businesses that provide goods or services considered contrary to its principles (*Haraam*). Although these principles were used as the basis for a flourishing economy in earlier times, Islamic banks were formed in the second half of the 20th century in order to apply these principles to private or semi-private commercial institutions within the Muslim community (Shebeer, 1996, p.28).

The definition makes it clear than an Islamic bank includes many elements, the most prominent of which are:

- A) Islamic bank is a financial intermediary, like traditional banks.
- b) Islamic bank provides financial services, current accounts, and investment deposits in accordance with Islamic Sharia'.

- c) What distinguishes Islamic bank from others is the Islamic dimension in collecting and using the resources.
- d) The Islamic bank aims to develop justice and social solidarity (Obada, 2008, p.27).

### **3-3 Resources of Islamic Bank Funds**

Banks are financing intermediaries. They are all financial organizations offering financial services. The financial aspect of them is considered as the utmost resource for their facility and management, carrying out their works and services (Ajlouni, 2010, p.110). They collect deposits and attract savings as the main resource of bank money in addition to bank equity capital.

The resources of funds of the Islamic bank can be divided in two main parts: the first is self-resources (internal): including the paid in capital of bank, reserves, and retained earnings. The second is external resources which represent the large part of the bank resources including deposits of different types. Some external funds of Islamic banks are also Islamic investment bonds, account covering funds documents, financial guarantees, credit cards, insurance letters, charities, services and grants. The approval of Islamic bank regarding these deposits is represented as financial products which the bank provides to its customers. Therefore, it is part of

the financial products that are provided by the Islamic bank as well as by traditional banks, (Ajlouni, 2010, p.173).

Islamic banks share commercial banks in the following services and investments:

Services: some aspects are as follows:

A. The financial transfers from one destination to another.

B. Currency Exchange (Ali, 2010, p.88).

### **3-4 Financial Services of Islamic Bank**

#### **1- Deposits:**

Banks are considered the only organizations commonly and legally responsible for accepting deposits. These deposits are considered as more important and competitive among the banks to gain more funds.

The financial deposits are defined as savings of individuals and organizations in the bank; the latter is responsible for paying its value back or the equal upon request or according to approved conditions and terms.

The deposits are accepted in Islamic banks through the following accounts:

a- Current account

b- Saving account

c- Time deposits

**a- Current Accounts (Demand Deposits):**

This account gives its owner the right to withdraw the deposited money any time and upon his/her demand. In other words, money deposit in banking institution can be withdrawn at any period of time. The main difference in this account between the commercial banks and Islamic banks is that the commercial bank's clients receive an interest, but an Islamic bank' clients do not receive any interest (Al-Khaqani, 2011, p.213).

**b- Saving Accounts:**

Customers utilize these accounts for saving and/or investment. Customers authorize the bank to invest their money based on general *Modarabah*. Deposits are the amounts of money deposited in the bank for an unlimited or a limited period for investment. Bank works depend on unrestricted (*Mutlaqa*) *Modarabah*. The customer is the owner of the capital and the bank is the worker (*Modareb*). The profits of saving accounts are divided between capital owner (customer) and *Modareb* (bank) in accordance to an agreed percentage. If a loss occurs, the owner is responsible for the financial loss while the bank loses its effort in the investment.

The bank searches for the best fields of investment. The money provided by the customer coupled with the financial experience



provided by the bank aid in developing the national economy. This conforms exactly with Islamic guidance in terms of keeping up the capital of society and its good use (Al-Khaqani, 2011, p.215).

### **C-Time Deposits:**

Is a money deposit at a banking institution that cannot be withdrawn for a certain "term" or period of time. When the term is over it can be withdrawn or it can be held for another term. Generally speaking, the longer the term the better the yield on the money. Similarly in Islamic banks, money cannot be withdrawn until the end of the term. Money is invested in allowed (*Halal*) investments. The losses, if occurred, will be carried by the owners' accounts (Al-Khaqani, 2011, p.217).

### **2- Money Transfers:**

This operation indicates the shifting of money or accounts from one account to another, one bank to another and from one country to another. This is followed by the transforming of the national currency to foreign currency or transforming the foreign currency to another foreign currency (Al-Shammari, 2011, p.363).

### **3- Collecting Commercial Documents:**

Commercial documents are contracts representing an amount of money that shall be paid after a certain period of time. These are commonly approved as guarantee instruments.

The collecting of commercial documents means that the bank is the deputy of the customer in collecting money. The bank sends a letter to the customer before the due date, reminding him/her of the due date, the value of the debt and the serial number of the commercial document (Al-Shmmari, 2011, p.202).

#### **4- Selling and Buying Foreign Currencies:**

This process means selling and buying foreign currencies whether in fixed or float exchange rate. The Islamic banks are not different from other banks except in following the terms determined by Islamic scholars (Al-Shammari, 2011, p.363).

#### **5- Renting Safe Boxes:**

This is a contract in which the bank is responsible for safeguarding valuables in a rented box used by the customer only. The rental charges vary according to the safe size and the period of customer use (Ali, 2010, p.242).

#### **6- Guarantee Letters:**

These are written commitments in which the bank guarantees a certain amount to be paid to a third party on behalf of the customer. Instead of paying cash money by the customer as back-paid guarantee for his commitment, he/she present the guarantee letter for the required amount (Al-Shammari, 2011, p.385).

## **7- Letter of credit:**

When the customer wants to import goods from abroad he/she contact an exporter, consents upon selling costs, and sends primary invoice including the type and value of goods. Then, the importer orders the bank, fills an order of open loan, writes all his information, signs and encloses the primary invoice. The letter of credit has been opened in Islamic banks depending on *Al-Morabaha* in which the bank buys this good on the demanded price , then the bank adopt the import procedure by dealing with the bank in the exporting country (Al-Shammari, 2011, p.367).

## **3-5 Islamic Bank Investment**

### **1- Modarabah (المضاربة)**

It is a dual contract between an owner of a capital and a worker, whether they are individuals or groups. The capital is paid by a person and the work is carried out by another. The first is called the owner of capital and the second called Modareb (Ali, 2010, p.109)

### **2- Morabaha (المrabحة)**

It is defined as selling something of original price in addition to increased information for the buyer which is represented as marginal return for seller, and one of the selling types of royalty. Some conditions and terms include identifying the product's characteristics, mentioning its

disadvantages, identifying the main price and cost of it and identifying the amount of returns. The selling of products must be intended for money (Ajlouni, 2010, p.237).

### **3- Mosharkah (المشاركة)**

It means that two or more banks share investment in the field of agricultural, commercial, industrial or services field. The distribution of returns between them happens according to a certain percentage of return, without requiring that equality shall be in money shares, but the loss directly depends on the percentage of capital shares (Al-Khaqani, 2011, p.228).

### **4- (Ejarah) Lease (الاجارة)**

Leasing allows the customer to own objects in return of a declared material compensation. That is the cost of utility or instead of use or utilization of one of the fixed assets for a limited rental period, after which the object is returned to the owner (Ajlouni, 2010, p.260).

#### **Types of Lease:**

- 1- Specified Ejarah: a car lease or apartment.
- 2- work Ejarah : persons shall be used to do certain works.
- 3- Ownership Ejarah: the bank rents something as car to a person for a limited period provided, that he/she owns it after the end of the period and paying all shares.

## **5- Sales on Credit (البيع بالتقسيط)**

The price of the product depends on whether the amount is to be paid immediately or in settlements. The price of the product is more when sold through settlements (Al-Khaqani, 2011, p.237).

## **6- (Al-Muzarah) Farming (المزارعة)**

It is a contract to plant agricultural products according to yielding conditions and terms. This is a company in farming, in which one party provides the land while the other does work on it for a certain period of time. The yield is then shared between the two parties according to a certain share previously agreed upon (Ali, 2010, p.111).

## **7- (Al-Musaka) Watering (المساقاه)**

Watering is a contract that depends on planting, farming, watering and gathering fruits of tree, with gaining a part of their fruits.

The contract of partnership between trees or plants' owner and farmer continues for a limited period and for a common part of yield (Ali, 2010, p.111).

## **8- (Al-Istisna'a) Manufacturing (الاستصناع)**

The selling of a good that is manufactured. Where the seller is the manufacturer who creates the good in accordance to a contract. The material for manufacturing is provided by the manufacturer in return of a certain amount (Ajlouni, 2010, p.283).

### **3-6 The relationship between an Islamic Bank and a Central Bank**

We can summarize the relationship between Islamic Bank and Central Bank in Capital System as follows (Ajlouni, 2010, p.145):

- 1- Central Bank should ask other Banks including Islamic Bank to deposit a limited percentage of its deposits in the form of cash. This is to maintain the financial position of banks and maintain the depositors' funds, in return of an interest paid by the central bank to other banks. This is called compulsory cash reserve.
- 2- The central Bank is the last resort for lending banks with interest when liquidity decreases. The Islamic Bank cannot deal with the Central Bank according to this article due to interest. Jordan Islamic Bank deposits a stable amount of money in the Central Bank with interest. The Central Bank lends Islamic Bank when necessary without interest as loan without interest.
- 3- Central Bank borrows from banks through it selling bonds with interest. The Islamic Bank should not deal with them because they are considered Riba'.
- 4- The Central Bank Offers encouragement discount to provide exports on interest which the Islamic Bank cannot benefit from.
- 5- The Islamic Bank determines the maximum of credit that banks offer in a limited period to decrease risks of bank money.

Here, there is no difference between commercial banks and Islamic ones.

- 6- Also, to save and protect depositors' money, the Central Bank determines the percentage of capital turnover percent of capital to all deposits now is determined with 12%.

### **3-7 The Relationship Among Islamic Banks**

Islamic Banks can cooperate with each other in many matters (Ajlouni, 2010, p.147):

- 1- Sharing investment in large projects
- 2- Establishing Islamic insurance company which cooperates to insure on products, transportation and capital assets, which can be related to Islamic Bank investments.
- 3- Establishing current deposits insurance for Islamic Bank on cooperative Islamic basis.
- 4- Lending each others for free.
- 5- Cooperation in Studies fields, researches, training that are related to Islamic financial activities.
- 6- Coordination and unification of work systems, banking forms, special base for activities and banking activities

# *Chapter Four*

## *Institutional*

### *Background*



## **Chapter Four**

### **Institutional Background**

#### **4-1 Introduction**

This study attempts to examine the efficiency of the Islamic banks in Jordan. The sample includes two Islamic banks. In order to make the study more clear and understandable, this chapter presents an explanation about the banks included in the sample.

#### **4-2 Jordan Islamic Bank for Financing and Investment** (jordanislamicbank.com)

Jordan Islamic Bank for Finance and Investment was established as a public shareholding company on 28<sup>th</sup> November, 1978 and was licensed to practice financing, banking and investment activities in compliance with the provisions of the glorious Islamic Sharia and in accordance with the provisions of Jordan Islamic Bank's Special Law, which was superseded by one chapter on Islamic banks in the Banks Law which was issued on 1/8/2000. When the Bank's first branch commenced business on 22/9/1979, the paid-up capital did not exceed JD 2 million of its authorized capital of JD 4 million, but with favor from Allah the paid up capital of the Bank now is JD 65 million (about USD 92 million).

The bank continues to provide its investment, financial and banking services through (56) branches covering different areas of the kingdom. It

has (9) cash offices in addition to the bonded house and public utilities which reached to (66) ATM'S throughout Jordan.

Since its establishment, the bank succeeded in maintaining its growth momentum and in establishing itself as one of the leading banks in Jordan by providing all kinds of banking and investment services to its clients in accordance with the provisions of Islamic Sharia, which applies a concept of economy different from the conventional concept especially with respect to the role of money. The Bank has been always a pioneer in every new in the banking field and coping with the development for improving and updating its services.

JIBFI has recently obtained the ISO (9001:2000) in management systems. Additionally, the bank's rating increase from (BB-Stable) TO (BBB-Stable) pursuant to capital intelligence reflecting the strong performance of the Bank in different production and management related issues and represents a new push towards achieving its future objectives in terms of improving, updating and developing its services in order to achieve an excellent level in compliance with the Bank's mission and with the principles of glorious Islamic Sharia. The number of customer's active accounts through the bank's network of (66) branches and offices, has reached (589) thousand accounts, the number of the Bank's employees has

reached (1498) and the outstanding number of financing transactions was (99) thousand transactions at the end of the year 2008.

#### **4-3 Islamic International Arab Bank**

(iiabank.com.jo)

The Islamic International Arab Bank commenced its banking operations in accordance with Islamic Sharia rules on the twelfth day of Shawal 1418 AH, corresponding to 9 February 1998, to meet the growing demand for Islamic banking services and products.

The Islamic International Arab Bank was established in the Hashemite Kingdom of Jordan as a public shareholding company in accordance with the companies Law of 1989 and the company was registered in the Register of Public Shareholding companies under No. 327 on 30 March 1997.

The bank operations include:

##### **1) Morabaha**

The bank purchases commodities, equipments, or appliances upon the client's request and specifications. The client commits purchase the commodity for its cost price in addition to the agreed upon profit. The

amount may be settled in one payment or in installments. This type of financing may be used for:

- Automobiles
- Construction Materials
- Raw Materials
- Equipments and Appliances
- Trade Goods
- Long- term Goods and Furniture

## 2) Islamic Lease (IJARA)

Upon customer request, the bank purchases tangible assets such as real estates, boats, planes, appliances...etc. The bank promises to Lease the asset to the client for use in exchange for periodic rent. The ownership of the leased asset will be transferred to the client after completion of the renting period as a gift from the bank with no compensation. Clients may also use Ijara financing to purchase homes and apartments with the following privileges:

- Competitive, Shari'ah-compliant rental rates
- long lease period up to 20 years
- Easy monthly installments
- Free participation in the Mutual Exchange Insurance Program

- Free real estate insurance
- Opportunity to obtain financing to purchase a kitchen or furniture
- Free VISA card for the first year
- The bank commits to transfer the ownership of the apartment, real estate, or rented asset upon full payment.

### 3) Modarabah

Modarabah Financing is a profit-sharing contract consisting of a capital investment from the Bank and a labor investment from the client. In accordance with its terms, the Bank puts forward the necessary capital to finance a specific project, whether partially or in full. The client undertakes the necessary labor such that the profits are shared through agreed upon percentages. The client can only face a loss if any negligence or infractions are revealed; in the case of unsuccessful project, the client loses the labor invested, while the Bank loses its capital investment, as circumstances demand.

### 4) Mosharkah

Jurists define Mosharkah as a contractual agreement between two partners with regard to both capital and profit. Mosharkah is one of the most important models of Islamic investment practiced by IIAB. The Bank takes an active role with its partner in studying and deliberating over the

intended project from technical, Shari'ah, and social aspects. The Bank also allows the client the chance to take full ownership of the project, by purchasing shares in installments.

#### 5) Istisna' Financing

The client approaches the bank with a request for financing for a specific technical/industrial project, presenting all technical designs and plans, as well as all general and specific conditions that relate to the project after consulting a specialized engineering consultancy office. After the Bank's agrees to the request, a contract is prepared detailing the project specifications, as well as the cost of the project and the payment plan to which the client commits, whether monthly installments or full payment. A separate contract is prepared between the bank and a “contractor”, by which the contractor commits to carry out the project in accordance with the design and specifications previously outlined.

# *Chapter Five*

## *Data &*

## *Methodology*

## **Chapter five**

### **Data and Methodology**

#### **5-1 Introduction**

The main objective of the study is to examine the efficiency of Islamic banks in Jordan, and the relative efficiency of each bank. The methodology of this study is based on using financial ratio analysis (FRA), and the Data Envelopment Analysis (DEA) in evaluating banks efficiency.

This chapter consists of three sections. Section 5-2 describes the population and the sample of the study, section 5-3 describes the data source, section 5-4 describes methodology used in the study, while the last section 5-5 summarizes the chapter.

#### **5-2 Study Population and Sample**

##### **(1) Population:**

The population in this study consists of the Islamic Jordanian banks during the period 2005-2009. Where there are two Islamic banks and twenty one commercial banks.

##### **(2) The Sample:**

According to Central Bank of Jordan website (<http://www.cbj.gov.jo>), the number of Islamic banks operating in Jordan is three banks as follows:

1. Jordanian Islamic Bank for Finance and Investment (JIBFI).



2. Islamic International Arab Bank (IIAB).

3. Jordan Dubai Islamic Bank (JDIB).

However, (JDIB) was excluded due to unavailable financial statements, since it has been established recently.

### **5-3 Data Sources**

This study considers the data of two Islamic banks operating in Jordan over the period 2005-2009. The data used in this study are financial information, extracted and analyzed from the balance sheets and income statements which are available in the annual reports of the banks and in Jordanian Banks publications. Also other sources were used such as articles, journals, and websites.

### **5-4 Methodology**

#### **5-4-1 Financial Ratio Analysis (FRA)**

The study uses eleven financial ratios for bank's performance. These ratios are grouped under three broad categories: a. profitability; b. liquidity; c. risk and solvency (Samad & Hassan, 2000).

**a. Profitability Ratios:**

The profitability can be judged by the following criteria.

- 1) Return on asset (ROA) = Profit after tax/ total asset
- 2) Return of equity (ROE) = Profit after tax/ equity capital
- 3) Profit expense ratio (PER) = profit/total expense

A high PER indicates that a bank is cost efficient and makes higher profit with a given expense.

ROA and ROE are indicators of measuring managerial efficiency, ROA is net earnings per unit of a given asset, it shows how a bank can convert its asset into net earnings. The higher ratio indicates higher ability and therefore is an indicator of better performance. Similarly, ROE is net earnings per dollar equity capital. The higher ratio is an indicator of higher managerial performance.

**b. Liquidity Ratios:**

Bank and other depository institutions share liquidity risk because transaction deposits and saving accounts can be withdrawn at any time.

Thus, when withdrawals exceed new deposits significantly over a short period, banks get into a liquidity trouble.

There are several measures for liquidity.

1) Cash deposit ratio (CDR) = cash/deposit.

Cash in a bank vault is the most liquid asset of a bank. Therefore, a higher CDR indicates that a bank is relatively more liquid than a bank which has a lower CDR. Depositors' trust to bank is enhanced when a bank maintains a higher cash deposit ratio.

2) Loan deposit ratio (LDR) = Loan/deposit

A higher loan deposit ratio indicates that a bank takes more financial liquidity risk by making excessive loans. Therefore, lower loan deposit ratio is always favorable to higher loan deposit ratio.

3) Current ratio = Current asset (CA) / current liability (CL) .

It indicates how the bank management has been able to meet current liabilities (i.e. demand deposit) with the current assets. A high ratio indicates that bank has more liquid assets to pay back the trusts (deposits)

to depositors. When withdrawals significantly exceed the new deposits, banks usually sell securities in order to face this shortage of funds. Government securities are easily sold and are considered liquid. As such, the current ratio as measured above is preferred to be high rather than low.

4) Current asset ratio (CAR) = current asset/total asset

A high CAR indicates that a bank has more liquid asset. A lower ratio is a sign for illiquidity as more of the assets are long term in nature.

### **c. Risk and Solvency Ratios:**

A bank is solvent when the total value of its assets is greater than its liabilities. A bank becomes risky if it is insolvent.

The following are the commonly used measures for a risk and insolvency.

1) Debt equity ratio (DER) = Debt/equity capital

Bank capital can absorb financial shocks. If asset values decrease or loans are not repaid, bank capital provides protection against those losses. A lower DER ratio is a good sign for a bank.

2) Debt to total asset ratio(DTAR) = Debt/total asset

Indicates the financial strength of a bank to pay its creditors, a high DTAR indicates that the bank is involved in more risky business.

3) Equity multiplier (EM) = total assets/share capital.

It is the amount of assets per dollar of equity capital.

A higher EM indicates that the bank has borrowed more funds to finance its asset. A higher value of EM indicates greater risk for a bank.

4) Loan to deposit ratio (LDR) = loans/deposit

Measures liquidity as well as credit risk for a bank. A high value indicates a potential source of illiquidity and insolvency.

#### **5-4-2 Data Envelopment Analysis (DEA) measurement**

The wide acceptance of DEA as a measurement tool for measuring efficiency of the financial institutions can be attributed to certain strengths of this approach. The main advantages of using DEA are as follows. The data may not necessarily assume any functional form. DEA leads to a

comparison of one Decision Making Unit (DMU) against peer or a combination of peers. The units of the inputs and outputs may vary as they do not affect the calculation of efficiency measure. This implies that changing the units of measurement (e.g., measuring quantity labor in person hours instead of person days) does not change the value of the efficiency measures. This model can handle multiple inputs and outputs (Cao, 2004).

The choice of inputs and outputs is informed by (Johnes, Izzeldin and Pappas, 2009) literature and by data availability:

The inputs are defined as:

- \_ Deposits and short term funding
- \_ Fixed assets
- \_ General and administration expenses
- \_ Equity

The outputs are defined as:

- \_ Total credit facilities
- \_ Other earning assets

The DEA measures the technical efficiency of a given bank by calculating an efficiency ratio equal to a weighted sum of outputs over a

weighted sum of inputs. For each DMU these weights are derived by solving an optimization problem which involves the maximization of the efficiency ratio for that DMU subject to the constraint that the equivalent ratios for every DMU in the set is less than or equal to 1.

Therefore, according to DEA, technical efficiency is defined as the ratio of the weighted sum of the **m** outputs to the weighted sum of the **n** inputs (Braglia et al., 2003, p543).

Efficiency of DMU j =

$$E_j = \frac{\text{weighted sum of outputs}}{\text{weighted sum of inputs}} = \frac{\alpha_1 y_{1j} + \dots + \alpha_m y_{mj}}{\beta_1 x_{1j} + \dots + \beta_n x_{nj}}$$

$$= \frac{\sum_{i=1}^m \alpha_i y_{ij}}{\sum_{i=1}^n \beta_i x_{ij}}$$

Where:

$\alpha_k$  : is the weight of output k

$\beta_k$  : is the weight of input k

$y_{kj}$  : is the amount of output k from DMU j

$x_{kj}$  : is the amount of input k from DMU j

The efficiency score is usually expressed as a number between 0% and 100 % (or constrained to the interval  $[0, 1]$ ). a DMU with a score less than 100% is deemed inefficient relative to others. The evaluation of the efficiency of each DMU (e.g. a productive unit) requires the definition of a single and common set of weights for each plant, thus introducing the problem of how this set can be obtained.

Full (100%) efficiency is attained by any DMU if and only if none of its inputs or outputs can be improved without worsening some of its other inputs or outputs.



# *Chapter Six*

## *Data Analysis*

## Chapter Six

### Data Analysis

#### 6-1 Introduction

This chapter examines Jordanian Islamic banks efficiency in terms of their ability to provide outputs with minimum inputs consumption. The analysis consists of two sections: conventional financial ratio analysis and non-parametric input-output (I/O) DEA model.

#### 6-2 Financial Ratio Analysis

In the ratio analysis, the study considered the liquidity ratios, profitability ratios, and risk and solvency ratios for all banks included in the sample. These ratios have been explained in details in chapter 5. All these ratios were calculated for all banks, the results obtained showed in the Table (6-1) and (6-2).

**Table (6-1): Financial Ratios for Jordanian Islamic Bank for Finance and Investment during the period 2005-2009**

JIBFI	PROFITABILITY RATIOS			LIQUIDITY RATIOS				RISK and SOLVENCY RATIOS			
Year	ROA	ROE	PER	CDR	LDR	CR	CAR	DER	DTAR	EM	LDR
2005	0.97%	18.86%	52.44%	41.75%	39.63%	0.55	49.72%	1834.21%	94.83%	19.34	39.63%
2006	1.06%	13.42%	60.79%	42.58%	45.46%	1.20	45.54%	1168.45%	92.12%	12.68	45.46%
2007	1.44%	17.22%	79.04%	39.63%	50.77%	1.26	40.28%	1096.99%	91.62%	11.97	50.77%
2008	1.90%	21.83%	83.34%	37.01%	52.63%	0.43	37.30%	1047.78%	91.26%	11.48	52.63%
2009	1.28%	15.77%	69.84%	40.60%	48.85%	0.13	40.19%	1134.21%	91.87%	12.35	48.85%
Mean	1.33%	17.42%	69.09%	40.31%	47.47%	0.71	42.61%	1256.33%	92.34%	13.57	47.47%

Source: prepared by the researcher.

The previous Table gives financial ratios for JIBFI that used in measuring the banks efficiency.

**Table (6-2): Financial Ratios for Islamic International Arab Bank  
during the period 2005-2009**

<b>IIAB</b>	<b>PROFITABILITY RATIOS</b>			<b>LIQUIDITY RATIOS</b>				<b>RISK and SOLVENCY RATIOS</b>			
<b>Year</b>	<b>ROA</b>	<b>ROE</b>	<b>PER</b>	<b>CDR</b>	<b>LDR</b>	<b>CR</b>	<b>CAR</b>	<b>DER</b>	<b>DTAR</b>	<b>EM</b>	<b>LDR</b>
<b>2005</b>	0.97%	6.93%	60.95%	9.28%	54.46%	0.55	43.36%	613.33%	85.98%	7.13	54.46%
<b>2006</b>	1.39%	12.71%	124.51%	17.54%	4.51%	1.20	42.65%	814.86%	89.07%	9.15	4.51%
<b>2007</b>	1.83%	14.67%	103.19%	17.46%	5.96%	1.26	42.30%	701.79%	87.53%	8.02	5.96%
<b>2008</b>	0.86%	8.37%	99.73%	5.55%	68.59%	0.43	36.60%	870.47%	89.70%	9.70	68.59%
<b>2009</b>	0.25%	2.21%	23.45%	5.23%	100.13%	0.13	10.90%	785.01%	88.70%	8.85	100.13%
<b>Mean</b>	1.06%	8.98%	82.37%	11.01%	46.73%	0.71	35.16%	757.09%	88.19%	8.57	46.73%

Source: prepared by the researcher.

The previous Table gives financial ratios for IIAB that used in measuring the banks efficiency.

The next important step in the ratio analysis is to make comparisons between two banks JIBFI and IIAB. The results shown in Table (6-3).

**Table (6-3) Comparison between JIBFI with IIAB in terms of FRA.**

<b>Mean</b>	<b>PROFITABILITY RATIOS</b>			<b>LIQUIDITY RATIOS</b>				<b>RISK and SOLVENCY RATIOS</b>			
<b>Bank</b>	<b>ROA</b>	<b>ROE</b>	<b>PER</b>	<b>CDR</b>	<b>LDR</b>	<b>CR</b>	<b>CAR</b>	<b>DER</b>	<b>DTAR</b>	<b>EM</b>	<b>LDR</b>
<b>JIBFI</b>	1.33%	17.42%	69.09%	40.31%	47.47%	0.71	42.61%	1256.33%	92.34%	13.57	47.47%
<b>IIAB</b>	1.06%	8.98%	82.37%	11.01%	46.73%	0.71	35.16%	757.09%	88.19%	8.57	46.73%

Source: prepared by the researcher.

From Table (6-3), we can conclude that JIBFI has higher profitability ratios (ROA, ROE) than IIAB. That is the JIBIF more profitable than IIAB. In terms of liquidity ratios, the above table showed that JIBFI has higher (CDR, LDR, CAR) ratios than those for IIAB, and the CR ratio is the same for JIBFI and IIAB. Also in (CDR, LDR, CAR) ratios, JIBFI has more liquidity than IIAB. In terms of risk and solvency ratios (DER, DTAR, EM and LDR) we found that those for JIBFI are higher than IIAB.

### 6-3 Data Envelopment Analysis

The Efficiency Measurement System (EMS) software is used to measure the efficiency of the banks included in the sample of the study. The data analyzed through input oriented approach DEA at CRS. The CRS efficiency results provide a measure of overall technical efficiency. In practical terms, the DEA is performed for each year separately. We considered deposits and short term funding, fixed assets, general and administration expenses and equity as inputs, and the total credit facilities and other earning assets as outputs. Table (6-4) display the DEA results based on the model with two outputs and four inputs.

**Table (6-4) Banks Efficiency Scores 2005-2009.**

Year	Efficiency JIBFI	Efficiency IIAB	Mean
2005	53.79%	77.16%	65.47%
2006	57.16%	7.39%	32.28%
2007	92.61%	100.00%	96.30%
2008	100.00%	96.92%	98.46%
2009	100.00%	100.00%	100.00%
Mean	80.71%	76.29%	

Source: prepared by the researcher.

Table (6-4) shows that JIBFI improves its position from being inefficient (with a score of 53.79%) in 2005 to become efficient (with a score of 100%) in 2009. However, the IIAB has randomly improved through the period. And the lowest efficiency score was in 2006 and results from lower bank outputs (total credit facilities). Overall, improvement is evident in the Islamic banking industry in Jordan from 65.47% in 2005 to 100% in 2009.

The CRS efficiency is significantly higher, on average, for JIBFI compared to IIAB by around 5 percentage points.

#### 6-4 Slack Analysis and Improvement

One of the objectives of this study is to provide suggestions to increase the technical efficiency of Jordanian Islamic banks. This section explains how IIAB and JIBFI can improve their efficiency scores. This section discusses the slacks analysis of inputs and outputs variables of inefficient banks. Slacks are the adjustments of inputs and/or outputs that should be eliminated by the DMU under evaluation to be considered as efficient. Slacks usually refer to inputs and it's the difference between the actual and target inputs and outputs values. Table (6-5) reports the results of the slack analysis for IIAB and (6-6) for JIBFI.

**Table (6-5) Slacks for IIAB**

Slacks IIAB						
	Input	Input	Input	Input	Output	Output
Year	deposits and short term funding	fixed assets	general and administration expenses	equity	total facilities	other earning assets
2005	66615292	0	667194	18384216	0	0
2006	0	4646918	51458	1328704	0	0
2007	0	0	0	0	0	0
2008	217307189	0	992775	19478686	0	0
2009	0	0	0	0	0	0

Source: prepared by the researcher.

**Table (6-6) Slacks for JIBFI**

Slacks JIBFI						
	Input	Input	Input	Input	Output	Output
Year	deposits and short term funding	fixed assets	general and administration expenses	equity	total facilities	other earning assets
2005	155646062	5638309	300457	0	0	944565
2006	126289978	26628620	194373	0	195661476	0
2007	119299362	30834879	415394	0	375800973	0
2008	0	0	00	0	0	0
2009	0	0	0	0	0	0

Source: prepared by the researcher.

Table (6-5) and (6-6) shows the amount that must increase in some inputs of IIAB and JIBFI to get more efficiency score in term of its inputs to produce the actual output.

These amounts of changes in inputs and outputs will be illustrated in table (6-7) and (6-8) that show the improvements of actual values to be target values for IIAB and JIBFI.

**Table (6-7) Improvements for IIAB**

Improvements for IIAB			
	Input	Input	Input
Year	deposits and short term funding	fixed assets	general and administration expenses
2005	309158518 to 171931288	239264474 to 184616366	2324353 to 1126275
2006	204893314 to 15141579	330417843 to 19770901	2734353 to 150609
2007	199145596 to 199145596	349143671 to 349143671	3285522 to 3285522
2008	774525188 to 533348040	581739521 to 563810990	4495007 to 3363700
2009	885982235 to 885982235	934792719 to 934792719	5561420 to 5561420
	Input	Output	Output
Year	equity	total facilities	other earning assets
2005	54829783 to 23922420	169259697 to 169259697	469082 to 469082
2006	62777516 to 3310543	10283409 to 10283409	489785 to 489785
2007	74083055 to 74083055	17956254 to 17956254	17820603 to 17820603
2008	93524698 to 71163689	536758541 to 536758541	320293 to 320293
2009	117600288 to 117600288	894008587 to 894008587	303024 to 303024

Source: prepared by the researcher.

**Table (6-8) Improvements for JIBFI**

Improvements for JIBFI			
	Input	Input	Input
Year	deposits and short term funding	fixed assets	general and administration expenses
2005	1203397269 to 491635749	700901569 to 371361746	10292376 to 5235593
2006	1267458084 to 598192423	837083180 to 451850344	11484769 to 6370350
2007	1363803632 to 1143716627	966152616 to 863917248	13600302 to 12179820
2008	1559081650 to 1559081650	1177667175 to 1177667175	16603181 to 16603181
2009	1899718916 to 1899718916	1330709625 to 1330709625	18405385 to 18405385
	Input	Output	Output
Year	Equity	total facilities	other earning assets
2005	54829783 to 29491774	169259697 to 169259697	2685532 to 3630097
2006	62777516 to 35883794	10283409 to 205944885	4416881 to 4416881
2007	74083055 to 68608178	17956254 to 393757227	8444875 to 8444875
2008	93524698 to 93524698	536758541 to 536758541	11511811 to 11511811
2009	176830597 to 176830597	894008587 to 894008587	8558083 to 8558083

Source: prepared by the researcher.

## 6-5 Comparison between FRA and DEA in Jordanian Islamic Banks

This section concludes the result of comparison between the FRA and the DEA. A Spearman's rank correlation analysis of all DEA efficiency scores and the eleven financial ratios are calculated. Table (6-9) display the Spearman's correlation analysis.

**Table (6-9) Spearman's Correlations between DEA and Financial Ratios.**

Correlations FRA & DEA									
Spearman's rho		Efficiency	ROA	ROE	PER	CDR	LDR	CR	CAR
Efficiency	Correlation Coefficient	1.000	-0.200	-0.200	0.600	-0.800	.900(*)	-0.700	.900(*)
	Sig. (2-tailed)		0.747	0.747	0.285	0.104	0.037	0.188	0.037
	N	5	5	5	5	5	5	5	5
ROA	Correlation Coefficient	-0.200	1.000	1.000(**)	0.600	0.200	-0.500	0.700	0.100
	Sig. (2-tailed)	0.747			0.285	0.747	0.391	0.188	0.873
	N	5	5	5	5	5	5	5	5
ROE	Correlation Coefficient	-0.200	1.000(**)	1.000	0.600	0.200	-0.500	0.700	0.100

	<b>Sig. (2-tailed)</b>	0.747	.	.	0.285	0.747	0.391	0.188	0.873
	<b>N</b>	5	5	5	5	5	5	5	5
<b>PER</b>	<b>Correlation Coefficient</b>	-0.600	0.600	0.600	1.000	0.400	-0.700	0.500	0.300
	<b>Sig. (2-tailed)</b>	0.285	0.285	0.285	.	0.505	0.188	0.391	0.624
	<b>N</b>	5	5	5	5	5	5	5	5
<b>CDR</b>	<b>Correlation Coefficient</b>	-0.800	0.200	0.200	0.400	1.000	-.900(*)	0.800	0.600
	<b>Sig. (2-tailed)</b>	0.104	0.747	0.747	0.505	.	0.037	0.104	0.285
	<b>N</b>	5	5	5	5	5	5	5	5
<b>LDR</b>	<b>Correlation Coefficient</b>	.900(*)	-0.500	-0.500	0.700	.900(*)	1.000	.900(*)	-0.700
	<b>Sig. (2-tailed)</b>	0.037	0.391	0.391	0.188	0.037	.	0.037	0.188
	<b>N</b>	5	5	5	5	5	5	5	5
<b>CR</b>	<b>Correlation Coefficient</b>	-0.700	0.700	0.700	0.500	0.800	-.900(*)	1.000	0.600
	<b>Sig. (2-tailed)</b>	0.188	0.188	0.188	0.391	0.104	0.037	.	0.285
	<b>N</b>	5	5	5	5	5	5	5	5
<b>CAR</b>	<b>Correlation Coefficient</b>	-.900(*)	0.100	0.100	0.300	0.600	-0.700	0.600	1.000
	<b>Sig. (2-tailed)</b>	0.037	0.873	0.873	0.624	0.285	0.188	0.285	.
	<b>N</b>	5	5	5	5	5	5	5	5
<b>DER</b>	<b>Correlation Coefficient</b>	-0.500	-0.700	-0.700	0.100	0.200	-0.100	-0.200	0.600
	<b>Sig. (2-tailed)</b>	0.391	0.188	0.188	0.873	0.747	0.873	0.747	0.285
	<b>N</b>	5	5	5	5	5	5	5	5
<b>DTAR</b>	<b>Correlation Coefficient</b>	-0.500	-0.100	-0.100	0.700	0.100	-0.300	-0.100	0.300
	<b>Sig. (2-tailed)</b>	0.391	0.873	0.873	0.188	0.873	0.624	0.873	0.624
	<b>N</b>	5	5	5	5	5	5	5	5
<b>EM</b>	<b>Correlation Coefficient</b>	-0.500	-0.700	-0.700	0.100	0.200	-0.100	-0.200	0.600
	<b>Sig. (2-tailed)</b>	0.391	0.188	0.188	0.873	0.747	0.873	0.747	0.285
	<b>N</b>	5	5	5	5	5	5	5	5
<b>LDR</b>	<b>Correlation Coefficient</b>	.900(*)	-0.500	-0.500	0.700	.900(*)	1.000(**)	.900(*)	-0.700
	<b>Sig. (2-tailed)</b>	0.037	0.391	0.391	0.188	0.037	.	0.037	0.188
	<b>N</b>	5	5	5	5	5	5	5	5
*. Correlation is significant at the 0.05 level (2-tailed).									
**. Correlation is significant at the 0.01 level (2-tailed).									

Source: prepared by the researcher.



Table (6-9) shows that bank rankings calculated from DEA efficiency are not significantly related to bank rankings derived only from the ROA, ROE, PER, CDR, CR, DER, DTAR and EM ratios. There is no evidence of any significant relationship in the rankings derived from any other pairs of DEA efficiencies and financial ratios.

The correlation evidence therefore suggests that FRA and DEA should generally be viewed as complementary rather than competing, and should be used together when evaluating efficiency of organizations since they answer different questions.

## **6-6 Summary**

In contrast with the FRA, DEA indicates that the JIBFI is more profitable and more liquid than the IIAB. Therefore we can conclude that the JIBFI is more efficient than the IIAB, but not significantly. In terms of risk and solvency ratios the analysis showed that the JIBFI is more risky than the IIAB. However, these differences in profit, liquidity and risk and solvency are statistically insignificant. Moreover, the DEA analysis results stands behind the results of FRA and show that JIBFI achieved an efficiency scores higher than the scores for the IIAB. Nevertheless, these differences are statistically insignificant.

# *Chapter Seven*

## *Conclusions &*

### *Recommendations*

## **Chapter Seven**

### **Conclusions and Recommendations**

#### **7-1 Introduction**

This study used the financial information published in the annual reports to measure the efficiency of Jordanian Islamic banks using Data Envelopment Analysis (DEA) and Financial Ratio Analysis (FRA) methodologies, during the period 2005-2009.

This chapter represents the conclusions and results of this study. In addition, it represents some key recommendations for future researches in this field.

#### **7-2 Conclusions**

1. JIBFI has higher profitability ratios than IIAB, which means that the JIBFI is more efficient than IIAB.
2. JIBFI has a higher risk and solvency ratios than the IIAB, which indicates that JIBFI is more risky than the IIAB. This is consistent with the high risk high return principle.
3. There is no difference in the level of efficiency measured by Financial Ratio Analysis (FRA) of Jordan Islamic Bank for Finance and Investment (JIBFI) over time.

4. There is no difference in the level of efficiency measured by Financial Ratio Analysis (FRA) of Islamic International Arab Bank (IIAB) over time.
5. Statistical tests support the efficiency hypothesis which states that there is no significant difference in the efficiency levels of Jordanian Islamic banks using Financial Ratio Analysis (FRA).
6. Technical efficiency of Jordanian Islamic banks was calculated by Data Envelopment Analysis (DEA) methodology with Constant Return to Scale (CRS) model.
7. There is no difference in the level of efficiency measured by Data Envelopment Analysis (DEA) of Jordan Islamic Bank for Finance and Investment (JIBFI) over time.
8. There is no difference in the level of efficiency measured by Data Envelopment Analysis (DEA) of Islamic International Arab Bank (IIAB) over time.
9. Statistical tests support the efficiency hypothesis which states that there is no significant difference in the efficiency levels of Jordanian Islamic banks using Data Envelopment Analysis (DEA).
10. Jordanian Islamic banks can improve their efficiency by making some adjustments to its inputs as indicated in this study.

11. The correlation between efficiency levels measured by Data Envelopment Analysis (DEA) and Financial Ratio Analysis (FRA) is not statistically significant.

### **7-3 Recommendations**

1. Jordanian Islamic banks managers should improve their profitability ratios.
2. The bottom line is that the efficiency of Jordanian Islamic banks must be evaluated by using both Data Envelopment Analysis (DEA) and Financial Ratio Analysis (FRA).
3. Growth has been particularly strong in the Jordanian Islamic banking industry, and this led to an increase in product innovation efficiency to deal with higher customer numbers.
4. Managers of Jordanian Islamic banks should make decisions about reallocating, the resources within their banks to increase the efficiency in order to sustain long term growth and profitability.
5. It would be interesting to assess the efficiency of Jordanian Islamic banks by taking into account other efficiency factors (variables) other than the ones used in this study.

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# *Appendices*

## **Appendix A: Inputs and Outputs used in DEA**

### **Inputs and Outputs used in DEA for JIBFI 2005-2009**

<b>JIBFI</b>	<b>{IsActive}</b>	<b>deposits and short term funding</b>	<b>fixed assets</b>	<b>general and administration expenses</b>
<b>Year</b>		<b>Input</b>	<b>Input</b>	<b>Input</b>
<b>2005</b>	true	1203397269	700901569	10292376
<b>2006</b>	true	1267458084	837083180	11484769
<b>2007</b>	true	1363803632	966152616	13600302
<b>2008</b>	true	1559081650	1177667175	16603181
<b>2009</b>	true	1899718916	1330709625	18405385
<b>JIBFI</b>	<b>{IsActive}</b>	<b>equity</b>	<b>total facilities</b>	<b>other earning assets</b>
<b>Year</b>		<b>Input</b>	<b>Output</b>	<b>Output</b>
<b>2005</b>	true	54829783	169259697	2685532
<b>2006</b>	true	62777516	10283409	4416881
<b>2007</b>	true	74083055	17956254	8444875
<b>2008</b>	true	93524698	536758541	11511811
<b>2009</b>	true	176830597	894008587	8558083

### **Inputs and Outputs used in DEA for IIAB 2005-2009**

<b>IIAB</b>	<b>{IsActive}</b>	<b>deposits and short term funding</b>	<b>fixed assets</b>	<b>general and administration expenses</b>
<b>Year</b>		<b>Input</b>	<b>Input</b>	<b>Input</b>
<b>2005</b>	true	309158518	239264474	2324353
<b>2006</b>	true	204893314	330417843	2734353
<b>2007</b>	true	199145596	349143671	3285522
<b>2008</b>	true	774525188	581739521	4495007
<b>2009</b>	true	885982235	934792719	5561420
<b>IIAB</b>	<b>{IsActive}</b>	<b>equity</b>	<b>total facilities</b>	<b>other earning assets</b>
<b>Year</b>		<b>Input</b>	<b>Output</b>	<b>Output</b>
<b>2005</b>	true	54829783	169259697	469082
<b>2006</b>	true	62777516	10283409	489785
<b>2007</b>	true	74083055	17956254	17820603
<b>2008</b>	true	93524698	536758541	320293
<b>2009</b>	true	117600288	894008587	303024

## **Appendix B: Data Statistics of Inputs/Outputs**

### **Data Statistics of Inputs/Outputs for JIBFI**

<b>Name</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Standard Derivation</b>
<b>deposits and short term funding</b>	1203397269	1899718916	1458691910	251130418
<b>fixed assets</b>	700901569	1330709625	1002502833	227178594
<b>general and administration expenses</b>	10292376	18405385	14077203	3045876
<b>equity</b>	54829783	176830597	92409130	44168571
<b>total facilities</b>	10283409	894008587	325653298	342399695
<b>other earning assets</b>	2685532	11511811	7123436	3164891

### **Data Statistics of Inputs/Outputs for IIAB**

<b>Name</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Standard Derivation</b>
<b>deposits and short term funding</b>	199145596	885982235	474740970	295017990
<b>fixed assets</b>	239264474	934792719	487071646	250754502
<b>general and administration expenses</b>	2324353	5561420	3680131	1190934
<b>equity</b>	54829783	117600288	80563068	22628645
<b>total facilities</b>	10283409	894008587	325653298	342399695
<b>other earning assets</b>	303024	17820603	3880557	6970432

## **Appendix C: Cross Efficiency**

### **Cross Efficiency for JIBFI**

<b>Year</b>	<b>Efficiency %</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>2005</b>	53.8	53.8	2.9	4.2	100.0	88.1
<b>2006</b>	57.2	39.8	57.2	92.6	100.0	39.3
<b>2007</b>	92.6	39.8	57.2	92.6	100.0	39.3
<b>2008</b>	100.0	53.8	2.9	4.2	100.0	88.1
<b>2009</b>	100.0	53.5	2.8	4.2	100.0	100.0

### **Cross Efficiency for IIAB**

<b>Year</b>	<b>Efficiency %</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
<b>2005</b>	77.2	77.2	6.0	100.0	96.9	100.0
<b>2006</b>	7.4	55.6	7.4	100.0	68.9	100.0
<b>2007</b>	100.0	48.5	5.5	100.0	74.8	100.0
<b>2008</b>	96.9	77.2	6.0	100.0	96.9	100.0
<b>2009</b>	100.0	54.3	5.0	8.9	68.7	100.0

## ملخص

قياس كفاءة البنوك الإسلامية باستخدام "تحليل البيانات المغلفة" والنسب المالية : دراسة حالة البنوك الإسلامية في الأردن خلال الفترة (2005-2009)

اعداد: حامد العمري  
اشراف: الدكتور محمد العجلوني

تهدف هذه الدراسة الى قياس كفاءة البنوك الإسلامية العاملة في الأردن باستخدام تحليل البيانات المغلفة و تحليل النسب المالية، خلال الفترة (2005-2009).

تعود أهمية هذه الدراسة الى مساعدة مدراء البنوك الإسلامية العاملة في الأردن في الحصول على كفاءة عالية و مساعدة المستثمرين في قطاع البنوك الإسلامية. تضم عينة الدراسة جميع البنوك الإسلامية العاملة في الأردن ما عدا بنكاً واحداً بسبب انشائه حديثاً وبالتالي عدم توفر قوائمه المالية.

أظهرت نتائج الدراسة كفاءة البنوك الإسلامية العاملة في الأردن في ظل استخدام المدخلات لانتاج المخرجات الحقيقية باستخدام تحليل البيانات المغلفة و تحليل النسب المالية. أخيراً، أوصت الدراسة مدراء البنوك الإسلامية العاملة في الأردن بزيادة الكفاءة و تحسين المدخلات لانتاج المخرجات الحقيقية.

**الكلمات المفتاحية:** الكفاءة، البنوك الإسلامية، البنوك الإسلامية الأردنية، تحليل البيانات المغلفة، تحليل النسب المالية.