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The Determinants of Efficiency, Profitability and Stability in the Banking Sector: A Comparative Study of Islamic, Conventional and Socially Responsible Banks

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**The Determinants of Efficiency, Profitability and Stability in the
Banking Sector: A Comparative Study of Islamic, Conventional and
Socially Responsible Banks**

Thesis submitted to the Plymouth University in partial fulfilment of the
requirements of the degree of Doctor of Philosophy

By

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Dedication

I dedicate my work to my special father and mother

My lovely family in Saudi Arabia

To my wife, son and daughter

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Signed

Date

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Abbreviations

AE	Allocative Efficiency
AFC	Asian Financial Crisis
AT	Additional Test
BCC	Banker, Charnes and Cooper Model
BMA	Bahrain Monetary Agency
CB	Conventional Bank
CBO	Central Bank of Oman
CCASG	Gulf Cooperation Council for the Arab States of the Gulf
CCR	Charnes, Cooper, and Rhodes Model
CE	Cost Efficiency
CEE	Central and Eastern Europe
CEO	Chief Executive Officer
CIA	Central Intelligence Agency
CRS	Constant Returns to Scale
CSR	Corporate Social Responsibility
DEA	Data Envelopment Analysis
DFA	Distribution-free Approach
DMU	Decision-making unit
EPs	Equator Principles
EU	Europe
EUR	Euro
FEM	Fixed effects Model
GCC	Gulf Cooperation Council
GDP	Gross Domestic Production
GDP PPP	Gross Domestic Production Per Capita
GFC	Global Financial Crisis
GLS	Generalized Least Square
GMM	Generalised Method of Moments
IB	Islamic Bank
IBB	Islamic Bank of Britain
IMF	International Monetary Fund
MENA	Middle East and North Africa
MPI	Malmquist Productivity Index
MT	Main Test
NIE	Non-interest expense
NII	Non-interest income or net interest income
NIM	Net interest Margin
NPL	Non-performing Loans
OLS	Ordinary Least Square
OPEC	Organization of the Petroleum Exporting Countries
PE	Profit Efficiency
PTE	Pure Technical Efficiency
RBA	Reserve Bank of Australia

ROA	Return on Assets
ROE	Return on Equity
SAMA	Saudi Arabian Monetary Agency
SE	Scale Efficiency
SFA	Stochastic Frontier Analysis
SRB	Socially Responsible Bank
TE	Technical Efficiency
TFA	Thick Frontier Analysis
UAE	United Arab Emirates
UK	United Kingdom
USA	United States of America
USD	American Dollar
VRS	Variable Returns to Scale
WTO	World Trade Organisation

Abstract

This study aims to investigate the determinants of efficiency, profitability and stability in the banking sector across the world over the period 2005-2012. In this study, efficiency is measured using data envelopment analysis (DEA), which is divided into technical efficiency (TE), pure technical efficiency (PTE), and scale efficiency (SE). The profitability is represented by return on assets (ROA), return on equity (ROE), and net interest margin (NIM). Furthermore, the z-score and capital ratios are the main indicators for stability. The data includes 323 banks (43 Islamic, 242 conventional, and 38 socially responsible banks [SRBs]) from around the world, covering 37 countries. The statistical methods to find the determinants are ordinary least square (OLS) and fixed effects model (FEM). The data for this study was extracted from the Bankscope and World Bank databases.

According to efficiency, the DEA measures demonstrate that socially responsible banks (SRBs) are the most efficient banks. This is due to the fact that SRBs management employ minimum inputs; one of the main characteristics of SRBs is the saving of resources (inputs). In contrast, the least efficient scores are achieved by conventional banks. As conventional banks have higher interest expenses to pay. In terms of Islamic banks, the larger banks were found to be more efficient. Furthermore, lending services are important to maximise outputs effectively. Additionally, efficiency in Islamic banks is influenced significantly by earnings. Islamic banks with higher capitalisation were found to be more efficient, and new Islamic banks operate better than older banks. Regarding the macroeconomic factors, countries with better market capitalisations include more efficient Islamic banks. Based on the conventional banks' findings, banks with a higher size performed better than the smaller sized banks. The loans profits increased the efficiency significantly. Focusing on age, the more recent banks achieve better efficiency scores. The three types of ownership (foreign, domestic, and public) reflect inverse correlations with DEA. With regards to the external variables, the wealth of the country is highly important in terms of efficiency. In addition, stock market growth supports the efficiency positively and significantly, while inflation and the global financial crisis (GFC) influenced the efficiency negatively and significantly. Concentrating on SRBs, banks with more capitals operated more efficiently than lower capitalised banks. Additionally, GDP, inflation and market capitalisation enhanced efficiency significantly. Overall, the relationship between the control of corruption and efficiency is positive and significant in Islamic, conventional and socially responsible banks. Tighter controls on corruption have led to better efficiency.

Regarding the profitability, the highest ROA and ROE were attained by conventional banks. This is because the main aim for conventional banks is to achieve returns, and charging interest maximises their earnings. On the other hand, SRBs scored the lowest ROA and ROE as those banks are primarily concerned with providing social and environmental services over profits. According to NIM, Islamic banks do not have interest expenses, which can allow them to score the highest NIM measures in this study; while conventional banks have the minimum NIM ratios due to higher interest expenses. Based on the Islamic banks'

results, Islamic banking was affected positively by total assets of banks. In addition, the stable Islamic banks achieved greater profits based on the strong associations between z-score and earnings. This contradicts the relationship between profitability ratios and capital ratios, which indicate negative and significant correlations. Depending on country-specific factor, Islamic banks in higher productivity countries could not exploit the growth to gain higher profits. This results in a weakness for Islamic banks in terms of being resistant to higher inflation rates. For the conventional banks, size of bank and capital are highly important for profits. The conventional banks can concentrate on providing more loans to maximise their returns. The stability of conventional banks also has positive and significant associations with profitability ratios. Concerning the SRBs, profitability ratios are affected significantly and positively by stability (z-score) and market capitalisation growth. On the other hand, foreign, domestic and public ownerships negatively impacted the profits. According to industry-specific variables, GDP growth reduces profits significantly.

For the stability, SRBs are demonstrably the most stable and resilient system against financial crisis. Accepting more deposits and attaining greater profits significantly increase the stability of all banks and lower the risk of insolvency. Overall, listed banks were found to be more efficient, profitable, and stable than unlisted banks.

This study helps managers and policy makers within the banking sector to reduce costs and increase profits with lower risks. In addition, finding the positive determinants allows managers to make more decisions based on positive factors. On the contrary, through raising efficiency, profitability and stability in banking, managers can aim to avoid negative variables altogether.

Finally, this study contributes to the literature in terms of adding socially responsible banks into the equation. In addition, comparing efficiency, profitability and stability simultaneously is a new method that can allow bankers to build effective strategic decisions based on the determinants.

Chapter One: Introduction and Structure

1.1 Introduction

This study investigates three major topics within the banking system: efficiency in banking, profitability in banking, and stability in banking.

1.1.1 Efficiency in banking

The importance of research into efficiency within the banking sector has increased in recent years, as all banks strive for efficiency by minimising inputs, such as expenses, and maximising their output, i.e. profits. The importance has also risen since there has been a considerable increase in bank mergers. Some studies suggest that mergers and deregulation lead to raised efficiency in the banking sector (Avkiran, 1999). Large banks take over smaller banks for a number of reasons, such as to reduce competition and risk, and to raise capital (Fixler & Zieschang, 1993). However, studying efficiency in banking can be helpful for shareholders, policy makers, managers, market analysts, investors, clients and government regulators (Andries & Căpraru, 2014). According to Aikaeli (2006), when monetary policies are effective, then banks are more likely to be efficient. Efficient banks can use minimum inputs to generate maximum outputs, which could increase the sustainability of banks; Berger and Humphrey (1997) argue that the success or failure of all firms relates to transforming their inputs into outputs. The main aim of banks is to achieve economies of scope and scale through deposits, loans and banking services.

In terms of a banking definition, the bank has been defined as an intermediation organisation that accepts money from depositors and provides it to borrowers. Another concept is that banks act as a production organisation, generating both deposits and loans by using labour and capital (Abdul-Majid *et al.*, 2011). Recently, banking services have expanded, and a larger number of operations represent competitive advantage for banks such as providing insurance options and financial consultations (HSBC UK, 2015). In this study, deposits are used as inputs and loans as outputs to calculate

efficiency measures (the intermediation approach). As a result, banks are applying system theory as a way to employ the available resources for the provision of services.

The importance of this research is represented as two sides. The first side represents the clients of banks, and the second side represents the bank itself. In terms of clients, customers prefer dealing with efficient banks as they provide better quality services. To this end, the banks have to declare their efficiency measures to make the customers aware of quality levels, and to make the banks more competitive. The banks can thus improve their performance by declaring their balance sheets, income statements, and cash flow statements, which can be found on their websites or via the Bankscope database when the banks announce their efficiency results. Research into banks is important to increase banking performance, and thus attract more clients; additionally, efficiency measures lead to knowledge about any disadvantages of the operation within the bank. Furthermore, increased knowledge of the efficiency measures helps bank managers and policy makers to reduce costs and increase profits. As a result of finding points of weakness that can lead to inefficiency, banks can build strategies to enhance efficiency. Banks have recently faced many challenges affecting their efficiency, such as the global financial crisis of 2007, which had a significant impact on most financial institutions. Only the most highly efficient firms were able to resist the challenges due to strong backup (World Bank, 2014). This thesis covers banks from 37 countries around the world divided into three types: Islamic, conventional, and socially responsible banks (SRBs). This study applies data envelopment analysis (DEA) for measuring efficiency which consists of research by Feng and Serletis (2010) and Gardener *et al.* (2012). Indeed, a large number of studies focus on efficiency, especially in conventional banking, due to the availability of large amounts of data (Garza-García, 2012; Han *et al.*, 2012). In contrast, studies of efficiency in Islamic banking are much fewer due to lack of information (Rosman *et al.*, 2014). However, recent studies have concentrated on a comparison between Islamic and conventional banks (Olson & Zoubi, 2011; Hadad, *et al.*, 2012). Regarding SRBs, as yet there has been no study analysing their efficiency, which encourages this researcher to focus more on this type of bank. Subsequently, efficiency scores will be compared between Islamic, conventional, and SRBs. As a second stage of the research, the determinants of bank efficiency will be specified

utilising two models: ordinary least squares (OLS) and fixed effects regressions. These models will be used to provide robust evidence of the impact between efficiency measures (treated as the dependent variables) and their determinants (independent variables).

1.1.2 Profitability in banking

Studying profitability allows policymakers to determine financial performance. According to a recent literature review, most researchers calculate profitability through return on assets (ROA) or return on equities (ROE) or both, such as Beck *et al.* (2013a). Some studies include net interest margin (NIM) such as Ghosh (2015) and Houston *et al.* (2010). However, banks' profits are attained through charging fees on their services and through interest. As a result, the most profitable banks are more efficient, competitive and stable (Apergis, 2014). Determinants of profitability can be internal (bank-specific variables) and external (macroeconomic variables). However, focusing on determinants of profitability simplifies understanding of the reasons behind any loss or profits which lets senior banking management look for alternative plans if there is any drop in returns. In case of a rise in profits, banks are able to create higher earnings by focusing on variables that increase profits. According to the literature review, there is no study which concentrates on profitability's determinants, and specifically comparing Islamic, conventional, and socially responsible banks. This study finds the relationship between the profitability indicators (ROA, ROE, and NIM, which can be dependent variables) and the internal and external variables (determinants of profitability which can be independent variables) in the banking sector.

1.1.3 Stability in banking

After the global financial crisis (GFC) in 2007, focusing on insolvency risk analysis became more important as the majority of banks achieved a huge amount of loss or bankruptcy. The stability indicators can be z-score, as employed by Ghosh (2014), and capital (equity to total assets) ratio (Horvath *et al.*, 2014). In this study, both measures are used: z-score and capital ratio during the period 2005-2012. The z-score was developed by Boyd *et al.* (1993) and statistically concerns the probability of bankruptcy.

A higher z-score means the bank is more stable, and less likely to go bankrupt. Regarding the capitalisation ratio, better values indicate that the firm is well capitalised and stable. After measuring the stability and comparing values between Islamic, commercial, and socially responsible banks, finding the determinants of stability is the main topic. As the determinants of efficiency and profitability, stability variables can be internal, such as the size of the bank (log of total assets), and external, e.g. inflation. However, these variables can affect the stability positively or negatively. In fact, the relationship between stability and its determinants clarifies the future view towards which variable can be used more, less, or even neglected altogether in order to avoid insolvency risks and to raise financial stability within the banking sector. In accordance with macroeconomics, identifying the factors that affect banks leads to the allocation of better recovery plans by banking policymakers. This study identifies the stability (z-score and capitalisation) as an explainable variable and its determinants (explanatory variables).

1.2 Objectives and research questions of the study

The main aim of this study is to measure the determinants of efficiency, profitability, and stability within the banking sector. Statistical models for Islamic, conventional, and socially responsible banks will be employed, which helps regulators, investors, bankers and clients. This study is divided into three main sections.

First section: The first step is to measure efficiency through DEA techniques. This can maximise the banks' benefits through knowledge of the factors that reduce bank efficiency. In addition, calculating efficiency leads to minimising inputs and maximising outputs through awareness of the right amount of inputs and outputs. After estimating efficiency measures, a comparison of efficiency will be conducted to find the differences in efficiency scores between Islamic, conventional, and socially responsible banks. This raises the competition between banks, which in turn provides improved service quality and aims to maximise profits. The second step towards finding the determinants of efficiency is explained in Chapter Five. These measures would allow banks to recognise the main reasons for their negative or positive efficiency. This can help the bank to

apply strategies against the factors that impact efficiency in a negative way. However, there are extensive studies on efficiency in the literature, particularly studies on conventional banks. Conversely, there are very few studies on Islamic banks, mainly due to lack of data. Nevertheless, some researchers have tried to compare efficiency between Islamic and conventional banks. Although there is a comprehensive number of studies on efficiency in the banking sector, there is no such study including socially responsible banks, which led the researcher to add this type of bank to the field.

Second section: Calculating profitability ratios for all banks makes it easier to identify which type of bank needs to improve their financial performance. After calculating the profitability ratios, this study empirically analyses the determinants of profitability, whether bank-specific (internal) variables or macroeconomic (external) variables.

Third section: this part estimates the z-score and capital ratios of all banks to find the stability levels (higher z-score and capitalisation means more stability was achieved). The second step is finding the variables that increase or decrease the stability through statistical models.

Overall, the effect of internal variables (positive or negative) allows banking regulators to apply strategies to raise efficiency, profitability, and stability. Further, the impact of macroeconomic variables allows banks to invest more by establishing more or fewer branches in any country. The calculation of efficiency, profitability, and stability supports finding the differences between Islamic, conventional and socially responsible banking sectors. However, this study aims to answer the three following questions:

Q1: Are Islamic, conventional, and socially responsible banks efficient, profitable, and stable over the period? Which type of bank is the most efficient, profitable, and stable?

Q2: What are the determinants of efficiency, profitability, and stability in Islamic, conventional, and socially responsible banks? Are the determinants different for these bank types?

Q3: How do internal and external factors affect efficiency, profitability, and stability? Are the influences positive or negative?

1.3 The main contributions of the study

The inclusion of socially responsible banks contributes to the existing literature, as it adds a new type of bank into the literature around efficiency, profitability, and stability within the banking sector. In addition, this study shows the importance of society's activities rather than simply profits achieved. Furthermore, the inclusion of the corruption control variable is severely limited in the existing literature. However, comparing the efficiency, profitability, and stability and their determinants for Islamic, conventional, and socially responsible banks can contribute highly to the field of banking. In terms of researcher knowledge, this study is the first to examine the impact of the global financial crisis on socially responsible banks. Consequently, the gaps identified are covered in this thesis. Finally, combining MENA and UK banks as one group and comparing it with socially responsible banks across the world is a useful contribution towards researcher knowledge.

1.4 Structure plan

This paper is organised in the following way: Chapter One is an introduction, including the difference between Islamic and conventional banks; objectives of the study; data of the study; brief of efficiency, profitability, and stability measures; profile of the countries under the study; central banks roles; SRBs responsibilities; SRBs characteristics; and the main contribution of the study. Chapter Two discusses the literature review of efficiency in Islamic banks, efficiency in conventional banks, and a comparison between Islamic and conventional banks. Chapter Three evaluates the recent studies on determinants of profitability, before explaining the findings in the existing literature on stability within the banking sector. Chapter Four reveals the methodology, which includes research questions, research philosophy, research method, measures of the study, and the data description. Chapter Five focuses on the empirical results of the DEA estimator and the models of efficiency's determinants. Chapter Six then presents the determinants of profitability. Chapter Seven investigates the determinants of stability.

Finally, Chapter Eight concludes the thesis, and suggests recommendations for future research. Figure 1.1 below summarises the structure plan of this thesis.

1.5 Summary

Chapter One has given the background of the banking sector. In addition, a brief explanation of efficiency, profitability, and stability within the banking sector has been presented. This chapter has also highlighted the difference between Islamic, conventional, and socially responsible banks. The objectives and research questions for the study have been presented. Furthermore, the main contribution of the study and structure plan has been provided in this chapter.

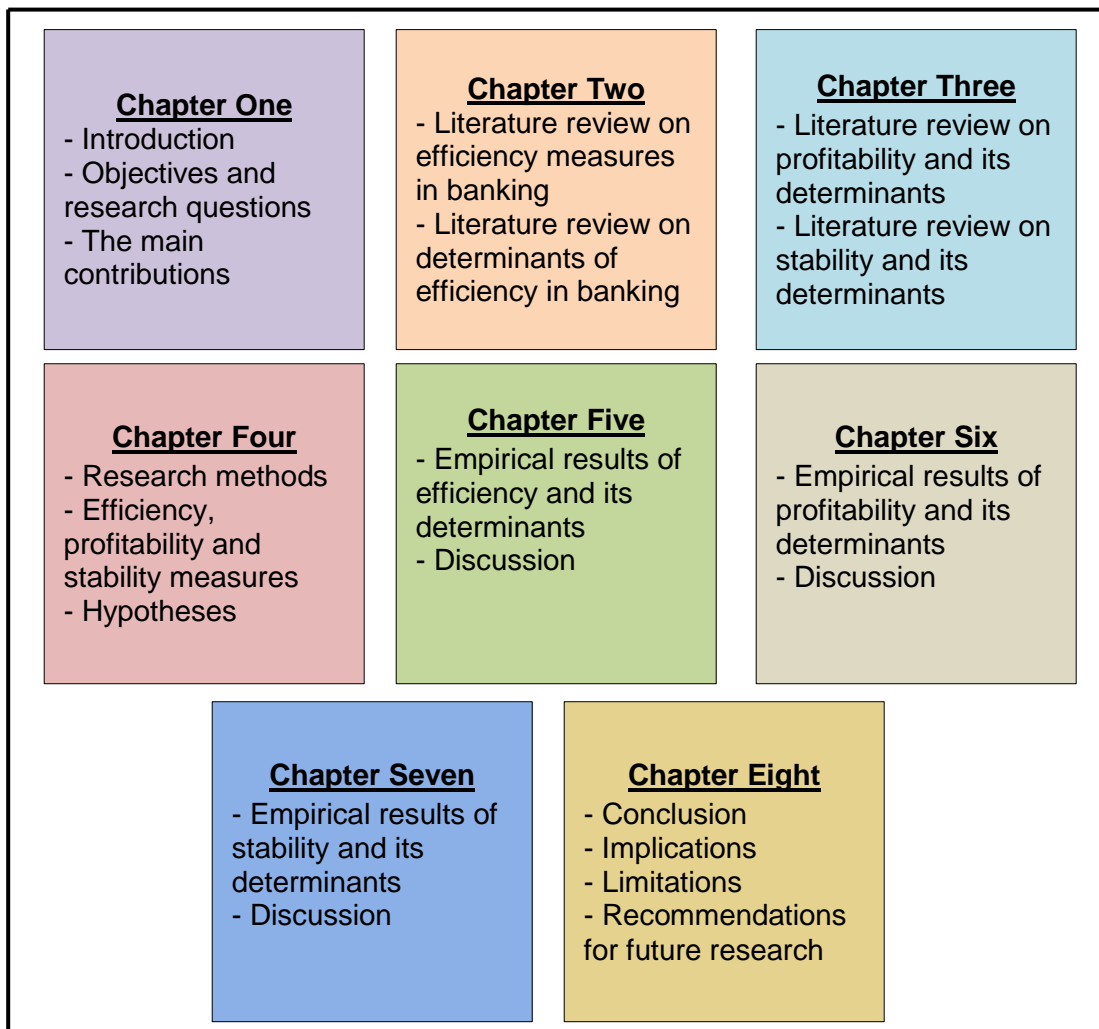


Figure 1.1: Structure plan of the thesis

Chapter Two: Theories of Banking and Literature Review on Efficiency in Banking

2.1 Theories of banking and hypotheses of efficiency, profitability and stability

According to Islamic banking, there are two resources of Sharia law (Islamic Development Bank, 2015) which are:

1. Primary sources: these sources are taken directly from the holy Quran and Sunnah.
2. Secondary sources: these are the interpretations (Ijtihad). Islamic banks have to follow the rules according to the above sources.

The operations of the Islamic banks are based on Islamic law (Sharia). Chong and Liu (2009) conclude that Islamic banks can be defined as being similar to conventional banks, but there are four principles that Islamic banks follow:

- The prohibition of uncertainty (Gharar).
- The prohibition of interest (Riba).
- Money is not a commodity.
- The prevalence of justice.

In fact, conventional banks do not follow all of the above principles. In addition, the main purpose of conventional banking is to maximise profits.

According to New Horizon Magazine (2014), published by the Institute of Islamic Banking and Insurance, Islamic banking services are divided into ten forms, as follows:

1. Mudharabah (profit sharing): This operation happens when a bank gives whole funds to the investors and shares the resulting profit, and one partner (bank or customer) is responsible for any potential losses. There is a fixed percentage to the bank, which is written into the contract between the investor and the bank.

2. Mousharaka (joint venture): This operation happens when a bank represents a shareholder, and the losses and profits can be shared between the borrower and the bank. This depends on the amount of equity of the company's assets.
3. Mourabaha (commercial funding with profit margin): This operation happens when a bank buys certain merchandise for a customer, then the bank achieves a fixed-margin profit determined within the contract, or the bank can share the losses and profits with the client based on the investment. The payment can be made in the future, whether paid in instalments or as the whole amount at once. The timing of payment and goods received must be predetermined.
4. Ijar (leasing): This is a lease contract that allows banking customers to use a bank's fixed assets or services for an agreed specific price and period under Sharia law conditions.
5. Wad'ee'a (safekeeping): This occurs when a customer deposits an amount of money in an Islamic bank for safekeeping. There is no interest on this deposit.
6. Gardh Hassan (interest-free loans): This is a completely interest-free loan. In this case, Islamic banks charge a certain amount of money called a loan processing fee.
7. Bai muajjal (credit sale): This is a contract between a bank and a customer that requires goods or services to be specified following Sharia law. The payment is in advance and the goods or services can be obtained in the future.
- 8- Ijar (leasing) that ends with ownership: An example of this case would be when a bank and a customer both share in buying a house, but the bank pays the majority of the money. The customer then pays rent to the bank for using the house. In this situation, the customer's share (equity) increases and the bank's share decreases. This process happens until the customer owns the property.
9. General loans: Islamic law prohibits that money can be borrowed and returned with interest. So in this case, a bank will buy house or car for a customer under the bank's ownership. The customer then pays the bank instalments until the full amount of the

item is repaid, and the customer then owns the property outright. In the event that the customer is unable to pay, the bank can invest or sell the item.

10. Sukuk (Islamic bonds): These are financial certificates that prove that the customer is involved in Islamic banking operations (1-9 mentioned above) in order to save customers' rights and equity.

In conclusion, Islamic banks operate with interest-free rates compared to other types of banks. However, the majority of recent studies on efficiency measurements have been based on conventional banks due to the wider availability of information on them compared to Islamic banks, which are a fairly new concept with little data available. It is observable that there is a higher number of commercial banks in this study's sample than Islamic banks. In fact, in any country containing both types of bank, there is always a higher proportion of commercial banks (Bankscope, 2012).

With regards to SRBs, there are many different names for this type of bank: alternative, civic, sustainable, and socially responsible banks. The main concerns regarding socially responsible banks are related to social or environmental (green) issues. Kansal *et al.* (2014) specify corporate social responsibilities (CSR) as follows:

- Sponsoring community events
- Providing local scholarships
- Encouraging literacy
- Providing affordable prices for houses
- Looking into energy saving
- Applying a green building strategy
- Reducing pollution
- Supporting recycling
- Defending human rights and dignity
- Launching green funds.

The organisation responsible for controlling banks is the central bank of any country. We can conclude some main tasks of central banks, which are outlined below.

- Measuring banks' efficiency, through using the parametric and nonparametric approaches to encourage inefficient banks to be more efficient. This approach depends on comparing inputs of banks with outputs to see the performance of

firms (Mester, 2003). Mester (2003) argues that the standard techniques of efficiency measurements can be used on the central banks as they have inputs and outputs. In addition, these measurements can improve the performance of central banks; however, it is hard to apply efficiency techniques on certain central bank policies, such as monetary policy.

- Monitoring the stability of the banking sector
- Issuing currency
- Strengthening the local currency
- Appraising banks
- Giving loans to banks
- Determining the interest rates
- Intermediating between the International Monetary Fund (IMF) and the country
- Providing prices for foreign currencies
- Imposing penalties and sanctions against the contravention banks
- Implementing monetary policies
- Managing foreign currency reserves
- Regulating the banking systems.

Source: Several Central Banks (e.g. Bank of England, 2015; Central Bank of Egypt, 2015).

To sum up, Table 2.1 compares between Islamic, conventional and socially responsible banks.

Table 2.1: Comparison between Islamic, conventional and SRBs

Criteria	Islamic Banks	Conventional Banks	SRBs
Other names	Interest-free banks Sharia compliant banks	Traditional banks Commercial banks	Ethical banks Green banks
The main aim	Applying Islamic rules	Maximising profits	Social and ecology issues
Supervisory Committee	Sharia Supervisory Board Board of Directors	Board of Directors	Ethical Committee
Constraints	Trading in something against Sharia law such as gambling	Services are illegal by government such as weapons trade	Dealing with unethical services such as alcoholic business
Source of guidance	Quran and Sunnah	Central banks	Religious groups who avoiding investing in Sin stocks
Services	Mudharabah Mousharaka Mourabaha Ijar Wadeea Gardh Hassan Sukuk Takaful	Profit sharing Joint venture Commercial funding Leasing Deposit Loan Bonds Insurance	Profit sharing Joint venture Green fund Leasing Deposit Loan Bonds Insurance

Sources: Adopted from Johnes (2014), Kansal (2014), Abdelsalam *et al.* (2013) and Forte and Miglietta (2007).

There are many differences with regards to concepts between Islamic, conventional, and socially responsible banks. The Islamic banking system's prohibition of interest (Riba) and constraints in dealing with non-ethical activities (for instance, gambling), means these factors are expected to reduce profitability compared to conventional banking. On the other hand, Islamic banks prefer to use their equity finance rather than debt finance (borrowings). This allows Islamic banks to be well capitalised (Usmani, 2002). With regards to conventional banks, the main aim of the conventional banking system is to maximise earnings compared to Islamic banks (providing ethical services based on Sharia Law, according to Iqbal [1997]) and socially responsible banks (social and environmental issues). As a result, conventional banks are likely to be the most profitable banks. Focusing on SRBs, one of the main goals for SRBs is to save resources (Kansal et al., 2014). Based on this concept, SRBs are able to be the most efficient banks through using minimum inputs (resources). Therefore, effective employment of inputs results in maximised outputs, which allows for more financial stability. Figure 2.1 shows the framework of how Islamic, conventional, and socially responsible banks operate.

In conclusion, we can conduct hypotheses of efficiency, profitability and stability as follows:

H1: Socially responsible banks are more efficient than Islamic and conventional banks.

H2: Conventional banks are more profitable than Islamic and socially responsible banks.

H3: Socially responsible banks are more stable than Islamic and conventional banks.

2.2 Efficiency in banking

This section is divided into two parts: a literature review on efficiency, and the determinants of efficiency in the banking sector.

2.2.1 Literature review on efficiency in banking

One of the most important studies on efficiency was conducted by Farrell (1957) on the American agricultural sector. The data from this study was classified over 48 states using variables as land, labour, materials and capital. These variables were compared with each other for each state to generate the efficiency measures, which varied

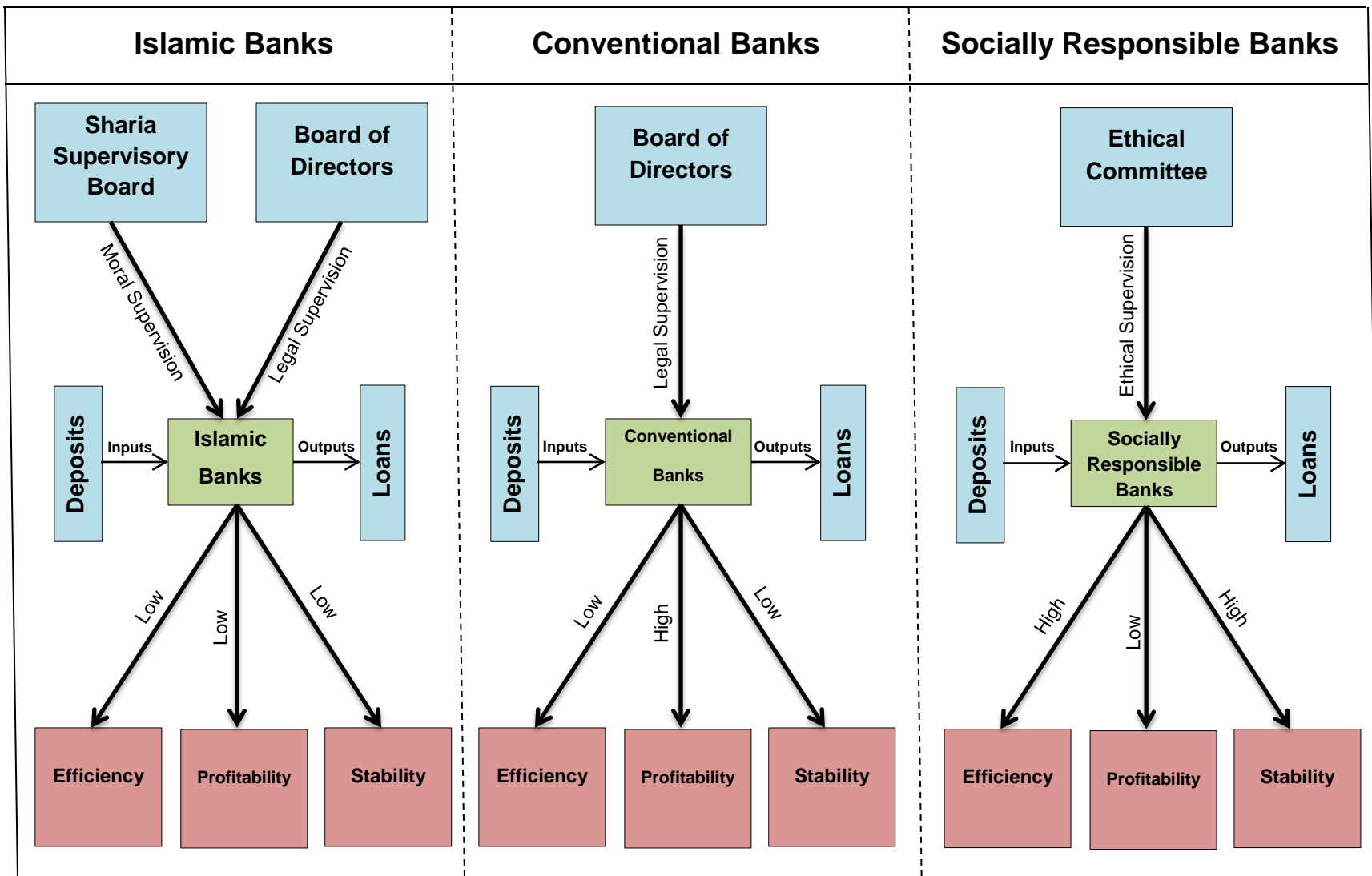


Figure 2.1: Framework of banking operations

between 33 (minimum) to 100 (maximum). The study concludes that there are two types of efficiency: technical efficiency and price efficiency. Technical efficiency concentrates on production amount only (excluding costs of inputs and outputs). In this case, firms can be efficient by minimising inputs to maximise outputs. However, price efficiency focuses on optimal inputs and outputs to achieve better returns (considering costs of inputs and outputs). Farrell (1957) assumes that when an organisation produces more than average, then it is efficient; otherwise it is inefficient. Further to this, Charnes *et al.* (1978) adopted the DEA approach by comparing more than multiple inputs with multiple outputs which could not be used by Farrell (1957). The study aimed to estimate the technical efficiency of American schools using inputs and outputs without knowing their costs. Charnes *et al.* (1978) established an approach called CCR (standing for Charnes, Cooper and Rhodes) to avoid the non-availability of the input and output costs problem, but this approach assumed constancy in earnings. In 1984, Banker, Charnes and Cooper were able to develop the CCR concept by considering the variety of returns and the costs of inputs and outputs. Banker *et al.* (1984) called the new approach 'BCC (pure technical efficiency)'. They then discovered scale efficiency, which compares the CCR and BCC ratios (any difference between CCR and BCC leads to scale inefficiency).

There are extensive previous studies focusing on efficiency in conventional banks. In comparison, fewer studies concentrate on efficiency in Islamic banks due to the limited availability of data for them. Recently, several studies compared the efficiency of conventional and Islamic banks. However, in the literature, no study has considered socially responsible banks (SRBs). Therefore, this study can fill the gap by including SRBs in the comparisons.

This chapter is divided into three sections: first, efficiency in Islamic banks; second, efficiency in conventional banks; and third, efficiency in Islamic and conventional banks.

2.2.1.1 Efficiency in Islamic banks

There is a study by Hassan (2006) of the Islamic banking industry and it included 21 Muslim countries around the world including 43 Islamic banks over the period 1995-2001. Hassan (2006) examined two methods to investigate their efficiency, the

parametric (cost and profit efficiency) and the nonparametric approaches (data envelopment analysis and malmquist productivity index). The minimum efficiencies were cost efficiency (73.5%) and allocative efficiency (73.3%) and the maximum efficiency was pure technical efficiency (95%). The results concluded that the Islamic banks were relatively inefficient in containing costs but they were efficient in generating profits (84.4%). According to determinants, sizes of banks, profits and loans supported efficiencies positively. This study did not include ownership impact on efficiency. Hence, this thesis finds the ownership influence on efficiency. In addition, this study examined the ROA and ROE as independent variables. Consequently, this can provide a high Multicollinearity, which led the researcher to avoid containing more than one profitability ratio as explanatory factors.

Hassan and Hussein (2003) used a non-parametric approach (DEA) and a parametric approach (SFA) to examine 17 Sudanese Islamic banks during the period 1992-2000. Their findings showed that the average DEA was 23%, while the average cost and profit efficiencies were 55% and 50%, respectively. The allocative and technical efficiencies scored 37% and 60%, respectively, which indicated that average cost inefficiency in the Islamic banks happened due to technical errors such as manager control. As a result, the banks could improve the X-efficiency by allocating their inputs, second, the labour force could be trained better, and third, the banks can increase the branches and ATMs to reduce the potential costs.

Focusing on the Malaysian Islamic banking sector, Sufian (2007) investigated 17 Islamic banks in Malaysia using DEA over the period 2001-2005. The findings concluded that the foreign banks exhibited more technical efficiency than the domestic banks. The efficiency scores varied from 0.597 to 0.975. The inefficiency occurred due to scale efficiency rather than pure technical efficiency. However, the banks could increase their efficiency by increasing their size in Malaysia. The disadvantage of this study is that no evidence of macroeconomic impact on efficiency, which can be covered by this thesis.

Rosman *et al.* (2014) measured the efficiency of 79 Islamic banks in the Middle East and Asia employing DEA through the period 2007-2010. The DEA measures illustrate

that Asian Islamic banks have higher efficiency measures than Middle Eastern Islamic banks. The results of DEA explain that the Islamic banks were able to sustain their operations throughout the financial crisis period as there is a slight drop in TE, PTE and SE after 2009 in Asian banks and after 2008 in the Middle East. The profits and capitalisation enhanced efficiency in Middle East but total assets led to poorer efficiency. According to Asian banks, profits, size of bank, capital ratio and loan loss provisions supported efficiency positively. The gap of this study is that there is no analysis of effect of loans (one of main banking operations) on efficiency.

Belanes's *et al.* (2015) study focused on 30 Islamic banks in GCC using DEA over the period 2005-2011. Most banks remained efficient but some banks witnessed a slight decline in technical, pure technical and scale efficiency measures. However, the most inefficient year was 2009 for TE, PTE and SE. The most efficient Islamic banks were in UAE due to the booming financial sector, while Bahraini Islamic banks attained the minimum efficiency indicators. No determinants of efficiency were estimated in this study, only efficiency measuring was included.

Mokhtar *et al.* (2007) measured the technical and cost efficiencies using DEA in Malaysian fully-fledged Islamic banks and Islamic windows as conventional banks, finance companies and merchant banks for the period 1997-2003. The inputs were: total deposits, personal expenses and other overhead expenses, and the outputs were total earning assets for 288 financial statements. The findings suggested the average efficiencies of Islamic banks increased during the period; also the fully-fledged banks achieved higher efficiency scores than Islamic windows but lower efficiency than the conventional banks. The main determinants of efficiency according to their regression were the size of the bank, adequacy of capital, bank expenses, quality of loan and age of the bank. Overall, the efficiency of the banking sector in Malaysia needed to be improved as the efficiency scores were very low. This study neglected the effects of Asian financial crisis (AFC) upon efficiency that started in 1997, particularly in Thailand (IMF, 2014).

To sum up, efficiency in the Islamic banking system is always low due to restrictions in their operations (applying Sharia law). As a result, a reduction in the outputs (such as profits) can occur in Islamic banking systems.

2.2.1.2 Efficiency in conventional banks

Assaf *et al.* (2011) used the DEA to analyse the technical efficiency of 9 Saudi commercial banks during the period 1999-2007. The study suggested that the efficiency had started to rise from 2004 and the Saudi banks with foreign capital were inefficient. The highest average efficiency score was 0.918 in 2006. On the other hand, the lowest average efficiency was 0.784 in 2002. This study did not show the impact of external variables.

Garza-García (2012) used the DEA efficiency for Mexican banks during the period 2001-2009. The data used in this study included 18 of the largest banks in Mexico. From the DEA, the average inefficiencies were 15%, 29% and 14% for technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) respectively, so the inefficiency occurred due to pure technical efficiency. The results of Tobit model indicate that higher profits (ROA), loans and foreign ownership attained better efficiencies. On the other side, non-performing loans and inflation affected efficiencies badly. The disadvantage in this study that is including three profitability (independent) indicators (net interest margin, return on assets and net interest income) which can have a high Multicollinearity hence, using one profitability ratio is enough.

Sufian (2007) examined the long-term trend in efficiency in six conventional Singaporean banks during the period 1993-2003. His results suggested that the technical efficiency scored 88.4%. In other words, the examined banks had a high efficiency, but they still had a waste of input inefficiency (11.6%). The overall efficiency was declining during the earlier period, but it started to grow later. All determinants of efficiency found to be negative and significant (total assets, loans and deposits). This study could contain more explanatory variables rather than three variables only.

Concentrating on the Korean banking sector, Sufian (2011) examined the technical efficiency of 29 banks during the period 1992-2003. The results suggested that the

technical efficiency was high under the operating approach, but it was slightly lower under the intermediation and value-added approaches. In addition, as a whole the most efficient year was 1992. No statistical analysis in this study conducted to show the factors that specifies efficiency in Korea.

Yeh (2011) used SFA to find the cost efficiency of 44 conventional Taiwanese banks over the period 1999-2004. The average cost efficiency of the examined banks was 72.69%, which is inefficient. The researcher suggested increasing the performance of Taiwanese banks by reducing the managerial share of ownership to reduce costs and increase the performance and efficiency of the banks. In addition, banks in Taiwan had to engage in mergers to raise their efficiency. The main positive determinants were total assets and borrowing (debt ratio). The limitation of this study can be observed that profit efficiency was not measured.

Shamsuddin and Xiang (2012) investigated the efficiency of 10 Australian banks utilising SFA during the period 1995-2008. The results noted that the efficiency had improved in large and small Australian banks in the technical, cost and profit efficiencies. In particular, large banks achieved more average cost efficiency than small banks. Small banks attained a higher level of average technical and profit efficiency. Additionally, bank stock returns impacted the efficiency positively and significantly. The study did not indicate the influence of global financial crisis on efficiency.

Another study investigated cost and profit efficiency in the banking sectors across Central and Eastern Europe between 1993 and 2000 (Yildirim & Philippatos, 2007). The sample panel consisted of 325 banks. The SFA methodology concluded that average profit and cost efficiencies in CEE banks were 72% and 77%, respectively. According to cost efficiency's determinants, size, capitalisation, loans, foreign ownership and GDP supported efficiency positively and significantly whereas, loan loss reserves decreased efficiency. However, profit efficiency was affected negatively and significantly by loan loss reserves, GDP and foreign ownership. The results could be more important by comprising domestic and public ownerships dummies.

Focusing on Eastern European countries, Fries and Taci (2005) used SFA to measure the cost efficiency taking a sample of 15 Eastern European countries and using 289 conventional banks during the period 1994-2001. The results showed that the overall cost efficiency measures of Eastern European banks were low. The highest average cost efficiency was achieved by Estonian banks scoring 0.85 and the lowest mean cost efficiency was achieved by Romanian banks at 0.55. The results showed as well that the private banks were more efficient than the state-owned banks due to deregulating. The researchers suggested that for improving the Eastern European efficiency, the banks had to take a position of competition against the European Union countries and the banks had to reduce their costs and raise their profits through planned strategies and policies. Overall, estimating profit efficiency could improve the study through comparing with cost efficiency.

Al-Sharkas *et al.* (2008) studied mergers in the United States banking industry using DEA and SFA during the period 1987-1999. The sample panel included 440 conventional banks. This study compared merged and non-merged banks in the US banking industry. Their findings suggested that the mergers enhanced the profit and cost efficiencies of banks. Moreover, by using efficient technology, the merged banks had lower costs than non-merged banks. Furthermore, the efficiency measures increased gradually over the period. All efficiency measures concluded that the merged banks were more efficient than the non-merged banks. Finding the determination of efficiency could enhance this study.

In a recent study on the US, Feng and Serletis (2010) employed DEA to find the technical efficiency of 292 conventional banks over the period 2000-2005. The results of DEA indicated that the US banks were relatively efficient during the period but the technical efficiency reduced from 2000 (0.934) to 2005 (0.926). The short period of this study considered to be ineffective. In addition, no factors impacted efficiency were analysed in this research. These two disadvantages can be included in this thesis.

Al Shamsi *et al.* (2009) measured the economic efficiency of 21 Emirati commercial banks during the period 2002-2004 using SFA and DEA. The banks studied were inefficient relatively due to cost, allocative, technical and pure technical reasons. The

banks in United Arab Emirates (UAE) did not take advantage of the development that has happened in Emirates recently in terms of size, technology and the integration with the world's economy. The researchers found that the banks could improve their efficiency by establishing more branches, enhancing the skills of the employees and reducing the ownership of the banks from the government. The weakness points in this study are estimating the efficiency of one country only (there is no comparison between any countries) and banks' names are not clear.

Using one output only, Erdem and Erdem (2008) used profit before tax generated from the inputs of employees, physical capital and interest bearing liabilities. They utilised DEA to measure the efficiency of 10 listed Turkish commercial banks during the period 1998-2004. Six banks were technically efficient during the period 1998-2004. The lowest efficiency for all the banks was in 2003 as a consequence of the economic crisis in Turkey, scoring 0.594, 0.794 and 0.325 for technical, allocative and economic efficiency, respectively. On the other hand, the highest efficiency was in 1999 scoring 0.781, 0.847 and 0.653 for technical efficiency, allocative and economic efficiency, respectively. The economic crisis in Turkey in 2000 and 2001 affected the efficiency in banks. Erdem and Erdem (2008) did not estimate PTE and SE which considered to be the main indicators of DEA. Furthermore, there are no explanatory variables in this study.

Focusing on Indian commercial banks, Sathye (2003) measured the productive efficiency of public, private and foreign banks in India from 1997 to 1998 utilising DEA on 94 conventional banks. Sathye (2003) argued that to improve efficiency, the banks should have enhanced the staff performance and considered the rationalisation of using inputs. In another study of Indian conventional banks using the SFA and DEA approach on the Indian banking sector, Das *et al.* (2004) examined the efficiency of Indian commercial banks during the period 1997-2003. The technical efficiency included two approaches, input-oriented technical efficiency and output-oriented technical efficiency, and both of them illustrated high levels of efficiency during the period. The cost and revenue efficiencies were high, compared to the profit efficiency. Overall, the efficiencies during the period increased slightly due to the financial liberalisation that

happened in India in the 1990s. Both above studies did not examined the factors that affected efficiencies in India. On the other side, Das and Ghosh (2009) estimated the determinants of efficiency in Indian banking sector. They examined the profit and cost efficiencies during the period 1992-2004 using the DEA. Their findings showed that the cost efficiency levels were high, especially in 1998 scoring 0.880, whereas the profit efficiency levels were low, especially in 1992 scoring 0.4277. In other words, the commercial banks in India during that period focused on reducing the costs and did not achieve profit maximising. The banks' sizes, liquidity, deposits and public ownership found to be increasing efficiency significantly over the period of the study. This result is contradicted with loans, which negatively and significantly affected the efficiency in India. This study found the determinants of efficiency in banking sector using Tobit model only. In order to improve the results, another statistical model could be run due to providing a robust evidence of the impact. Moreover, considering foreign ownership as an explanatory variable would support the comparison between the efficiency of private and public ownerships.

Comparing the efficiency of Indian and Pakistani conventional banking sectors during the financial liberalisation, Ataullah *et al.* (2004) employed DEA over the period 1988-1998. The study compared the public sector banks, domestic private banks and foreign banks in India and Pakistan. Overall, the technical efficiency measures concluded that the efficiency improved over the period for both countries especially after 1995 due to the financial liberalisation. In the case of India, the technical efficiency rose as a result of improvement of the scale and pure technical efficiencies. In the case of Pakistan, the technical efficiency rose due to the improvement of the scale efficiency. The results showed that in both countries the banks were more efficient in terms of generating earning assets rather than generating income. They found that the financial liberalisation closed the gap in efficiency between small and large banks. Higher profits in India and Pakistan (ROA) led to attain better efficiency indicators whereas, costs (costs to assets and costs to revenues ratios) directed to poorer efficiencies. In general, this study could be more effective by examining more factors of efficiency rather than three variables only. Additionally, there are no external variables in the model (such as inflation).

Zhang *et al.* (2012) investigated the technical efficiency of a panel sample of 133 city commercial banks in China (31 regions) during the period 1999-2008. Their results indicated that the banks' efficiency could be heavily affected by the law enforcement effectiveness of the 31 regions used. In conclusion, the average technical efficiency based on the income model (score 0.816) was slightly higher than the average technical efficiency based on the earning assets model (score 0.799). The positive determinants of technical efficiency found to be loans, capitalisation and securities while, GDP and non-performing loans increase inefficiency. This study could be developed by using more efficiency indicators such as pure technical efficiency and scale efficiency.

Staub *et al.* (2010) compared state-owned, private, foreign, private (domestic) and foreign participation banks in Brazil using from 184 banks. The method was DEA to investigate cost, technical and allocative efficiencies over the period 2002-2007. Their figures indicated that the cost efficiency was the lowest. In other words, the costs as inputs were high in Brazilian banks. The highest efficiency score was the allocative efficiency. The results showed that the large banks and foreign banks were the most efficient. The market shares and age of banks led to higher efficiencies. The gap in this study is lack of external factors have been used, which are highly anticipated influencing efficiency in Brazilian banking sector.

However, Casu and Molyneux (2003) employed DEA on 750 commercial banks from the UK, Spain, Italy, Germany and France over the period 1993-1997. They compared the constant returns to scale (CRS) and variable returns to scale (VRS). Overall, the results illustrated relatively low average efficiency levels, and in the CRS stage, the average efficiency was higher than the VRS stage. The highest level of average efficiency was in 1997 in the CRS and VRS stages, whereas the lowest average of efficiency was in 1995. The limitation of this study can be concluded that Casu and Molyneux (2003) could not examine the internal and external factors that can impact the efficiency.

Sufian (2010) compared the efficiency of the Malaysian and Thai banking industries using a sample of 15 conventional banks before and after the financial crisis that happened in Asia in 1997 employing DEA for the period 1992-2003. The results

indicated that Thai banks were more efficient than Malaysian banks achieving higher means technical, pure technical and scale efficiencies equal to 0.880, 0.943 and 0.934, respectively. Malaysian banks scored average technical, pure technical and scale efficiencies equal to 0.663, 0.837 and 0.806, respectively. The inefficiency in both countries was due to technical analysis rather than pure technical and scale efficiencies. The results of DEA showed that before 1997 the efficiency indicators were high, then declined after 1997 until 2000 and then increased. The drop happened due to the financial crisis in 1997 and the banks suffered for some time; after that they tried to find new strategies to raise the efficiency again after 2000. According to Malaysian banking's efficiency, there are positive and significant correlations between efficiency and loans, ROA and deposits whereas, negative and significant relationships attained by loan loss provisions, size of banks and non-interest income. Thai banks affected positively by size, loan loss provisions and capital ratio. The Asian financial crisis (AFC) affected Malaysian and Thai banks badly.

Another study on a European country has been conducted Hasan and Marton (2003) who analysed all the Hungarian commercial banks that operated in the Hungarian Financial and Stock Exchange Almanac (HFSEA) during the period 1993-1998 utilising SFA to measure the inefficiency. The results suggested that the average profit inefficiency was higher than the average cost inefficiency at 34.50% and 28.76%, respectively. In other words, the Hungarian banks were more efficient during the period in reducing costs than generating profits. The empirical results suggest that profit efficiency could be improved by focusing on financial investment, bank size, foreign shares and acquisition but reducing liquidity and capitalisation increased efficiency. According to cost efficiency, liquidity, size and foreign shares supported efficiency positively whereas, financial investment and capitalisation led to inefficiency. This study could compare Hungary with another European country to provide clearer point of view. Additionally, macroeconomic variables were not available in this study.

Another study measured the productive efficiency of Lebanese commercial banks after the war in Lebanon. Ariss (2008) used SFA during the period 1990-2001 for 60 banks. The results suggested that the period of 1996-2001 was much more efficient due to

more liberalisation in the economy such as deregulation than the period of 1990-1995. The average cost efficiency for the period of 1996-2001 was 97.06%, whereas for 1990-1995 the mean cost efficiency was 85.33% which shows that the banks in Lebanon enhanced their cost efficiency during the period of the study. Overall, the average cost efficiency was relatively low due to the war in the country (Ariss, 2008). In this study, profit efficiency was not measured, which can be one of the main disadvantages of the study. Moreover, determinants of efficiency were not investigated in this study.

Another study concerning the Australian banking industry was conducted by Vu and Turnell (2004). This study analysed cost and profit efficiencies of nine Australian conventional banks during the period 1997-2009, employing the SFA approach. They divided their study into two periods, pre-global financial crisis (GFC) from 1997-2006 and during GFC from 2007-2009. The findings showed that the overall profit efficiency of Australian banks during the period was higher than the overall cost efficiency. The major banks were found to be more efficient in cost and profit than the regional banks. Before the GFC, the major banks scored 0.865 and 0.691 for average profit and cost efficiencies, respectively, whereas the regional banks scored 0.811 and 0.723 for average profit and cost efficiencies, respectively. During the GFC, the major banks scored 0.758 and 0.701 for average profit and cost efficiencies, respectively; whereas, the regional banks scored 0.653 and 0.686 for average profit and cost efficiencies. The statistical results reported that banks with lower size and capital were more efficient. Additionally, profitability ratios (ROE and NIM) had a negative signs with efficiency. Finally, non-interest expenses (NIE) impacted the profit and cost efficiencies negatively and significantly but the GFC decreased profit efficiency significantly only. The limitation of this study is that the external factors' impact was not available in this study.

A study of the New Zealand banking sector by Tripe (2003) estimated the scale efficiency of eight conventional banks using the DEA approach for the period 1996-2002. The highest average scale efficiency was attained by the Bank of New Zealand scoring 96.29% and the lowest average scale efficiency was attained by the National Bank of New Zealand scoring 87.59%. This showed that the banks could improve the scale efficiency by expanding their size and enhancing the managerial practices in terms of

technical efficiency. Statistically, time trend increased efficiency while, interest rates reduced efficiency. This study could be improved by including more variables in the regression rather than two explanatory factors (interest rate and time trend).

Drake *et al.* (2009) examined the efficiency of the Japanese banking sector using DEA during the period 1995-2002 employing intermediation, production and profit/revenue approaches. The findings showed that the majority of Japanese banks were relatively efficient. The intermediation approach produced the highest relative efficiency measures due to employing a clear policy agenda from the decision makers in the range of 67.46%-77.60% of average efficiency; whereas, the least relative efficiency scores obtained through the production approach were in the range of 24.47%-33.40% for average efficiency. There is no statistical approach conducted in this article to show the internal and external factors that affect efficiency.

Canhoto and Dermine (2003) compared the efficiency of 20 new and old banks in Portugal over the period 1990-1995 utilising DEA. In 1986, Portugal entered the European community and then the government changed the whole banking system using the deregulation system as privatisation, granting new banking licences and an opening borders policy. Due to deregulation, the efficiency of Portuguese banks improved. The banks increased their efficiencies during the period of the study. New banks were more efficient than old ones scoring 0.77, 0.86 and 0.89 for mean CRS, VRS and scale efficiencies respectively. Old banks attained 0.62, 0.73 and 0.85 for average CRS, VRS and scale efficiencies, respectively.

Percin and Ayan (2006) measured the efficiency of 31 Turkish conventional banks utilising DEA for 2003 and 2004. The efficiency levels of CRS, VRS and scale efficiencies were reduced from 2003 to 2004. In 2003, the Turkish banks scored averages of 0.868, 0.955 and 0.911 for CRS, VRS and scale efficiencies respectively, whereas in 2004 the banks achieved averages of 0.772, 0.848 and 0.900. In 2004, they calculated that 11 banks out of 31 were found to be efficient, whereas 16 banks were efficient under the VRS approach. In 2003, the results indicated that 16 banks were efficient under the CRS approach, while 23 were efficient under VRS assumption.

Assaf *et al.* (2012) used the cost efficiency of 25 Nigerian banks during the period 2002-2007, dividing this period into two parts, first, pre-consolidation and second, post-consolidation using the intermediation approach. The consolidation started in Nigeria in 2004 when the Central Bank of Nigeria (CBN) declared new policies for Nigerian banks. These policies were to encourage the banks to raise their average size by acquisition and mergers, but some banks could not handle the CBN policies, which pushed them into liquidation. The findings showed that the cost efficiency had significantly increased after the consolidation level in 2004; the average efficiency started from 0.782 in 2002 and grew to 0.912 in 2007. The period of this paper could be extended to find the global financial crisis effects.

Concentrating on the Chinese commercial banking system, Wang *et al.* (2014) analysed the efficiency of 16 major commercial banks during the period 2003-2011 using DEA measures. They used two stages to find DEA measures; deposit production and profit-earning stages. The findings suggest that the overall efficiency improved during the period. Even the efficiency in the first stage (deposits production) was found to have risen in DEA measures over the period. According to DEA estimators in the second stage (profit-earning), the graph of DEA fluctuated and dropped sharply in 2006 and 2009; in contrast, the graph slightly increased in the rest of the years. In general, they found that state-owned banks are more efficient than joint-stock banks during the period. The gap of this study is that there is no consideration for determinants of efficiency.

Svitalkova (2014) compared the efficiency of six European countries namely, Czech Republic, Slovakia, Austria, Poland, Hungary and Slovenia during the period 2004-2011 using the DEA approach. He used inputs as personnel costs, fixed assets, deposits while the outputs are loans, net interest revenue and loan loss provisions. According to CRS and VRS values, the efficiency of Hungary, Austria and Czech Republic are relatively high compared with Slovenia, Slovakia and Poland. This study shows the effect of the financial crisis in these countries as in 2009 the CRS and VRS had a sharp decline and kept reducing until 2011 apart from Slovakia, Slovenia and Poland for the CRS and VRS estimators. In other words, the only three countries that could improve their efficiencies after 2009 are those countries. Focusing on the Czech Republic

banking sector only, Řepková (2014) analysed the efficiency of 11 commercial banks. The data was extracted from Bankscope for the period 2003-2012. The DEA indicators were adopted through the input-oriented (intermediation) method which transfers deposits to loans. However, Řepková (2014) employed labour and deposits as inputs, and loans and net interest income as outputs. In conclusion, the mean CRS reached 84%-89% and the VRS scored 70-78%. In addition, larger banks were found to be less efficient than the smaller banks due to the excess of deposits in the balance sheet and inappropriate size of operation.

Ohsato and Takahashi (2015) is a very recent study that focused on management efficiency in the Japanese banking sector for the years 2012 and 2013. All regional banks had inefficient scoring DEA with 0.352 and 0.266 in 2012 and 2013, respectively. This study suggests that Japanese banks need to minimise the inputs and maximise the outputs through policy makers' strategies, otherwise the efficiency will keep decreasing over time.

In conclusion, according to the literature on efficiency in Islamic banks, conventional banks were found to be relatively more efficient than Islamic banks, because conventional banks aim to maximise their profits (outputs). In addition, the efficiency scores in developed countries are significantly higher than efficiencies in emerging countries.

2.2.1.3 Efficiency in Islamic and conventional banks

Johnes *et al.* (2009) examined the efficiency of Islamic and conventional banks in the GCC countries over the period 2004-2007 using data envelopment analysis. The findings suggested that the average efficiency was significantly lower in Islamic banks than conventional banks. In contrast, Abdul-Majid *et al.* (2010) found that the efficiency of the Islamic banks was more than the efficiency of the conventional banks over the period 1996-2002 using data from 10 countries (111 banks).

Mostafa (2007a) examined the efficiency of the top 100 Arab conventional and Islamic banks from 14 countries in 2005 using DEA. The researcher employed two methods of DEA using CCR and BCC. However, the inputs of Mostafa's (2007a) study were: the

capital and assets of the banks, whereas the outputs were: the profits, the return on equity (ROE) and the return on assets (ROA) of the banks used. The results showed that the Arabian banks of the study were inefficient, as only 4 banks scored 100% efficiency in both BCC and CCR scores. In other words, 96 banks were inefficient as they needed to reduce their inputs and increase their outputs to raise efficiency. The four efficient banks were from Egypt and the United Arab Emirates namely, the Banque de Caire and Egyptian American Bank from Egypt, and the National Bank of UAE and United Arab Bank from the United Arab Emirate. In another study, Mostafa (2007b) examined 50 GCC Islamic and conventional banks using DEA of BCC and CCR in 2005, and he found that 5 banks achieved 100% efficiency of BCC and CCR.

Hadad *et al.* (2012) utilised a couple of models: 'semi-oriented radial measure' 'slacks-based model' or 'SORM SBM' DEA which was created by Tone (2001), and the range-directional (RD) model suggested by Silva Portela *et al.* (2004) to analyse the efficiency of 130 Indonesian conventional and Islamic banks over the period 2003-2007. The results suggested that the most efficient bank type was the state-owned and the least efficient bank type was the regional government-owned. Furthermore, the average efficiency in banks varied between 58%-63% for the SORM SBM model, and between 72%-79% for the RD model, which indicated in general, inefficiency in Indonesian banks.

Comparing the cost and profit efficiency of Islamic and conventional banks, Olson and Zoubi (2011) studied the efficiency of 10 Middle Eastern and North African (MENA) countries. There was a large difference between the average cost and profit efficiency, scoring 70.3% and 59.4%, respectively. The conventional banks had higher cost and profit efficiency than Islamic banks with the conventional banks scoring cost and profit efficiency of 71.2% and 74.4%, respectively, whereas Islamic banks scored 66.4% and 59%, respectively. The disadvantage of this study can be observed that the model included many faded coefficients. In addition, macroeconomic variables have not been investigated to find the effect on efficiency.

Bader *et al.* (2008) examined and compared the cost, revenue and profit efficiencies of 37 conventional banks and 43 Islamic banks around 21 different countries for the period 1990-2005. All banks examined attained high average cost efficiency, scoring 0.918, but

lower average revenue and profit efficiency, scoring 0.811 and 0.872, respectively. On the other hand, all banks examined were better in using their inputs (resources) than generating outputs (profits and revenues). In particular, conventional banks were found to be more cost efficient, achieving average cost efficiency of 0.935, than the Islamic banks who achieved 0.903; the Islamic banks were found to be high in revenue and profit efficiencies achieving average revenue and profit efficiencies of 0.817 and 0.879, respectively, whereas conventional banks achieved 0.806 and 0.863, respectively.

To conclude, based on the literature of efficiency in conventional and Islamic banks, some studies approved that Islamic banks operated more efficiently than conventional banks and some studies confirmed the vice versa. Most studies focused on the Middle Eastern region due to a high availability of Islamic banks in this area.

2.3 Determinants of efficiency in banking

This study empirically examines the effect of internal and external factors on efficiency in Islamic, conventional and socially responsible banks. Depending on the literature review, the most effective and available internal variables can be bank size, capital ratio, loan intensity, credit risk, financial leverage, return on assets (ROA), bank age, ownerships (foreign, domestic and public) and listing. The external variables can be gross domestic production (GDP), inflation, market capitalisation, global financial crisis and control of corruption. The following section explains the recent studies of each variable.

2.3.1 Internal variables

1. Bank size

Most studies use bank size as an indicator of efficiency and many found a significant and positive effect on efficiency, which means that larger sized banks are more efficient than smaller sized banks. In other words, more assets owned by banks led to improved efficiency; Sufian's (2009) study employed DEA to investigate the efficiency of 36 Malaysian commercial banks in 1990-1999. In the second-stage regression, the findings imply that larger sized banks are more efficient than smaller sized banks. Many studies are in line with Sufian (2009) (e.g., Wanke & Barros, 2014; Tan & Floros, 2013; Vu &

Nahm, 2013; Abul Alkheil *et al.*, 2012; Noor & Ahmed, 2012; Sufian & Habibullah, 2009; Yildirim & Philippatos, 2007; Yudistira, 2004). In contrast, a number of studies proved that smaller banks attained better efficiency measures (Hou *et al.*, 2014; Chortareas, *et al.*, 2012; Han *et al.*, 2012; El-Moussawi & Obeid, 2010; Satub, *et al.*, 2010; Ariff & Can, 2008; Girardone *et al.*, 2004; Hasan & Marton, 2003). However, Rosman's *et al.* (2014), Zhang and Matthews's (2012) and Chiou's (2009) results suggested that size of banks influenced the efficiency positively and negatively in their studies. In general, few studies found that the relationship between size and efficiency is insignificant (Wanke & Barros, 2014; Garza García, 2012; Assaf *et al.*, 2011).

2. Capital ratio

Another internal factor is capital ratio that indicates the importance of shareholders equity of firms. Higher capitalisation can increase efficiency in the banking sector (Mamatzakis *et al.*, 2015; Rosman *et al.*, 2014; Taba *et al.*, 2013; Noor & Ahmed, 2012; Chiou, 2009; Pasiouras, 2008; Yildirim & Philippatos, 2007; Grigorian & Manole, 2006; Hasan & Marton, 2003). In some cases, lower capitalised banks are more efficient (Vu & Nahm, 2013; Zhang *et al.*, 2012; Fang *et al.*, 2011; El-Moussawi & Obeid, 2010; Hermes & Nhung, 2010; Ariff & Can, 2008; Girardone *et al.*, 2004; Casu & Molyneux, 2003). Banks could enhance their efficiency based on the relationship between capital ratio and efficiency measures whether increasing or decreasing the capital of the bank. However, Hou *et al.*, (2014), Chortareas *et al.* (2012) and Sufian and Habibullah, (2009) could not justify any effect on efficiency by capitalisation.

3. Loan intensity

One of the main roles of the banking system is to provide loans. Most studies in the literature examined loans to assets ratio as a main determination of efficiency. As a result, many studies point out that providing more loans could raise efficiency in the banking sector such as Johnes *et al.* (2014), Garza García's (2012), Sufian and Habibullah's (2009), Yildirim and Philippatos (2007) and Pasiouras (2008). On the other side, Noor and Ahmed (2012) and Sufian (2009) underline that loans raise the risk of inefficiency in the banking sector. Havrylchyk's (2006) findings suggest that loans could

improve the technical and cost efficiencies, while loans decrease the allocative efficiency in the Polish banking sector. However, Vu and Nahm (2013) and Hasan and Marton (2003) could not find any correlation between loan intensity and efficiency. In general, accepting more deposits from clients allows banks to supply more loans which could maximise the profits. Hence, banks need to offer more services to attract more clients to deal with banks.

4. Credit (liquidity) risk

Lee and Chih (2013) examined the efficiency of large and small banks in China during the period 2004-2011. This study claimed that credit risk (loan to deposits ratio) empirically determined the profit efficiency significantly and negatively in smaller banks. This means that banks needed to focus on increasing loans to raise efficiency. Hou *et al.* (2014) found the same relationship between credit risk and efficiency. Ariff and Can (2008) conclude the opposite results which confirm that engaging in more lending activities led to worse efficiency over the period 1995-2004 in China. This is in line with Zhang *et al.* (2012) also in the Chinese banking sector over the period 1999-2008.

5. Financial leverage

Few studies concern financial leverage as a determinant of efficiency such as Abul Alkheil's *et al.* (2012) study. This examined the efficiency as a first stage in Malaysia, the UK, Turkey and GCC over the period 2005-2008. The second stage examined the variables that influence efficiency. Abul Alkheil *et al.* (2012) pointed out that there was a negative and significant association between the DEA scores and financial leverage.

6. Return on assets (ROA)

An extensive number of studies have concentrated on ROA as an explanatory variable of efficiency. Most studies have proven that the profitability ratios increase efficiency (Rosman *et al.*, 2014; Tabak *et al.*, 2013; Fukuyama & Matousek, 2011; Sufian, 2009; Hassan, 2006). This result is expected and realistic as banks achieving more returns are able to provide better services which raise efficiency. However, a few studies found that there was a negative and significant relationship between efficiency and profitability

ratios (Hou *et al.*, 2014; Fang *et al.*, 2011). In addition, El-Moussawi and Obeid's (2010) findings proposed that ROA affected efficiency positively and negatively in the GCC banking sector through the period 2005-2008. Sufian and Habibullah noted that ROA had no impact on efficiency in Korean commercial banks over the period 1992-2003.

7. Age

Abul Alkheil *et al.* (2012) revealed that older banks were more efficient than new banks in Islamic and conventional banks. This result is realistic due to older banks having more experience in banking operations and could provide better quality of service. Satub *et al.* (2010) and Chiou (2009) also state that older banks are more efficient. In contrast, Lee and Chih (2013) confirmed that new commercial Chinese banks attained better profit efficiency measures than older banks as the relationship between PE and age was negative. However, Hasan and Marton (2003) suggested that age is not important to efficiency in Hungarian conventional banks through the period 1993-1998.

8. Ownership

Mostly ownership has been examined as a dummy variable like Gardener *et al.* (2012) who classified the ownership to country-level of state banks, foreign banks and private banks. This study demonstrated that foreign banks concentration increased efficiency significantly, whereas an increment in state and private bank levels affected efficiency significantly and negatively in the South East Asian banking sector during the period 1998-2004.

Wanke and Barros (2014) found that an increase in the role of public banks led to better productive efficiency in Brazilian commercial banks in 2012. This result is in line with Chortareas's *et al.* (2012) and Ariff and Can's (2008) studies.

Girardone *et al.* (2004) found that public banks were more efficient than private banks in Italy over the period 1993-1996. Additionally, they pointed out that raising the private banks' level decreases efficiency.

Garza García (2012) investigated the relationship between foreign ownership and efficiency using DEA measures (TE, PTE and SE) in Mexico over the period 2001-2009. The results suggest that the relationship between efficiency and foreign ownership is positive and significant. Some studies have the same conclusion such as Tabak's *et al.* (2013), Chortareas's *et al.* (2012), Grigorian and Manole's (2006) studies. In contrast, Zhang and Matthews (2012) confirm that foreign banks' level decreased the cost efficiency in Indonesian commercial banks through the period 1992-2007.

Fang *et al.* (2011) conclude that foreign banks concentration affects the cost efficiency negatively and significantly. Moreover, government banks were found to be more efficient than foreign banks but government banks did not impact the cost efficiency in South-Eastern Europe during the period 1998-2008. Regarding the profit efficiency, foreign banks increase the profit efficiency, while government banks decrease the profit efficiency.

Satub *et al.* (2010) divided ownership into foreign, domestic private and state-owned banks. The empirical results show that state-owned banks scored the highest efficiency measures. Furthermore, more domestic private and state-owned banks lead to better allocative efficiency through the period 2000-2007 in Brazil.

Yildirim and Philippatos (2007) examined the SFA of 12 European countries with transition economies over the period 1993-2000. The results of the fixed-effects model propose that foreign ownership increases the cost efficiency but decreases the profit efficiency in European countries under study.

Finally, Assaf *et al.* (2011) examined the correlation between the pure technical efficiency and domestic ownership in Saudi Arabian Islamic and commercial banks over the period 1999-2006. Their findings indicate that domestic banks significantly increase the pure technical efficiency. Tabak *et al.* (2013) also underlined that domestic banks improve the profit and cost efficiency in the 17 Latin American countries between 2001 and 2008. Additionally, they conclude that domestic banks could impact the profit

efficiency negatively and significantly over the period. However, Hou's *et al.* (2014), Vu and Nahm's (2013) and Fukuyama and Matousek's (2011) results found no relationship between efficiency and ownership.

9. Listing

This variable can be examined as an additional test to find which banks are performing more efficiently - the (stock market) listed or unlisted banks. Few studies analyse the effect of listing on efficiency in the banking sector. As an example, Yudistira (2004) found that unlisted Islamic banks achieved better DEA measures than listed banks. Yildirim and Philippatos (2007) and Havrylchyk (2006) found insignificant associations between listing and efficiencies in their studies.

2.3.2 External variables

1. Gross domestic production (GDP)

Comprehensive studies consider GDP as a determinant of efficiency. Hermes and Nhung (2010) examined the determinants of DEA in Latin America and Asia for the period 1991-2000. The findings revealed that banks located in countries with development in GDP operated efficiently. This finding is consistent with the studies of Hou *et al.* (2014), Johnes *et al.* (2014), Tan and Floros (2013), Vu and Nahm (2013), Chortareas *et al.* (2012), Garza García (2012), Zhang *et al.* (2012) and Hermes and Nhung (2010). The growth of GDP is the main indicator of the economic situation; the more GDP generated the better the economy. Thus, banks concentrate on countries with greater GDP to invest. The investment can be through operating more branches, increasing capitalisation or mergers and acquisition. In contrast, Sufian and Habibullah (2009) claimed that GDP influenced efficiency negatively and significantly in the Korean banking sector. A few studies reached the same conclusion such as Zhang *et al.* (2012), El-Moussawi and Obeid (2010), Satub *et al.* (2010), Yildirim and Philippatos (2007). However, Abul Alkheil *et al.* (2012) stated that GDP was not significant to efficiency in their study.

2. Inflation

El-Moussawi and Obeid (2010) examined inflation as an independent variable. The relationship between the inflation and efficiency was significant and positive in Islamic banks. On the other side, most studies confirmed that inflation affects efficiency significantly and negatively which is closer to the realistic economic condition of Vu and Nahm (2013) Garza García (2012) and Sufian and Habibullah (2009). However, a few studies found that inflation has not impacted efficiency (Gardener *et al.*, 2012; Grigorian & Manole, 2006). In general, higher inflation restricted banks from achieving profits due to lack of purchasing power of individuals which reduced the deposits of banks. As a result of lowering deposits, banks decrease loans that reflect banking operations negatively. Generally, banks need to find ideal strategies such as operating in countries with lower inflation rates.

3. Market capitalisation

Johnes *et al.* (2014) and Vu and Nahm (2013) consider market capitalisation as a positive determinant that increases efficiency. In contrast, Grigorian and Manole's (2006) findings proved that stock market growth led to reduced efficiency over the period 1995-1998. Some studies confirmed that the stock market had a positive and negative correlation with efficiency (Garza García, 2012; Sufian & Habibullah, 2009). However, Noor and Ahmed (2012) illustrated that the stock market was not important to efficiency in the Islamic banking system.

4. Global financial crisis (GFC)

Noor and Ahmed (2012) empirically found that the global financial crisis influenced the efficiency significantly and negatively in the Islamic banking system (similar to Moradi-Motlagh & Babacan, 2015). The economy was affected negatively around the world over the period of the GFC (2007-2009). However, this study examines the effect of GFC on efficiency measures using OLS and fixed effects models. Many studies have examined the effect of the Asian financial crisis (AFC) on efficiency such as Sufian and Habibullah (2009) who claimed that AFC influenced efficiency significantly and negatively in commercial Korean banks.

5. Control of corruption

There is a lack of research analysing the correlation between controlling corruption and efficiency in banking. To our knowledge, only one study is available which concentrates on the control of corruption, which is Chortareas's *et al.* (2012) study. This study claims that stronger supervision on corruption increased efficiency significantly in European banks between 2000-2008.

A summary of more detailed recent studies on the determinants of efficiency is shown in Appendix 1.

2.4 Summary

This chapter introduced the recent studies on efficiency and its determinants, explaining efficiency and comparing Islamic and conventional banking sectors as a first stage. The second stage explains the factors of efficiency; thus the literature review on determinants of efficiency was discussed in this chapter. After reviewing the recent studies of efficiency, the researcher decided to use DEA measures (TE, PTE, and SE) for calculating the efficiency. The reason behind choosing DEA is because of its more accurate and reliable measurements compared to other efficiency indicators. However, the relationship between DEA measures and explanatory variables can be found through the OLS and fixed effects models.

Chapter Three: Literature Review on Profitability and Stability

3. Introduction

This chapter is divided into two sections: the first section presents a literature review on profitability in banking. The second section offers a literature review on stability in banking.

3.1 Literature review on profitability in banking

Historically, Short (1979) is the pioneer of examining the performance determinants within the banking sector. Short (1979) analysed the association between banking profitability and banking concentration using a dataset of 12 countries through the period 1972-1974. The results suggest that greater concentration leads to higher profit rates. Afterwards, Bourke (1989) conducted a study to find the internal and external determination of profitability in Europe, North America, and Australia over the period 1972-1981. Bourke (1989) concludes that a higher degree of market power increases profits.

There are comprehensive studies on financial performance in commercial banks, but few comparing Islamic and commercial banks, and no study comparing Islamic, conventional, and socially responsible banks. There are three main performance indicators used by researchers: return of assets (ROA), used by Apergis (2014) on the US banking sector; return on equities, which is utilised by Lee and Kim (2013) on commercial banks in Korea; and net interest margin (NIM), employed by Tan and Floros (2012), that focuses on the commercial banking sector in China. Some studies use ROA, ROE, and NIM, such as Liang *et al.* (2013), on the European banking sector. Most studies found the determinants of profitability using statistical models such as OLS (Olson & Zoubi, 2011) or the fixed effect model (Sufian & Habibullah, 2010). This division is arranged as a literature review on profitability in Islamic banks, profitability in conventional banks, and profitability in Islamic and conventional banks, and then determinants of profitability (ratios) are explained.

3.1.1 Profitability in Islamic banks

Smaoui and Salah (2012) examined the profitability's determinants in GCC region including 44 Islamic banks over the period 1995-2009. The ROA, ROE and NIM were utilised as profitability indicators in this study. The main findings conclude that greater asset quality, capital and size lead to better profits. The macroeconomic variables in this study (GDP and inflation) have a positive and significant correlation with profitability. This study could be improved by analysing the impact of the global financial crisis on the Islamic banking system. Additionally, the researchers could compare Islamic financial performance with conventional banks to see the difference.

Wasiuzzaman and Tarmizi (2010) focused on financial performance of 16 Islamic Malaysian banks over the period 2005-2008. The profitability ratio is represented by the return on average assets (ROAA), and OLS was used to find the determinants of ROAA. The empirical results in this study show that the positive determinants were found to be liquidity, operational efficiency, GDP and inflation, while asset quality and capitalisation affected the banking earnings inversely. The use of only one profitability indicator represents a weakness point in this study is neglecting the comparison between performance ratios.

Bashir (2003) considers ROA and ROE as dependent variables for Islamic banks to find the factors of profits in the Middle East during the period 1993-1998. Large capitalised banks attained better ROE but fewer ROA. In addition, foreign banks were likely to achieve better profits. The results also show that financial market structure is very important for profitability. Moreover, the taxation reduced the ROA and ROE significantly and badly. Finally, the inflation in the Middle East influenced the banking profits positively and significantly over the period 1993-1998.

To summarise, in Islamic banks, return on assets and return on equity found to be highly employed to evaluate the financial performance but few studies concentrate on NIM.

3.1.2 Profitability in conventional banks

Sufian and Habibullah (2010) examine the characteristics that affect bank performance in Malaysia over the period 1999-2007. The dependent variables are ROA and ROE while the independent variables are bank characteristics, economic conditions and freedom standards. The fixed effects and generalized method of moments (GMM) regressions have been employed to find the determinants of performance. The outcomes of the regressions indicate that there is a significant and positive relationship between ROA and loan intensity, diversification, cost ratio, capital ratio, inflation, economic freedom, business freedom and corruption freedom. In contrast, the variables found to be dropping the ROA are credit risk, GDP and monetary freedom. According to ROE, Sufian and Habibullah (2010) reveal that loan intensity, diversification, cost ratio, inflation, economic freedom, business freedom and corruption freedom increase the ROE, whereas credit risk, GDP and monetary freedom reduce the ROE throughout the period in Malaysia. The limitation of this study can be excluding net interest margin as an explained variable. Moreover, this study could be expanded in time period to investigate the global financial crisis influences.

Westman (2011) focused on the European banking sector by estimating the performance determinants of investment and commercial banks of 37 European countries from the years 2003 to 2006. The baseline model specification has been run to find the relationship between the profitability (ROA and ROE) and its determinants. Overall, non-traditional banks are more profitable than traditional and diversified banks. Moreover, larger banks have more profitability than smaller banks. Finally, banks with higher capital achieve more ROA, whereas banks with lower capital scored more ROE during the period in the examined banks.

In the Macedonian banking system, Ćurak *et al.* (2012) analysed bank-specific, industry-specific and macroeconomic determinants of bank profitability (ROA) over the period 2005-2010 adopting the GMM method (statistical approach). According to the results, ROA is influenced significantly and negatively by solvency risk (capital ratio), credit risk (loans to total assets) and operating expenses of management (costs to assets). In contrast, liquidity (loans to deposits), concentration (Herfindahl-Hirschman

Index) and GDP growth were found to be correlated with ROA significantly and positively (the higher the determinants the more profits) in selected Macedonian banks.

Tan and Floros (2012) focused on the Chinese banking industry by examining the factors of profitability (ROA and net interest margin (NIM)). The sample includes 101 banks (5 state-owned banks, 12 joint-stock commercial banks and 84 city commercial banks) for the period 2003-2009. The statistical approach to find the determinants of profitability is the GMM method. Regarding the findings of GMM, this study illustrates that ROA has been affected positively by labour productivity (gross revenue/number of employees), banking sector development in China (bank assets to GDP), stock market development (market capitalisation of listed companies/GDP) and annual inflation rates. In contrast, credit risk (LLP/loans), taxation (tax/operating profit before tax), capitalisation ratio and concentration (total assets of the largest five banks/total assets of the whole banking industry) were found to be reducing the ROA through the examined period in China. Overall, the banks under the study scored very low average ROA (0.007) which needs to be improved through maximising the profits by reducing the capital of banks and increasing the labour productivity. The ownerships' effects were not considered in this study, which can be included in this thesis.

Lee and Kim (2013) investigated the bank performance and its determinants examining 17 Korean commercial banks for the period 2003-2010. This study used ROA and ROE ratios as dependent variables and the independent variables of size, risk ratio (loans to deposits), ownership, GDP growth, and mergers and acquisitions transactions. The relationship between profitability ratios and its determinants was evaluated by fixed effects regression. As a result, larger banks were found to be more profitable, GDP growth improves the profits, and merger and acquisitions transactions reduce the profitability in terms of the ROA measures. According to the ROE determinants, the GDP growth enhances the ROE over the period in Korea. Overall, foreign international banks were found to be more profitable than government banks in Korea. In order to improve this research, another statistical regression could be used (e.g., OLS model) besides fixed effects model. Evermore, public ownership could be added to compare foreign and public possession.

Focusing on the US banking sector, Apergis (2014) evaluated the factors that impact the profitability of 1725 non-traditional banks spanning the period 2000-2013. The explained variable in this study is the ROA with the explanatory variables of insolvency risk index, total non-traditional activities, ratio of loans to assets, capital ratio, ratio of non-performing loans, Herfindahl-Hirschman Index, consumer prices, real per capita income and financial crisis. The findings explain that all the above factors affect the profitability in US non-traditional banks as ROA influenced positively the total non-traditional activities, ratio of loans to assets, capital ratio, Herfindahl-Hirschman Index, consumer prices, and real per capita income. In contrast, a negative and significant relationship was found between ROA and insolvency risk, ratio of non-performing loans and financial crisis. In particular, ROA has been affected the most by the financial crisis as the coefficient was the highest compared to other factors. Overall, considering ROA only as a dependent variable is a disadvantage point as including more profitability ratios (such as ROE and NIM) provide a stronger argument of earnings' factors.

Concentrating on NIM only, Hussain (2014) applied a linear estimation to find the NIM determination for 26 commercial Pakistani banks from 2001-2010. The main findings of the study suggest that smaller banks invested their interest revenues more effectively than larger banks. The negative determinants of Pakistani banks found to be liquidity, diversification and stock market. On the other side, in order to achieve better NIM Pakistani banks could consider operating costs and market share in terms of bank-specific indicators. According to industry-specific variables, industrial growth and inflation increased the NIM significantly. However, ignoring the impact of the global financial crisis reflects a weakness point in this study.

Overall, by comparing the profitability of conventional banks with Islamic banks, we find that conventional banks are more profitable because they charge interest for some services, and Islamic banks have specific constraints (e.g. alcoholic trade) that affect their earnings.

3.1.3 Profitability in Islamic and conventional banks

Olson and Zoubi (2011) analysed the performance of 83 Islamic and conventional banks in the Middle East and North Africa (MENA) region covering 10 countries. The period is from 2000 to 2008 using ROA and ROE as dependent variables. The statistical relationship between the profitability and its determinants has been found after running random effect regression. The results of the study show that loan intensity, capital ratio, credit risk and inflation impact the ROA positively and significantly. On the other side, the inefficiency ratio calculated as operating expenses to gross income was found to be affecting the ROA negatively. This study contributed that loan intensity and inflation raise the ROE, whereas inefficiency ratio, capital ratio and credit risk are reducing the ROE during the period in the examined MENA banks. Furthermore, foreign banks were found to be achieving more profits than government banks.

Beck *et al.* (2013a) identify that size decrease of ROA and ROE in 510 Islamic and conventional banks across 22 countries for the period 1995-2009. In other words, small banks achieve more profits referring to the significant and negative relationship between the size and ROA/ROE over the period of the study. In contrast, the results suggest that an increase in fixed assets leads to a decline in ROE only. In general, the researchers proved that Islamic banks are affected less by financial crisis than conventional banks; also, Islamic banks financially performed and capitalised better than conventional banks during the period of the study. In order to make this study more effective, more determinants could be included.

Ghosh (2015) examined the determinants of profitability using ROA and NIM as explained variables in 12 MENA countries through the period 2000-2012. The advantage of this study is that the researcher included the Arab Spring (revolutions period). The results confirmed that Arab Spring affected ROA and NIM negatively. Regarding to ROA's results, capital ratio impacted ROA positively and significantly while, liquidity had a negative relationship with ROA. The other independent variables (size, capital ratio, ratio of liquid asset to total asset and diversification) were not important to the NIM in MENA countries. In conclusion, the competitive advantage in this study is including the Arab Spring, which contributes to the literature strongly. But, neglecting

ROE (as a profitability indicator) and industry-specific factors can be disadvantages of this study.

As a summary of the literature review of profitability in Islamic and conventional banks, the main region of the literature review is the Middle Eastern and North African (MENA) area.

3.2 Determinants of profitability in banking

Based on the literature review on profitability, this study examines the determinants of profitability using the highest beneficial internal variables as bank size, capital ratio, loan intensity, credit risk, deposit ratio, age, z-score, ownership (foreign, domestic and public) and listing. On the other side, GDP, inflation, market capitalisation, global financial crisis and control of corruption can be examined as external variables.

3.2.1 Internal variables

1. Bank size

Most studies examined size of bank (total assets) as an indicator of profitability such as Petria *et al.* (2015) who examined the effect of size on performance in 27 European countries over the period 2004-2011. The results suggest that size impacts the ROA positively and significantly. This concludes that banks with higher total assets achieved better profits. The reason for this result could be due to larger banks being more likely to gain profits from economies of scale than smaller banks, with a higher degree of production differentiation and loan diversification. Many studies proposed that size of the bank influences the ROA positively (e.g., Chronopoulos *et al.*, 2015; Guillén *et al.*, 2014; Bertay *et al.*, 2013; Lee & Kim, 2013; Mirzaei *et al.*, 2013; Shehzad *et al.*, 2013; Haan & Poghosyan, 2012; Houston *et al.*, 2010; Flamini *et al.*, 2009), also based on NIM, Liang *et al.* (2013) and Sufian and Habibullah (2009) found that more assets supported the interest revenues. On the other side, some studies suggested the opposite finding which is smaller sized banks were more profitable (see Căpraru & Ihnatov, 2014; Haan & Poghosyan, 2012; Barry *et al.*, 2011; Lin & Zhang, 2009; Altunbas & Marques, 2008). However, the size of the bank could be unimportant to the financial performance (Ghosh, 2015; Mollah & Zaman, 2015; Al-Musali & Ismail, 2014;

Shah & Jan, 2014; Ćurak *et al.*, 2012; Delis *et al.*, 2012; Tan & Floros, 2012; Olson & Zoubi, 2011; Athanasoglou *et al.* 2008).

2. Capital ratio

A comprehensive number of studies have focused on the relationship between profitability in banking and capitalisation. As an example, Căpraru and Iulian Ihnatov (2014) examined the impact of capitalisation in 143 commercial banks for the period 2004-2011 in Romania, Hungary, Poland, Czech Republic and Bulgaria. The results show that the correlation between profitability ratios (ROA and ROE) and capitalisation is positive and significant. Banks with greater capital can invest effectively more than lower capital banks which leads to achieving better profits. This finding is supported by a large number of studies in the banking area (e.g. Ghosh, 2015; Mamatzakis *et al.*, 2015; Apergis, 2014; Mirzaei *et al.* 2013; Chitan, 2012; Kutan *et al.*, 2012; Manlagnit 2011; Sufian & Habibullah, 2010; Flamini *et al.*, 2009; García-Herrero *et al.*, 2009 Altunbas & Marques, 2008; Athanasoglou *et al.*, 2008; Demirguc-Kunt & Huizinga, 1999). In contrast, Chronopoulos, *et al.* (2015) pointed out that capitalisation influences the profitability negatively and significantly in the US banking sector for more than 17,500 commercial banks over the period 1984-2010. In fact, a few articles found that lower capitalised banks are more profitable than higher capitalised banks (Mollah & Zaman, 2015; Shehzad, *et al.*, 2013; Ćurak *et al.* (2012) Dietrich & Wanzenried, 2011; Altunbas & Marques, 2008). In some cases, capitalisation could increase and decrease profitability ratios such as Olson and Zoubi (2011) and Westman (2011) who conclude that capital enhances ROA but reduces ROE. Delis *et al.* (2012), Tan and Floros (2012) and Dietrich and Wanzenried (2011) pointed out that capital ratio has no effect on profitability (ROA/ROE) in their studies. According to NIM, most studies went with the idea of higher capitalised banks were able to invest in interests (see, Căpraru & Ihnatov, 2014; Heffernan & Fu, 2010; Sufian & Habibullah, 2009; Claeys & Vennet, 2008; Lanine & Vennet, 2007) while, few studies disagreed with this concept and underlined that increasing capital forced banks to pay more interest expenses (Zhou & Wong, 2008).

3. Loan intensity

Lin and Zhang (2009) investigated the loans impact on financial performance examining 322 Chinese banks through the period 1997-2004. The statistical results indicate that providing more loans leads to higher profits. On the other side, Manlagnit (2011) recommended banks to reduce loans due to increasing profits in Philippines for the period 1990 to 2006. Chronopoulos *et al.* (2015) and Demirguc-Kunt and Huizinga (1999) agreed with this point of view. However, Altunbas and Marques (2008) classified their data into two types: domestic (207 banks) and cross-border mergers (55 banks) in Europe over the period 1992-2001. The finding of hierarchical regression suggests that domestic mergers banking could find strategies of making a cut in their loans due to raising the earnings; whereas, cross-border mergers banking includes a positive relationship between loans and profits. Referring to the NIM determinants, not many studies considered loan intensity as a determinant, Sufian and Habibullah (2009), Claey's and Vennet (2008) and Lanine and Vennet (2007) mentioned that involving in lending activities supported the net interest margin positively and significantly. This result occurred due to providing more loans can raise the lending interests (earnings) from clients.

4. Credit (liquidity) risk

Chitan (2012) considered loans to deposits ratio as a negative sign to the ROE ratio for Romanian commercial banks during the period 2004-2011. This means that the growth in lending leads to better ROE ratios (similar to Altunbas & Marques, 2008). In this case banks could find strategies that can link between deposits and loans such as providing more loans with higher interest rates due to intensifying the earnings. Liang *et al.* (2013) concluded the opposite relationship between NIM and credit risk after examining 194 European commercial banks for the period 2000-2007. In this case, banks had to reduce loans due to achieving better NIM.

5. Deposit ratio

This variable allows policy makers in the banking sector to accept more or fewer deposits. A few studies examined deposit ratio as an independent variable to the

profitability such as García-Herrero *et al.* (2009) who investigated the impact of deposits in China. This study examined 87 commercial banks for the period 1997-2004. The statistical empirical results proposed that deposit intensity could increase the profitability significantly. This result is in line with Claey's and Vennet (2008) who encouraged accepting more deposits due to strengthen the NIM. The banks can provide more deposit interests to attract clients in this case. By contrast, Barry *et al.* (2011) confirmed that deposits affected the earnings negatively and significantly in the 16 West European countries in the period 1999-2005 for the commercial banking sector.

6. Age

Mirzaei *et al.* (2013) examined the correlation between age profits for 1929 banks over 1999-2008. They divided their sample into emerging and advanced economies including 40 countries. The fixed effects model underlines that old banks attained more returns in countries with emerging economies. This could be due to older banks having more experience in banking operations than new banks; also, time could allow banks to generate more capitalisation which leads to profits. In comparison, new banks had better profitability in advanced economies countries (negative relationship between profitability ratios and age which is consistent with Beck *et al.*, 2005 study).

Dietrich and Wanzenried (2011) focused on the Swiss banking sector using data of 372 commercial banks. This study used age as a dummy variable and found that older banks were more profitable (ROA and NIM) than new banks. According to new banks, they increased the return on assets significantly. According to return on equity ratio, older banks (insignificant with ROE) were also found to be more profitable than new banks (significantly increase the ROE).

However, Dedu and Chitan (2013) found no impact of age on profitability in Romania for the period 2004-2011.

7. Z-score

Mollah and Zaman (2015) consider the Islamic and commercial banking sector in their study examining the determinants of profitability including z-score in 25 countries

including 172 banks (86 Islamic and 86 commercial banks) for the period 2005-2011. The association between profitability and z-score was positive and significant in Islamic and commercial banks (similar to Mamatzakis *et al.*, 2015 outcome). This demonstrates that more stability and less default risk encourage banks to achieve more returns. Thus, banks seek to increase capitalisation and profits simultaneously.

8. Ownership

According to ownership, most studies classify ownership into three types: domestic (private), foreign, and government (state-owned or public) ownership. Regarding domestic ownership, some studies conclude that domestic banks increase the profitability such as Athanasoglou *et al.* (2008). This contradicts with Flamini *et al.* (2009) who estimated that domestic ownership decreases the earnings. Focusing on foreign ownership, Lin and Zhang (2009), Micco *et al.* (2007) and Demirguc-Kunt and Huizinga (1999) confirmed that foreign banking concentration improves profits in their studies. On the other side, Dedu and Chitan (2013), Lee and Kim (2013), Dietrich and Wanzenried (2011) and Manlagnit (2011) pointed out that the relationship between profitability ratios and foreign ownership was negative and significant. However, Mirzaei *et al.* (2013) had a mixed point of view which confirms that foreign ownership could increase (in emerging economies) and decrease (in advanced economies) profits. Concerning public ownership, Rumler and Waschiczek (2014) proved that public ownership increases the profitability of Austrian commercial banks for the period 1995-2010. Lee and Kim (2013) and Olson and Zoubi (2011) disagree with this point of view (negative relationship between profitability and public ownership).

In general, the relationship between ownership and profitability can encourage or discourage banks' shareholders to invest more or less in banking such as buying or selling shares. In addition, shareholders can operate more branches locally or abroad based on the relationship between ownership and profitability.

9. Listing

Many studies propose that banks listed on the stock market are more profitable than those which are unlisted. The reason behind this is because listed banks have more control from central banks, which lead them to be more organised than unlisted banks. Saghi-Zedek and Tarazi (2015) and Lin and Zhang (2009) approved this point of view. On the contrary, Dietrich and Wanzenried (2011) found the opposite correlation between listing and ROA for Switzerland. However, Barry *et al.* (2011), Heffernan and Fu (2010), Olson and Zoubi (2011) and García-Herrero *et al.* (2009) found insignificant associations between stock market listing and profitability ratios.

3.2.2 External variables

1. Gross Domestic Production (GDP)

Mostly all banks focus on countries with developed economies to achieve economies of scale and scope. Recent studies have underlined that GDP growth enhances ROA/ROE (e.g., Chronopoulos *et al.*, 2015; Guillén *et al.*, 2014; Rumler & Waschiczek, 2014; Bertay *et al.*, 2013; Dedu & Chitan, 2013; Lee & Kim, 2013; Mirzaei *et al.*, 2013; Chitan, 2012; Kutan *et al.*, 2012; Dietrich & Wanzenried, 2011; Houston *et al.*, 2010; Flamini *et al.* 2009; Pasiouras & Kosmidou, 2007; Boubakri *et al.*, 2005). A few studies have the opposite point of view that GDP development reduces ROA/ROE (see Bertay *et al.*, 2013; Shehzad *et al.*, 2013; Delis *et al.*, 2012; Sufian & Habibullah, 2010; Boubakri *et al.*, 2005). However, Ewijk and Arnold (2014), Houston *et al.* (2010) and Claey's and Vennet (2008) supported that investing in interests is better in countries with higher GDP growth as the relationship between NIM and GDP were significant and positive.

2. Inflation

In the literature, many studies indicate that banks in countries with higher inflation rates financially perform better than banks in countries with lower inflation rates as the relationship between inflation and profitability ratios were positive and significant. Examples that support this point of view include the studies of Căpraru and Ihnatov (2014), Rumler and Waschiczek (2014), Bertay *et al.* (2013), Delis *et al.* (2012), Kutan *et al.* (2012), Tan and Floros (2012), Olson and Zoubi (2011), Sufian and Habibullah

(2010), Flamini *et al.* (2009), García-Herrero *et al.* (2009) and Pasiouras and Kosmidou (2007) who considered ROA and ROE. Dietrich and Wanzenried (2014), Hussain (2014), Tan and Floros (2012) and Houston *et al.* (2010) found also that countries with higher inflation rates have better environment for interests investment (positive relationship with NIM). However, a few studies went against this result in terms of ROA and ROE such as Lee and Kim (2013), Mirzaei *et al.* (2013), Shehzad *et al.* (2013), Kanas *et al.* (2012) and Houston *et al.* (2010) who found that higher inflation rates led to lower earnings. Considering NIM, Liang *et al.* (2013) and Sufian and Habibullah (2009) found a negative and significant correlation between NIM and inflation. This point of view is more logical due to inflation causing decrement in an individual's wealth (purchasing power or cash flow) which negatively affects the deposits of banks. As a result of reduction in deposits, loans reduce which leads to less profit. Although inflation is a very important variable to the economy, Petria *et al.* (2015), Mirzaei *et al.* (2013), Athanasoglou *et al.* (2008) and Demircug-Kunt and Huizinga (1999) could not find any evidence of inflation impact on profitability in their studies.

3. Market capitalisation

Pasiouras and Kosmidou (2007) investigated the determinants of profitability in 15 European countries using data of 584 banks over the period 1995-2001. The stock market expansion was found to be very important for banks to maximise their profits as the relationship between market capitalisation and profitability was highly correlated at the 1% level. However, Demircug-Kunt and Huizinga (1999) found that stock market index was insignificant in their study over the period 1988-1995. Dietrich and Wanzenried (2014) found that stock market growth did not affect NIM in their study.

4. Global financial crisis (GFC)

Al-Musali and Ismail (2014) proved that the profits of Saudi commercial banks were increased in the period of the global financial crisis. Apergis (2014) found the same result on American commercial and investment banks. By contrast, Haan and Poghosyan (2012) confirmed that the global financial crisis affected the financial performance of the American commercial negatively, savings and cooperative banks.

Dietrich and Wanzenried (2014) underlined that the global financial crisis badly decreased the net interest margins and banks at that time suffered from high costs (expenses).

5. Control of corruption

Sufian and Habibullah (2010) found that the relationship between corruption freedoms is strongly significant and positive in terms of profitability ratios (ROA and ROE). In addition, Demirguc-Kunt and Huizinga (1999) confirmed that corruption affects the profits of banks significantly and negatively. This result encourages the government to impose more control on corruption to enhance financial performance in the banking sector.

Appendix 2 explains, in detail, the recent studies which examine the determinants of profitability in the banking sector. The relationship between the profitability ratios and the independent variables are shown as well.

3.3 Stability in banking

As mentioned in the Introduction Chapter, studies on stability have increased considerably in importance since the global financial crisis of 2007. Many studies concentrate on conventional banks (Cubillas & González, 2014; Fu *et al.*, 2014; William, 2014), but there are limited studies analysing Islamic banks or comparing Islamic and conventional banking stability (Ghosh, 2014; Beck *et al.* 2013a). Most studies focus on z-scores which indicate the percentage of bankruptcy. Many studies also consider capital ratio as a stability indicator (dependent variable), such as Horvath *et al.* (2014), Schaeck and Cihak (2014) and DeYound and Torna (2013). There are comprehensive studies which found the determinants of stability through statistical regressions such as OLS, which is the most common model (Chalermchatvichien *et al.*, 2014; Jeon & Lim, 2013; Lee & Chih, 2013; Srairi, 2013), fixed effect regression (Fu *et al.*, 2014) and random effects (Bourkhis & Nabi, 2013; Cubillas & González, 2014). This next part is divided into two topics: a literature review on stability in Islamic banks and stability in conventional banks, and then stability in Islamic and conventional banks.

3.3.1 Stability in Islamic banks

Čihák and Hesse (2010) used only z-score as a stability indicator for 77 Islamic banks across the world, over the period 1993-2004. The main determinants in this study are efficiency ratio, loan intensity and size. In particular, efficiency ratio has a negative and significant correlation with stability. This means that expenses of banks were remarkably more than income, which raises the probability of bankruptcies. The lending activities also impacted the stability inversely and significantly. Finally, larger-sized banks were found to be more stable and less risky. This study could be improved by including more stability indicators such as capital ratio.

Rajhi and Hassairi (2013) discuss the Islamic banking stability for MENA and Southeast Asian regions for the period 2000-2008. This study explains the causes of stability as size of banks, loans services, liquidity and GDP. In contrast, efficiency ratio and inflation led to instability. These results allow managers to attract more clients to borrow; one way could be by minimising the lending interest. Additionally, bankers could consider reducing their costs, as efficiency ratio has a negative and significant sign.

Concentrating on 15 African countries, Faye *et al.* (2013) investigate the Islamic financial resistibility using z-score and equity to assets ratio as dependent factors over the period 2005-2012. The main empirical results conclude that stability and capitalisation were significantly and conversely affected by the size of banks. The GDP per capita and supervision quality were very beneficial in supporting capitals. Moreover, more restrictions in banking activities imposed from government resulted in better financial stability and fewer insolvency risks.

The literature review of the stability in Islamic banks is limited. Therefore, further research can be conducted and more stability indicators can be examined.

3.3.2 Stability in conventional banks

Concentrating on the stability factors of four South Asian banks (Bangladesh, India, Pakistan and Sri Lanka), Nguyen *et al.* (2012) evaluated the causes of stabilities

through using z-score as a dependent variable for the period 1998-2008 using generalised methods of moments (GMM) estimator as a statistical method. The findings show that banks with greater market power are more stable when they diversify into non-traditional activities. Moreover, size, total non-interest income, capital ratio, financial development (market capitalisation to GDP) and business cycle (GDP growth rate) raise the z-score (decrease insolvency risk); whereas, ex-post credit losses and concentration reduce the z-score (increase insolvency risk). Overall, state-owned banks were found to be less risky than foreign banks. In conclusion, the most stable country was found to be Sri Lanka (average z-score = 8.93) followed by India (8.33) then Pakistan (7.54) and Bangladesh (7.41). However, the results indicate that the selected banks have not been influenced by the Asian financial crisis (AFC) or global financial crisis (GFC).

Concentrating on the Chinese banking sector, Lee and Chih (2013) examined the impact of financial regulation upon risk of commercial banks in China using z-score for the risk during the period 2004-2011. Statistically, the OLS model was employed to find the determinants of risk. The results of the OLS model reveal that small banks were exposed to more risk of bankruptcy than large banks scoring Ln (z-score) of 3.744 and 3.850 for small and large banks, respectively; a higher z-score means that the bank has less risk and more stability (Fu *et al.*, 2014). However, large banks show a negative relationship between the risk and operating cost to operating income ratio. Moreover, the capital (adequacy) ratio and leverage impact the risk positively in small banks. Finally, loan to deposits seems to be relevant for small banks (negative relationship with risk) also, new large banks face more risk of bankruptcy than older large banks. In this study, it is observable that there is no presence for macroeconomic variables that could have significance relationship with financial stability.

An international study by Cubillas and González (2014) examined the financial stability of 4333 banks in 83 (developed and developing) countries from 1991 to 2007. Their methodology depends on the random effects model having z-score and bank market power as dependent variables. The results obtained by Cubillas and González (2014) explain that the financial liberalisation increases the risk-taking which also raises the

competition in the banking sectors. Moreover, capital requirements help decrease the negative impact of financial liberalisation on financial stability. Additionally, official supervision and financial transparency are only effective in developing countries. However, the main determinants of z-score according to this study are bank market power which have a positive effect on z-score, while, deposit insurance coverage to deposits per capita, GDP growth, GDP and inflation affect z-score negatively. In comparison, banks in developed countries are more stable and have less risk than developing countries referring to the findings. Furthermore, small banks were found to be having more risk-taking (lower z-score) over the period of the study in the 83 countries. This study failed to compare stability between the used countries.

Jeon and Lim (2013) discuss the impact of competition, bank-specific and economic variables on financial stability by comparing commercial banks and saving banks in Korea through the period 1999-2011. The statistical methods of analysing the results are OLS and fixed effects regressions. Three main issues were discussed; (i) Competition in the Korean banking market significantly increases the financial stability of commercial and savings banks in Korea (positive relationship between competition and z-score) but specifically, savings banks are more stable (have more z-score measures) over the period than commercial banks. (ii) Referring to bank characteristics, this study points out that profit ratio (net income over revenues) and loan to deposits ratio (credit risk) allowed banks to be less insolvency risky. (iii) According to economic variables, the findings indicate that the market volatility and interception affected the z-score significantly and negatively which means these variables are decreasing the z-score and raising the insolvency for commercial and saving banks in Korea during the period. In order to develop this research, the analysis could count effects of Asian financial crisis and global financial crisis.

Concentrating on the Asian Pacific region, Fu *et al.* (2014) analysed the financial stability and its determinants in 14 countries during the period 2003-2010 including 1500 observations. The z-score is the dependent variable and the independent variables are efficiency of bank competition (calculated as the difference between price and marginal cost), concentration, size, loan loss provision to total assets, net interest margin, GDP

growth, financial crisis, entry restrictions, capital requirements and deposit insurance. After using fixed effects regression to identify the stability's determinants, the results suggest that the competition and net interest margin (profitability ratio; more profits makes banks more stable) are the only variables that increase the stability and reduce the risk. On the other hand, the higher concentration of the three largest banks in each country leads to decline in the stability; also, the findings show that smaller banks were found to be less risky and more stable over the period in the Asian Pacific region. However, there is no significant effect from the financial crisis on the stability referring to the empirical results of that study. However, there is no consideration in this study for ownerships' impacts on stability.

Williams (2014) made a study on 1091 Asian banks over the period 1998-2012. This study summarises that increasing capital (equity), fixed assets, GDP, deposit rate led to raising the z-score over the period. Thus, these independent variables made the stability higher and reduced the risk, so banks could consider them due to achieving more stability in the future. Overall, both AFC and GFC affected the banks' stability negatively as the z-score reduced during the crisis periods and they faced a high probability of failure (insolvency risk).

Another study on 68 Asian banks has been conducted by Chalermchatvichien *et al.* (2014) focusing on bank stability in the Asian region using z-score as a dependent variable through the period 2005-2010. The results of OLS examination reveal that net stable funding ratio (available amount of stable funding to required amount of stable funding) influences the z-score significantly and positively over the period which made the banks more stable. In contrast, a significant and negative relationship was found between z-score and the following variables: ownership concentration, loan loss and revenue growth. In other words, these variables led to making the banks weaker and unstable (with high risk-taking). The OLS only was used in this study, which reduce the effectiveness of results. Thus, using another statistical model (for example, fixed or random effects models) provides more robustness.

Focusing on capital ratio as an indicator of stability, Schaeck and Cihàk (2014) analysed banking sector in 10 European countries for the period 1995-2005. The main findings

estimated that banks with fewer assets (small) could maximise their capital more than large banks. Additionally, older banks were well capitalised compared to the new banks. Finally, banks in countries with higher individual wealth (GDP per capita growth) could raise their capitalisation. The logic reason behind this result can be due to higher GDP per capita provide an advantage to banks to take more deposits and then invest them by exposing lending interests.

Horvath *et al.* (2014) studied the stability of Czech Republic commercial banking sector by taking 31 commercial banks through the period 2000-2010. Horvath *et al.* (2014) employed GMM model to find the capital ratio determinants. The findings proposed that z-score had a significant and positive relationship with the capital which means that the Czech banks were stable and not risky when they involved more in operations. In addition, higher inflation rates increased the capital which is unexpected. On the other side, negative determinants of capitalisation found in the study as non-performing loans, credit risk, earnings volatility, size and unemployment. This study neglected employing loans and deposits as explanatory factors. This gap can be examined in this thesis to find whether loans and deposits affect stability or not.

Nguyen and Nghiem (2015) compared the stability of public and private banks in Indian employing capital ratio as a stability measure for the period 1990-2011. The empirical results confirmed that credit risk (loans to deposits ratio) badly rose in both sectors (public and private), which means that banks were finding a trouble in terms of covering the clients' deposits. In this case, banks could reduce the amount of loans and accept more deposits. Focusing on Indian industry-specific factors, the GDP and inflation decreased the shareholders' equity in terms of public banking sector significantly. On the other side, the inflation rates found to be increasing the capital ratio positively and significantly in private sector.

According to US banking sector, DeYound and Torna (2013) analysed American banks's stability using capital ratio from 2007-2010. The statistical results showed that over the period, the American banks' capitalisation were affected significantly and positively by stakeholder, liquidity, non-performing loans, equity, brokered deposits, goodwill. The contribution of this study is using the goodwill which has not been

considered in the recent studies. However, there is no negative determination in this study.

Based on the literature review of stability in conventional banks, financial stability is high due to the generation of outstanding profits by conventional banks. As a result, this moves the banks further away from the risk of insolvency.

3.3.3 Stability in Islamic and conventional banks

Beck *et al.* (2013a) argue that non-loan earnings assets increase the z-score in 510 Islamic and conventional banks across 22 countries for the period 1995-2009. The results suggest that Islamic banks are less likely to dis-intermediate during crises due to higher z-score. Overall, small banks were found to be scoring the highest z-score and increasing in fixed assets leading to raising the z-score, which makes banks in the sample more stabilised. In conclusion, the selected banks can reduce the probability of bankruptcy by focusing on non-loan earnings assets and fixed assets. According to capital ratio, smaller banks found to be more capitalised than larger banks. In contrast, banks with greater amount of fixed assets had less capital.

According to the MENA region, Srairi (2013) compared the determinants of risk using 10 countries over the period 2005-2009. This study evaluated 175 Islamic and conventional banks in MENA. There are three types of explanatory variables as ownership, bank-specific variables and financial indicators. Srairi (2013) adopted OLS regression as a statistical approach to examine the determinants of z-score. This study yielded three main results: (i) Family banks tend to be more stable than company and state-owned banks. (ii) Concentration (equity % participation by the largest shareholder of the bank), size, loan growth, operating leverage, diversification, banking sector development, shareholders rights and bank concentration (assets of 3 largest banks to total assets of all banks in the country) were found to have a significant and positive z-score which leads to making the banks less risky. (iii) Efficiency ratio (cost to income) was found to be decreasing the z-score which raises the insolvency risk. Overall, during the period, conventional banks have more mean z-score (21.7) than Islamic banks (20.8) which

makes the conventional banks more stable and resistant against crises in MENA countries.

An international study by Bourkhis and Nabi (2013) focused on Islamic and conventional banks covering 16 countries using z-score as a bank stability indicator. This study used 68 (34 Islamic and 34 Conventional) banks for the period 1998-2009 using random effects to find the factors that affect the stability. The results obtained by Bourkhis and Nabi (2013) argue that the global financial crisis (GFC) does not impact the banks' stability. Overall, stability was affected significantly and negatively by loan intensity (more loans lead to lower z-score). However, a significant and positive relationship was found between z-score and inflation rates which made the banks more stable with low amount of failure risk. In particular, the findings suggest that efficiency ratio (cost to income) influenced the z-score in large banks only inversely. Larger banks were found to be unstable compared to small banks. In conclusion, Islamic banks could reduce the risk of bankruptcy more than conventional banks over the period. This study could be improved by using more stability indicators (e.g., capital ratios) to allow comparison between banks.

A significant comparison has been conducted between Middle Eastern banks and Eastern Europe banks over the period 1999-2008 examining 1929 banks by Mirzaei *et al.* (2013). The empirical results explain that for banks in the Middle East, market share, interest rate, capital ratio and overheads to total assets ratio have a significant and negative relationship with z-score, while inflation and bank size were found to be decreasing the z-score (increasing the risk). Regarding the Eastern Europe banks, the findings indicate that z-score (stability) was influenced significantly and positively by market share, interest rate spread, capital ratio, off-balance sheet to total assets, bank age, inflation and GDP. In contrast, overheads to total assets ratio is negative and significant with z-score at the 5% level. Overall, the most stable banks were found to be the foreign banks (Middle Eastern and Eastern Europe) through the period.

According to the GCC banking market, Ghosh (2014) tested the relation between risk and capital for 57 conventional banks and 46 Islamic banks in the GCC region for the period 1996-2011. The main finding (after employing the 2SLS model) shows that banks

generally increase capital in response to an increase in risk. However, the determinants of risk identified by Ghosh (2014) such as funding (short-term funding over total assets) and listed banks explain the z-score significantly and positively. In contrast, income diversification was found to have a significant and negative relationship with z-score (the risk indicator) which made banks more risky through the period. Regarding the capitlisation, the relationship between the capital ratio and size found to be significant and negative while, ROA were improving the capital significantly over the period. In general, Ghosh (2014) proposed that the GFC does not impact the stability of banks in GCC.

Köhler (2015) examined the factors of stability on 15 EU countries investigating 3362 banks through the period 2002-2011. The factors that strengthen the stability were found to be non-interest income share, capital ratio, loan intensity, net interest margin, GDP growth and GDP per capita. On the other side, size, inflation, deposit money bank assets to GDP and real long-term interest rate reduce the stability. Overall, the most stable type of bank was the cooperative banking system, while investment banks were exposed to the highest insolvency risk. However, comparing stability of commercial, investment, cooperative and savings banks could add a contribution to the literature.

The literature review on stability allows the researcher to empirically analyse the relationship between the stability and the independent variables. The bank-specific variables can be bank size, capital ratio, loan intensity, credit risk, ROA, operating leverage age, ownerships (foreign, domestic and public) and listing. On the other side, GDP, inflation, market capitalization, global financial crisis and control of corruption can be examined as macroeconomic variables. All recent variables were available through Bankscope and World Banks databases.

In comparison, Islamic banks were found to be well capitalised compared to conventional banks, as Islamic banks prefer to get their finance through equities rather than debts (Usmani, 2002). However, conventional banks are more stable and less risky than Islamic banks. This is because conventional banks are more profitable than Islamic banks.

3.4 Determinants of stability in banking

The recent studies examined the factors of stability through internal and external variables. The following section introduces the literature review of stability in the banking sector which can be used efficiently in this thesis.

3.4.1 Internal variables

1. Z-score

Horvath *et al.* (2014) examined the stability of commercial banks in Czech Republic over the period 2000-2010 using capital ratio as an indicator of stability. The results suggest that banks with higher capitals found to be resistible against any fail. In addition, well capitalised banks are financially performing better and strongly stable over the period of the study.

2. Capital ratio

Capitalisation is one of the most important bank-specific variables to describe stability in the banking sector. There are many examples showing the importance of capitalisation such as the studies of Ghosh (2015), Kohler (2015), Tabak *et al.* (2015), Williams (2014), Mirzaei *et al.* (2013), Nguyen *et al.* (2012) and Zhang *et al.* (2012) who claimed that higher equity led to raising constancy in the banking industry. Consequently, more capitalisation lets banks face any threat of failure. On the contrary Tabak *et al.* (2013) argued that capitalisation decreased the stability in the Latin American banking sector for the period 2001-2008. In order to avoid any bankruptcy risks, banks need to reduce their capitalisation (which enhances the stability). However, Srairi (2013), Delis *et al.* (2012) and Barry *et al.* (2011) found no relationship between capital ratio and z-score in their studies.

3. Bank size

The size of banks (total assets) played a very important role on stability in the recent studies. There are various points of view considered regarding banking size. Some studies confirmed that size keeps banks stable with less default risk and others go against this orientation. An example of a study that considered a positive relationship

between stability and bank size could be the most recent study of Tabak *et al.* (2015), who examined the stability (z-score) determinants of 76 Brazilian commercial banks for the period 2001-2011. The result of this study supports having more total assets in the Brazilian banking industry. The same result was found by Cubillas and González (2014), Beck *et al.* (2013a), Srairi (2013), Nguyen *et al.* (2012), Soedarmono *et al.* (2011), Houston *et al.* (2010), Berger *et al.* (2009) and Berger *et al.* (2009). Conversely, Kohler (2015), Zhang *et al.* (2015), Dong *et al.* (2014), Fu *et al.* (2014), Beck *et al.* (2013b), Mirzaei *et al.* (2013), Tan and Floros (2013), Agoraki *et al.* (2011) and Barry *et al.* (2011) proved a negative and significant correlation between size and stability (z-score). This result is in line with Ghosh (2014), Horvath *et al.* (2014), Schaeck and Cihak (2014), Beck *et al.* (2013a), Bertay *et al.* (2013) and Berger *et al.* (2009) who confirmed also a negative relationship between capital ratio and total assets. However, some studies found an insignificant association between bank size and stability (e.g., Anginer *et al.*, 2014; Ghosh, 2014; Gulamhussen *et al.*, 2014; Williams, 2014; Barakat & Hussainey, 2013; Bertay *et al.*, 2013; Jeon & Lim, 2013; Mirzaei *et al.*, 2013).

4. Loan intensity

Kohler (2015) found that banks with a larger loan portfolio have significantly higher z-scores. This encourages banks to raise their lending activities due to being further from insolvency risk, as noted for European commercial banks in the period 2002-2011. This contradicts the results of Rumler and Waschiczek (2014), Beck *et al.* (2013), Bourkhis and Nabi (2013) and Berger *et al.* (2009) who claimed that loans decrease the financial stability (z-score) and increase the risk-taking in their studies. Ghosh (2014) found that lending operations did not make any difference to stability and risk default in the GCC Islamic and commercial banking industry through the period 1996-2011. Berger *et al.* (2009) analysed both stability indicators (z-score and capital ratio) for 23 countries for the period 1999-2005. This study discouraged banks from giving more loans as lending reduced the capital and increased the default (bankruptcy) risk which logically made banks instable.

5. Credit (liquidity) risk

Soedarmono *et al.* (2011) conducted a study which concentrated on examining the financial stability using a sample of commercial banks from 12 Asian countries over 2001-2007. They documented that the relationship between liquidity and stability ratios (z-score and capitalisation) are positive and significant (the same conclusion as Nguyen & Nghiem, 2015; Dima *et al.*, 2014; Jeon & Lim, 2013). This means that banks could enhance their stability through providing fewer loans to cover the withdrawals of clients. On the other side, Lee and Chih (2013) found a negative and significant correlation between z-score and loans to deposits ratio. As a result, increasing the loans to deposits ratio let banks take less risk over the period 2004-2011. Dong's *et al.* (2014) results revealed that loans to deposits ratio was irrelevant to stability in the Chinese commercial banking sector through the period 2003-2011.

6. Return on assets (ROA)

The statistical results of Anginer *et al.* (2014) claimed that the profitability ratio (ROA) improved the steadiness of banks over the period 2004-2009. This result also concludes that earnings of banks are very important in terms of profits and can save banks from default risk. This is consistent with Ghosh (2014) in terms of capital ratio. The rest of the studies in the literature could not provide any further evidence that profits influence stability and risk in banking systems (Tabak *et al.*, 2015; Zhang *et al.*, 2015; Ghosh, 2014; Srairi, 2013; Tan & Floros, 2013).

7. Operating leverage

A few studies have examined the determination of fixed assets intensity on stability. Srairi (2013) concentrated on the stability indicators of 10 MENA countries including 175 (Islamic and conventional) banks for the period 2005-2009. Based on the results, the Islamic and conventional banks in MENA countries were recommended to purchase (invest) more fixed assets as the z-score and operating leverage were found to be significant and positive which is consistent with Williams's (2014) finding. Berger *et al.* (2009) had an opposite result which suggested that fixed assets (negative correlation with z-score) made the financial stability worse (raised the risk of failure) over the period

1999-2005 in their sample of 23 countries (1091 Asian commercial banks). This result allows policy makers to sell more fixed assets; depreciation could be due to the high cost of the fixed assets. In contrast, this study approved that fixed assets intensity increased the capitalisation significantly over the period.

8. Age

Lee and Chih (2013) compared the stability (z-score) of small (185 banks) and large (57) banks in China for the period 2004-2011. Lee and Chih (2013) argued that the experience in the Chinese banking sector affected the stability of large banks. Higher experience time leads to steadier banks with less insolvency risks. In this study, age is unimportant for small banks (similar to Dedu & Chitan, 2013). Schaeck and Cihák (2014) included z-score and capital ratio as dependent variables to find if the age impact the stability or not examining 10 European Countries for the period 1995-2005. As a result of this study, time trend found to be highly important to both z-score and capitalisation. Another study also focused on age, Mirzaei *et al.* (2013) compared the stability (z-score) between emerging economies and advanced economies in the Middle East and Eastern Europe through the period 1999-2008. This study concludes that older banks in advanced economies were financially more settled and less risky. On the other side, age was found to be an insignificant variable to stability (z-score).

9. Ownership

Agoraki *et al.* (2011) examined the effect of the ownership on the stability of banking system examining 13 European transition countries for the period 1998-2005. The results suggest that public ownership increase the stability and reduce the risk of insolvency while, foreign ownership tended to affect the stability significantly and negatively (same conclusion of Berger *et al.*, 2009). Barakat and Hussainey (2013) concentrated on government roles of banking for 20 European Countries through the period 2008-2010. As a result, government involvement impacted the stability of banks badly. Regarding to capital ratio, Berger *et al.* (2009) underlined that foreign ownership maximised the banks' capital significantly over the period 1999-2005.

10. Listing

Kanagaretnam *et al.* (2015) claim that banks that are included in the stock market are well capitalised. This contradicts with Ghosh (2014) who proposes that unlisted banks are better capitalised than listed banks. According to the z-scores, many studies show that listed banks are more stable than unlisted banks (such as Wang *et al.*, 2015; Dong *et al.*, 2014; and Ghosh, 2014). In contrast, Saghi-Zedek and Tarazi's (2015) outcome goes against this (i.e. unlisted banks have better financial stability than listed banks). However, Nguyen *et al.* (2012) and Barry *et al.* (2011) could not find a significant association between listing and stability.

3.4.2 External variables

1. Gross Domestic Production (GDP)

The GDP growth is a macroeconomic indicator that has been examined by most studies in stability of the banking industry. The majority of studies prove that there is a positive relationship between GDP development and stability (z-score) in the banking industry e.g. Kohler (2015), Anginer *et al.* (2014), Diaconu and Oanea (2014), Dima *et al.* (2014), Lee and Hsieh (2014), Williams (2014), Bertay *et al.* (2013), Dedu and Chitan, (2013), Mirzaei *et al.* (2013), Srairi (2013), Tan and Floros (2013), Delis *et al.* (2012), Zhang *et al.* (2012) and Houston *et al.* (2010). In contrast, a minority of studies proposed that GDP decreases the stability and increases the probability of bankruptcy. Examples for this case can be the studies of Cubillas and González (2014), Dong *et al.* (2014), Agoraki *et al.* (2011) and Soedarmono *et al.* (2011). Bertay *et al.* (2013) confirmed that banks in better GDP growth found hurdles in growing (investing) their capital (negative association between capital ratio and GDP growth). According to capitalisation, Nguyen and Nghiem (2015) confirmed also that GDP affected the stability negatively. However, Chalermchatvichien *et al.* (2014) could not estimate any correlation between GDP and z-score (stability).

2. Inflation

Rumler and Waschiczek (2014) investigated the factors that determined the bank-taking risk, focusing on the Austrian banking industry for the period 1995-2010. In fact, they

found that inflation reduced the bank risk-taking. As a result, the constancy of Austrian commercial banks enhanced. Many studies support Rumler and Waschiczek's (2014) result (for example, Barakat & Hussainey; 2013; Bertay *et al.*, 2013; Bourkhis & Nabi, 2013; Tan & Floros, 2013). Nguyen and Nghiem (2015) in private banking sector and Horvath *et al.* (2014) found the same result in terms of capitalisation. This result encourages banks to expand their activities in countries with higher inflation rates but some studies discourage banks from operating more due to a negative and significant relationship between z-score and inflation rates (see Kohler, 2015; Cubillas & González, 2014; Mirzaei *et al.*, 2013; Delis *et al.*, 2012; Houston *et al.*, 2010). Nguyen and Nghiem (2015) approved the same conclusion in accordance to public banking sector. In fact, the inflation rates are not always an influential variable to stability (Srairi, 2013; Delis *et al.*, 2012).

3. Market capitalisation

Nguyen *et al.* (2012) indicate that financial development in the Asian economies such as in the stock market is very important to the banking industry as they investigated the financial stability (z-score) determinants of 151 Asian commercial banks including Bangladesh, India, Pakistan and Sri Lanka over the period 1998-2008. Dima's *et al.* (2014) results show the same association between stock market growth and stability (z-score) using a sample of commercial banks in 63 developed and developing countries through the period 1997-2010. In addition, Lee and Hsieh (2014) found also a positive and significant relationship between capital ratio and stock market earnings. Anginer *et al.* (2014) and Tan and Floros (2013) argued that stock market development did not influence stability in the banking industry.

4. Global financial crisis (GFC)

For GFC, there is no study finding a positive relationship with stability. Williams's (2014) findings suggest that Asian commercial banks faced a risk of bankruptcy over the GFC period. In addition, Anginer *et al.* (2014) conclude that bank stability was affected by GFC. Some studies found no influence of GFC in banks such as Ghosh (2014), Bourkhis and Nabi (2013) and Nguyen *et al.* (2012).

5. Control of corruption

There is a lack of research which considers the impact of corruption. Depending on the literature review of stability in banking, the researcher found only one study which included corruption as an independent variable; this study was conducted by Hoque *et al.* (2015) of 12 EU countries over the period 2000-2012. The results demonstrated an insignificant correlation between stability and corruption. Based on this, the present thesis will consider the influence of controlling corruption on financial stability.

Based on the literature review around efficiency, profitability, and stability, no study covers the socially responsible banking sector; therefore, this study can fill the gap. In addition, comparing efficiency, profitability, and stability simultaneously has not been covered in recent studies, especially comparing Islamic, commercial, and socially responsible banks. This allows banks to become aware of strengths and weaknesses, as well as being able to identify threats and challenges. In terms of profitability, based on the researcher's knowledge, no study addresses the relationship between net interest margin and z-score. However, including the three types of ownership (foreign, domestic, and government) could be a useful contribution and could also help banks to make decisions about whether to invest or not, based on the results. Finally, no study examines the impact of the global financial crisis on capitalisation within the banking sector.

Appendix 3 illustrates the literature review on stability (as a dependent variable) and its independent variables, and the relationship between them.

3.5 Conceptual framework

With regards to determinants, based on the literature on efficiency, many bank-specific variables were found to be influential to efficiency. Therefore, this study examines the most important bank-specific factors such as bank size, capital ratio, loan intensity, credit risk, financial leverage, returns on assets (ROA), bank age, ownerships (foreign, domestic and public), and listing. In the literature, macroeconomic factors were strongly associated with efficiency. Hence, the most significant variables examined in this thesis

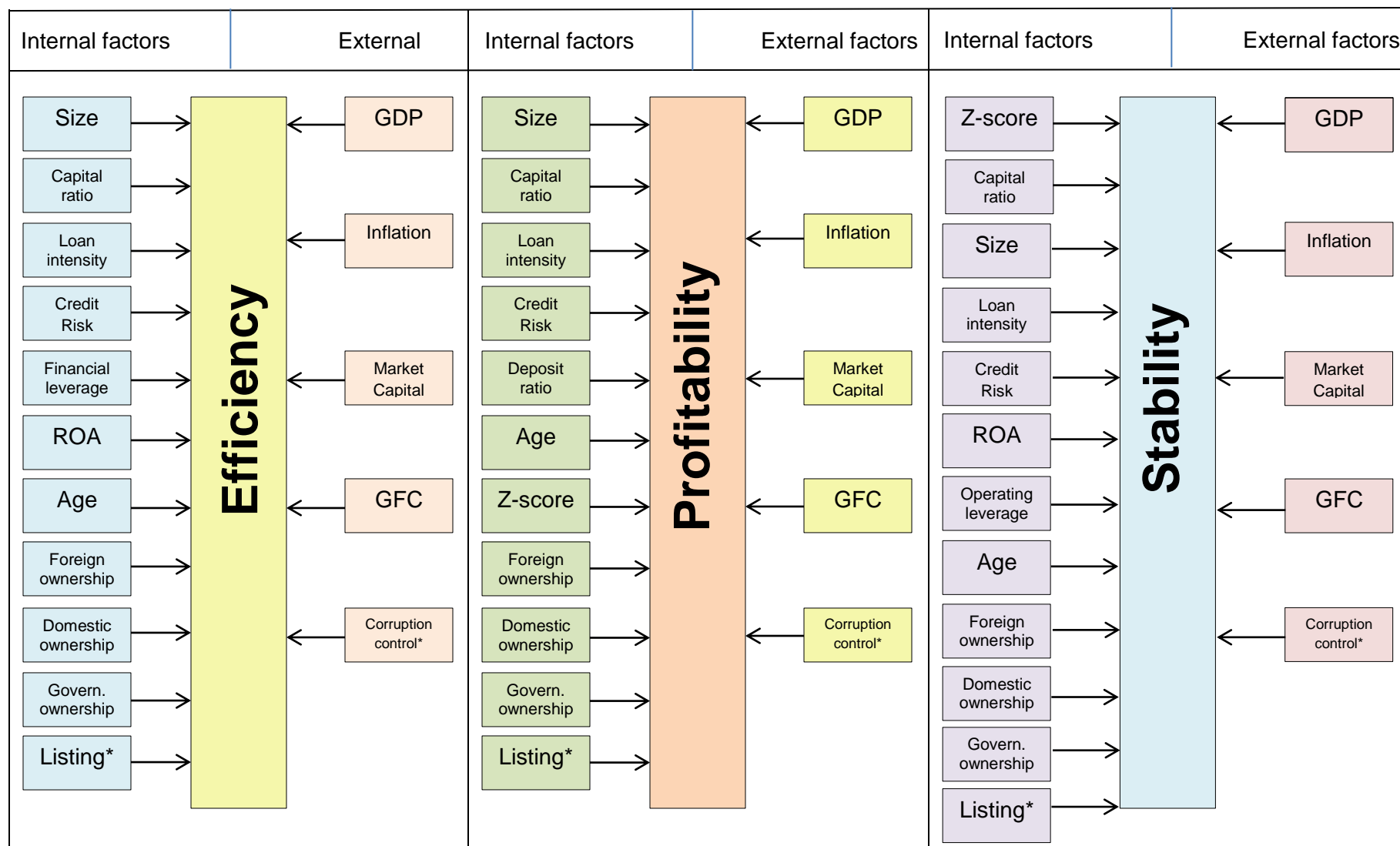
are gross domestic product (GDP), inflation, market capitalisation, the global financial crisis, and corruption control. For profitability, the highest beneficial internal variables are bank size, capital ratio, loan intensity, credit risk, deposit ratio, age, z-score, ownerships (foreign, domestic, and public), and listing. On the other side, GDP, inflation, market capitalisation, the global financial crisis, and control of corruption can be examined as external variables. Finally, the financial stability of banks can be determined by internal factors, such as z-score, capitalisation, bank size, loan intensity, credit risk, ROA, operating leverage, bank age, ownerships (foreign, domestic, and public), and listing. GDP, inflation, market capitalisation, and GFC can represent stability effectively. Figure 3.1 illustrates the relationship between efficiency, profitability, and stability and their determinants.

3.6 Summary

The ROA, ROE, and NIM are the most common indicators identified in the literature review, and reflect the relationship between banks' performance and its determinants through the statistical regressions such as OLS and fixed effects models. Regarding the stability, z-score and capital ratio are measured for all banks, then the correlation between stability and the independent variables can be identified. The period for this study includes 2007, which was the year of the global financial crisis, and is the reason behind choosing z-score as a main indicator for banks' stability; z-score is realistic in terms of finding the insolvency risk. Additionally, the values required for calculating the z-score were available from the Bankscope database (ROA and capital ratio).

Statistically, the relationships between efficiency, profitability, and stability indicators (dependent variables) and their determinants (independent variables) will be analysed through two main regressions: OLS and fixed effects models. The OLS is the most common model utilised by researchers, as the results of OLS are outstanding. Regarding fixed effects, this model is the second most common model used in recent studies.

OLS and fixed effects regressions are the most accurate models compared to Tobit and random effects regressions. Moreover, the researcher has chosen these two models to



* Additional variable

Figure 3.1: Conceptual framework

ensure that the results are correct by giving robust evidence through OLS and fixed effects. Furthermore, the shared models in the literature review of efficiency, profitability, and stability were OLS and fixed effects models. In general, this study analyses the banking sector across the world (Islamic, conventional, and socially responsible banks) over the period 2005-2012.

Chapter Four: Methodology

4.1 Introduction

The data in this research is analysed through three main methods: efficiency, profitability and stability methodologies. This chapter explains in detail each method including the indicators of efficiency, profitability and stability. In addition, the data collection method and data description are shown in this chapter. Furthermore, the explanation of bank-specific and macroeconomic variables (determinants) is indicated in this part of the thesis. Finally, the used models to analyse the data are shown in this section.

4.1.1 Data collection method

The data in this study was extracted from two main sources: Bankscope and World Bank databases as follows:

4.1.1.1 Bankscope database

This research uses the database of Bankscope providing information about banks around the world. Bankscope provides updated balance sheets, income statements, retained earnings statement, profitability ratios and rating of banks. The data is updated more than 20 times a year and declared on the main Bankscope database through the internet which supports the transparency principal for the clients of banks. In other words, the client can check the financial statements before opening accounts in any bank. The data of the study will be gathered for Islamic, conventional and socially responsible banks from 2005-2012 (Bankscope, 2015). This research uses two statements of balance sheet and income statement for the banks' data and World Bank database in terms of macroeconomic variables. All data was organised as a panel data set.

1. Balance sheet: is a financial statement that includes two parts: credit and debit. The debit part contains assets owned by the company as current assets, fixed assets and intangible assets. On the other side, the credit part contains all claims against assets as current liabilities and equity. According to accounting methods: $\text{assets} = \text{liabilities} + \text{owner's equity}$. Assets can be defined as economic values of

what the company owns, and has three types: physical (fixed) assets such as buildings, cars, machines and equipment, financial (current) assets e.g. cash, account receivables, short-term investment and inventories, and intellectual (intangible) assets such as trademarks, patent, goodwill. On the other side, liabilities can be defined as the amount of money that the company owes to others and have two types: current liabilities e.g. payable and short-term debt, and long-term liabilities such as long-term debt. The last section of the credit part is equity defined as the amount of money which constructs the capital of a company; it is represented as percentages of ownership that allow owners to earn profits as percentages of sharing (Brooks, 2010). Capital contains equity plus debt in the following equation:

$$\text{Capital} = \text{total equity} + \text{total debt}$$

2. Income statement: is a measure of the performance of a company during a period of time through comparing revenues and costs by the following equation:

$$\text{Net (profit or loss)} = \text{total revenues} - \text{total expenses}$$

If the result is positive then a company achieves a profit, whereas if the result is negative then it means that a company achieves a loss. The income statement starts with revenue and ends up with net income; companies get net income after reducing all costs, expenses, depreciation and tax from revenue (Brooks, 2010).

4.1.1.2 World Bank database

The World Development Indicators (WDI) database is the main source of the World Bank database. World Bank collects the data from the official sources such as database of ministries of countries. The data available is national, regional and global. This database is updated three times a year and the formal publication is released in April each year. World Bank database covers most countries' economies. However, most Macroeconomic data gathered from the World Bank database is free to access on the internet (World Bank, 2015).

4.2 Type of data gathering

The way of gathering the data in this study is secondary data which is concerned with gathering the information through Bankscope and World Banks databases.

According to Bryman and Bell's (2007) observations about the recent research methods of students, they found some advantages of secondary data collecting:

1. It gives high standards of quality as data is checked and updated continuously.
2. Gathering data through a secondary approach saves cost and time, as data can be accessed through university or internet accounts.
3. It reduces the effort of travelling to collect the data.
4. It gives the chance of cross cultural analysis by knowing balance sheets and income statements for different countries without travelling and meetings.

4.3 Research sample

The data in this study was extracted from two main sources: Bankscope and World Bank databases. For Bankscope, the data was extracted from balance sheets and income statements of 323 banks being 43 Islamic banks (13.31% of used banks), 242 conventional banks (74.92%), and 38 socially responsible banks (11.76%) across the world covering 37 countries available in the Bankscope and World Bank databases from 2005 -2012. The data has been gathered from Middle Eastern and North African (MENA) regions including Islamic, conventional and socially responsible banks. Regarding the banks, data has been collected from 20 countries namely, Algeria, Egypt, Iran, Iraq, Lebanon, Libya, Malta, Morocco, Israel, Jordan, Palestine, Syria, Tunisia and Yemen, as well as the Gulf Cooperation Council (GCC) countries, which are considered to be oil exporter countries in the Middle Eastern region namely, Bahrain, Kuwait, Oman, Qatar, the kingdom of Saudi Arabia and United Arab Emirates which include Islamic and conventional banks in this study (Bankscope, 2014). Furthermore, we have banks from the United Kingdom (the UK can be used as a benchmark), which is one of the strongest industrial countries in the world. In addition, the UK has several Islamic banks such as the Islamic Bank of Britain (IBB), which was the first Islamic bank in the UK (it was established in 2004) (Islamic Bank of Britain, 2014). Currently, the name of IBB is Al Rayan Bank which formally changed its name in December 2014. Actually, Al Rayan Bank in the UK is owned by Qatari Maraf Al Rayan Bank. According to Al Rayan Bank, the bank is following a socially responsible banking scheme under an Islamic, socially responsible finance programme (Al Rayan Bank, 2015). Therefore, the researcher has chosen to

compare banks in the MENA region and the UK, as they both have Islamic, conventional and socially responsible banks and due to availability of data in Bankscope. In addition, there are some socially responsible banks in the UK that can link to this study, which can lead to the comparison of Islamic, conventional, and socially responsible banks from completely different regions. However, socially responsible banks spread globally, so we gathered them from some MENA countries and 17 different countries around the world ordered alphabetically: Australia, Austria, Bangladesh, Bolivia, Canada, Denmark, France, Germany, Mongolia, Nepal, Netherlands, New Zealand, Norway, Spain, Switzerland, the United Kingdom and the United States of America. According to data gathered from World Bank database, macroeconomic variables e.g. inflation rates have been collected for the 37 countries. In general, 5 conventional banks in this sample are adopting Equator Principles (EPs) namely Bank of Muscat in Oman, Barclays Bank, HSBC Bank, Lloyds Bank and Standard Chartered Bank in the United Kingdom. All these banks are following the environmental and social risk management in their projects (Equator Principles, 2016). Regarding the listing, 21 listed Islamic banks and 22 unlisted Islamic banks are included in the sample. According to conventional banks, there are 98 listed conventional banks and 144 unlisted banks. For the socially responsible banks, 7 listed banks and 31 unlisted banks will be estimated in this study (Bankscope, 2016).

In fact, all data has a unified currency of US Dollars in millions. The names of banks are shown in appendices 5-7. So, this study examines eight different groups as:

1. Islamic banks including UK and MENA.
2. Conventional banks including UK and MENA.
3. Socially responsible banks across the world.
4. Islamic, conventional and socially responsible banks in MENA (including GCC).
5. Islamic, conventional and socially responsible banks in MENA (excluding GCC).
6. Islamic and conventional banks in GCC countries.
7. Islamic, conventional and socially responsible banks in UK (the UK can be used as a benchmark).
8. Islamic (UK and MENA), conventional (UK and MENA) and SRBs (across the world).

4.3.1 Profile of the countries under study

4.3.1.1 MENA Countries

This section explains the economic background of MENA countries, the United Kingdom, and countries which use socially responsible banks in the sample. The main purposes of choosing MENA countries are set out below.

1. Most MENA countries have the same culture and language (Arabic).
2. They contain Islamic, conventional, and socially responsible banks.
3. There is an appropriate level of availability of data for the MENA region.
4. The first international Islamic bank, the Islamic Development Bank, was located in the Middle East in 1975 in Jeddah, Saudi Arabia (Islamic Development Bank, 2014); whereas the first domestic Islamic bank, namely Dubai Islamic Bank, was established in Dubai, UAE, in 1975 (Dubai Islamic Bank, 2014).
5. Some MENA countries are leading global oil exporters, especially GCC countries whose GDP is based on the oil sector. Eight MENA countries (Algeria, Iran, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and UAE) out of 12 members are in the Organisation of Petroleum Exporting Countries (OPEC) (OPEC Organisation, 2014).

Overall, MENA includes 20 countries: Algeria, Bahrain, Egypt, Iran, Iraq, Lebanon, Libya, Malta, Morocco, Israel, Jordan, Kuwait, Oman, Palestine, Qatar, Saudi Arabia, Syria, Tunisia, UAE, and Yemen.

4.3.1.2 The United Kingdom

The United Kingdom (which is used as a benchmark in this study) is one of the strongest industrial countries in the world. In addition, the UK has several Islamic banks such as the Islamic Bank of Britain (IBB), which was the first Islamic bank in the UK (established in 2004) (Islamic Bank of Britain, 2014). Currently, the name of IBB is Al Rayan Bank, which formally changed its name in December 2014. In fact, Al Rayan Bank in the UK is owned by the Qatari Maraf Al Rayan Bank. According to Al Rayan Bank, the bank follows a socially responsible banking scheme under an Islamic, socially responsible finance programme (Al Rayan Bank, 2015). Therefore, this researcher has chosen to compare banks in the MENA region and the UK, as they both have Islamic, conventional, and socially responsible banks, as well as the availability of data in Bankscope. In addition,

there are some socially responsible banks in the UK that can be linked to this study, and can be compared with Islamic, conventional, and socially responsible banks from completely different regions.

4.3.1.3 Countries including socially responsible banks

Socially responsible banks are found all over the world, so we gathered them from MENA countries and from 17 other countries (Australia, Austria, Bangladesh, Bolivia, Canada, Denmark, France, Germany, Mongolia, Nepal, Netherlands, New Zealand, Norway, Spain, Switzerland, the United Kingdom and the United States of America).

4.3.2 Economic situations

It can be seen in Table 4.1 that the wealthiest country is the USA, achieving GDP equalling USD 17,416,235 million. The weakest economy is Palestine, with GDP equal to USD 6,641. According to GDP per capita, Qatar was found to be the highest in terms of individual wealth (USD 146,178), with the GDP per capita at USD 53,143 in 2014. In contrast, the minimum GDP per capita in 2014 was found to be in Bangladesh (USD 2,948). The remaining countries used in this study are shown in Table 4.1, which shows their GDP and GDP (PPP) in 2014.

4.4 Methodology of efficiency

4.4.1 Introduction

This study compares the efficiency of Islamic, conventional and socially responsible banks to see any differences between efficiency scores utilising a non-parametric approach as DEA including technical and scale efficiencies. The technical efficiency is divided into two approaches: technical efficiency (TE) constant-returns-on-scale (CRS) and TE variable-returns-on-scale (VRS); the selection of technical efficiency is the ability of the bank to use its available technology (or equipment) compared with scale efficiency which shows the efficiency of output amount (size of production) compared to inputs. After that, this study investigates the determinants of efficiency as a second stage through using two main models; the ordinary least squares (OLS) and fixed effects regression. Both models have been used to provide robust evidence of the impact between efficiency and its determinants with varied regressions over the period 2005-2012.

Table 4.1: GDP and GDP per capita of countries under the study

N	Countries	GDP (million US\$) in 2014	GDP per capita (US\$) in 2014
1	USA	17,416,253	53,143
2	Germany	3,820,464	40,007
3	UK	3,002,947	39,762
4	France	2,935,356	36,907
5	Canada	1,793,797	43,472
6	Australia	1,482,539	46,550
7	Spain	1,400,483	32,103
8	Netherlands	880,394	43,404
9	Saudi Arabia	777,870	24,500
10	Switzerland	679,028	53,705
11	Norway	511,602	65,461
12	Austria	436,069	46,223
13	UAE	402,340	63,497
14	Iran	367,098	15,590
15	Denmark	330,614	42,790
16	Israel	290,643	32,491
17	Egypt	271,427	11,089
18	Iraq	229,327	14,951
19	Algeria	212,453	13,320
20	Qatar	202,450	146,178
21	New Zealand	181,574	34,826
22	Kuwait	175,787	70,686
23	Bangladesh	161,763	2,948
24	Morocco	103,824	7,198
25	Oman	77,116	26,900
26	Syria	71,998	5,100
27	Libya	65,516	21,046
28	Tunisia	46,995	11,125
29	Lebanon	45,019	17,174
30	Yemen	40,415	3,959
31	Jordan	33,858	33,858
32	Bahrain	32,791	27,900
33	Bolivia	30,824	6,130
34	Nepal	19,341	2,244
35	Mongolia	11,516	9,433
36	Malta	9,545	29,133
37	Palestine (Gaza)	6,641	4,921

Source: World Bank (2015)

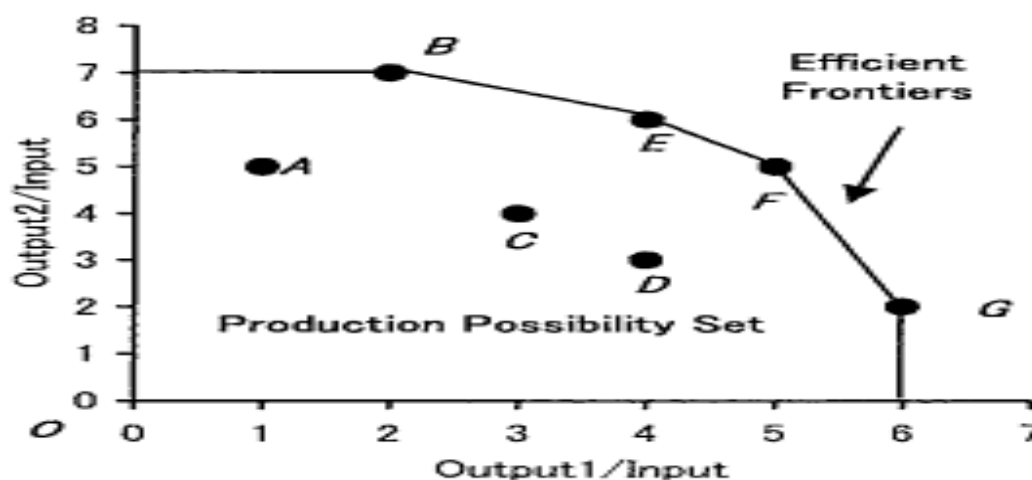
4.4.2 Measures of data envelopment analysis (DEA)

There are many approaches for measuring the efficiency in the banking industry but the most common are nonparametric approach such as DEA including technical, pure technical and scale efficiencies. In the literature many studies have used DEA such as Rosman *et al.* 2014 and Wanke and Barros (2014). On the other side, some articles focused on employing the parametric approach such as

SFA including cost, profit and revenue efficiencies (Fang *et al.*, 2011; Hasan & Marton, 2003). Some researchers used both DEA and SFA in their study (for instance, Gardener *et al.*, 2012; Fukuyama & Matousek, 2011; Hassan & Hussein, 2003). According to Sturm and Williams (2004), the DEA is defined as an indicator that represents a non-parametric linear programming approach which excludes input and output prices. In addition, DEA can measure the same type of examined organisations which are banks in this study; in other words, decision making units (DMU's). The DEA does not consider the error, which is a disadvantage of this indicator. The measures of efficiency varied from 0 which means there is null efficiency to 1 which indicates the maximum level of efficiency. This study uses data envelopment analysis (DEA) for the period 2005-2012. The DEA is a linear programming technique and non-parametric or mathematical programming method to estimate production frontiers by comparing inputs with outputs (Banker, 1993). Simply DEA represents a ratio of weighted outputs to weighted inputs, the more outputs generated the more efficient banks can be attained (Sufian, 2006).

In Figure 4.1 below (proposed by Cooper *et al.*, 2006), the efficient points can be E, F, G and B points due to a high number of outputs (higher than A, C and D dots). In contrast, the inefficient areas are A, C and D points. In this case, Cooper *et al.* (2006) explained that a firm can generate two outputs from using one input. The efficiency of point A can be calculated by dividing the distance between 0-A by 0-B ($0-A / 0-B$).

Figure 4.1: Efficient frontier of efficiency measures



*Source: Cooper *et al.* (2006)

Comparing DEA and SFA, the DEA always focuses on individual DMU's and the SFA focuses on estimating frontier. In this study DEA measures are used as dependent variables due to investigating the determinants of efficiency.

Estimating DEA indicators based on Charnes *et al.* (1978) approach who provided a mathematical model for DEA as:

$$\text{Max } h_0 = \frac{\sum r_{ur} y_{rj0}}{\sum v_i x_{ij0}}$$

subject to $\frac{\sum r_{ur} y_{rj}}{\sum v_i x_{ij}} \leq 1, j = 1, \dots, n \text{ (for all } j)$

Where: y_r : represents output data for decision making unit (DMU)

x_i : represents input data for decision making unit (DMU)

Based on the formula above we can conclude the technical efficiency as follows:

$$TE = \frac{\text{Aggregate Output Measure}}{\text{Aggregate Input Measure}} \dots \dots \dots (1)$$

The following study on efficiency which conducted by Banker *et al.* (1984) approved the following equation for pure technical and scale efficiencies:

$$PTE = \text{Technical Efficiency} / \text{Scale efficiency} \dots \dots \dots (2)$$

$$\text{Subject to } SE = \text{Technical Efficiency} / \text{Pure Technical Efficiency} \dots \dots \dots (3)$$

Where: PTE: pure technical efficiency
SE: scale efficiency

This means that any difference between technical and pure technical efficiencies leads to scale inefficiency. In fact, technical efficiency can be used as a formula of pure technical efficiency multiplied by scale efficiency.

However, DEA can be divided into two approaches; intermediation and production techniques (Sealey and Lindley, 1977). The intermediation method can be defined as a firm being a producer of services using deposits as inputs to generate outputs such as loans; the production method can be defined as a firm that produces deposits as outputs (Sufian, 2007). This research applies the intermediation approach that deals with deposits as inputs. In addition, DEA can be classified by; first: the CCR score which is related to Charnes, Cooper, and Rhodes (Charnes *et al.*, 1978) which can indicate the first DEA usage in the efficiency field and it assumes that there is no relationship between the scale of operations and

efficiency under the (CRS) approach. Second: the BCC score which is related to Banker, Charnes and Cooper (Banker *et al.*, 1984) which improves the CCR approach by assuming the model under (VRS) function gives the pure technical efficiency. To simplify more, TE (CRS) and CCR approaches are the same and PTE, TE (VRS) and BCC methods are the same as well. However, Sufian, (2007) proposed that if there is a difference between the technical efficiency and pure technical efficiency it leads to the scale inefficiency. Finally, DEA can be examined by the following measures:

1. The Technical Efficiency (TE).
2. The Pure Technical Efficiency (PTE).
3. The Scale Efficiency (SE).

4.4.2.1 Technical Efficiency

The objective of technical efficiency is to obtain the efficiency through comparing the current production and the potential production. The TE scores show how well management of banks' strategies (decisions) can use inputs to achieve outputs (size of operations). So, the technical efficiency considers practical (operational) work. The efficiency situation can be maximum when the production index hits the frontier, and it gives the proportional reduction in input usage (Green, 1993). The technical efficiency can be determined as how to use inputs efficiently. Farrell (1957) defined technical efficiency as comparing the performance of a bank with its counterparts facing the same regulations, environment and technology based on production function.

Another formula is $TE = PTE \times SE$ (Banker *et al.*, 1984)

This is the simple equation of the technical efficiency but the programmes of measuring efficiencies using complicated formulas are the main reason for using software to measure efficiencies from the researchers (e.g. Frontier Analyst, DEAP and DEA Solver programmes). Technical efficiency measures the quality of using the technology through time periods based on inputs and outputs. Sufian (2007) defined technical efficiency as the ability of firms to generate maximum outputs from a set of inputs and he adopted a technical efficiency approach on Singaporean commercial banks and found that the mean technical efficiency was 88.7%.

4.4.2.2 Pure Technical Efficiency

Pure technical efficiency is representing the efficiency measure of management practice (performance) of transforming inputs to outputs. Greater PTE indicates that bank practically operates more efficiently. All banks strive to score the highest efficiency measure (1). The PTE has been calculated as technical efficiency divided by scale efficiency as extracted from the equation above. In fact, PTE was defined by Rosman *et al.* (2014) as a measurement of technical efficiency devoid of the scale efficiency effects. Additionally, PTE includes the costs of inputs and outputs compared to TE (does not consider costs of inputs and outputs) If there is any difference between TE and PTE measures of a particular bank at any year, it means that there is scale inefficiency in the same year. Gaganis and Pasiouras (2009) applied the PTE method to the Greek banking industry. In particular, they conduct a comparison between the efficiency of foreign and domestic banks. Domestic banks achieved higher PTE scores than foreign banks in Greece. However, the equation to calculate pure technical efficiency is $PTE = TE / SE$ (Banker *et al.*, 1984). In fact, pure technical efficiency (PTE) is technical efficiency under a variable-to-scale method (VRS). Another name for PTE is the BCC model from Banker, *et al.* (1984).

4.4.2.3 Scale Efficiency

The main determinant of scale efficiency is the ability to generate large size of outputs using fewer amounts of inputs. In other words higher size of banking operations (by comparing TE with PTE) means better scale efficiency which allows banks from achieving economies of scale. This study utilises scale efficiency following Garza-García (2012) studying the Mexican banking industry. Garza-García (2012) uses calculated $SE = CRS / VRS$. In the other words, $SE = TE / PTE$ (Banker *et al.*, 1984). In conclusion, any difference between technical efficiency and pure technical efficiency forces banks to have scale inefficiency.

4.4.3 The theoretical difference between DEA Input and output orientations

The input oriented approach uses fixed variables of production and assumes that DMUs are efficient in achieving the same amount of outputs whereas, the output oriented approach gives the efficiency as the quality of outputs; which is more

realistic (Food and Agriculture Organization of the United Nations - Corporate Document Repository, 2012). In general, the input-oriented method attempts to minimise the inputs with the given outputs' level. In contrast, the output-oriented method aims to maximise the outputs with the existing inputs (Cooper *et al.*, 2007). Based on the definitions above, we can conclude the cases of efficiency.

1. Reduce inputs and generate fixed amount of (or given) outputs (input-orientation).
2. Fixed amount of inputs leads to maximise outputs (output-orientation).
3. Minimise inputs and maximise outputs (optimal case).
4. Raise inputs and outputs simultaneously, but in this case inputs need to be less than outputs.
5. Reduce inputs and outputs together (inputs have to be less than outputs).

In this study, input-orientation is used as the results encourage banks to reduce the waste of resources (inputs).

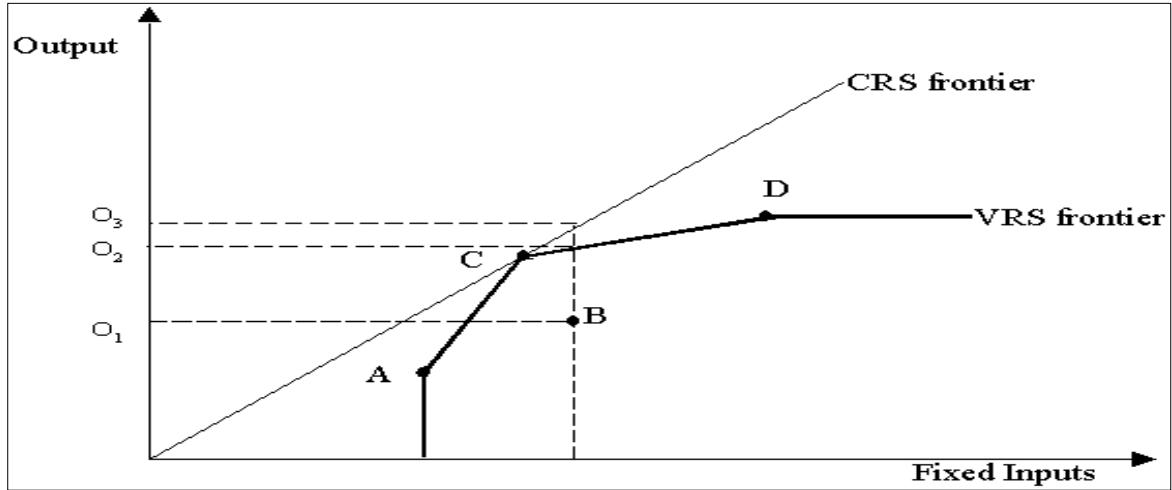
4.4.4 The difference between DEA, CRS and VRS frontiers

The constant return to scale (CRS) assumes that all banks (DMU's) operate on an optimal scale as a linear frontier, whereas variable return to scale (VRS) considers that the outputs are placed on a changeable frontier as in Figure 4.2 below.

Figure 4.2 assumes in the CRS case that using any amount of inputs can be generate the same amount of outputs (any point on CRS is efficient). On the other side, the VRS frontier assumes that point A is fully efficient due to employing a low amount of inputs and producing high outputs. In comparison, point B denotes inefficiency (inputs more than outputs). However, in case of points A, C and D (efficient), the amount of inputs is less than the production.

More details explained by Gaganis and Pasiouras (2009) who assumed K inputs, M outputs for each N bank. In addition, $K \times N$ is X matrix and $M \times N$ is Y matrix so, the input-oriented measure for one DMU under CRS method is calculated as:

Figure 4.2: The difference between CRS and VRS



*Source: Banker *et al.* (1984)

$$\text{Min}_{\theta, \lambda} \theta$$

$$\text{s.t. } -y_i + Y\lambda \geq 0$$

$$\theta x_i - X\lambda \geq 0$$

$$\lambda \geq 0$$

Where: λ is a vector of $N \times 1$ constant

y : output

x : inputs

θ is efficiency score which varies from 0-1, 1 represents an efficient bank and it is placed on the efficiency frontier; whereas, $\theta < 1$ means that the bank is inefficient and needs to reach the frontier through the reduction of inputs by the result of $1 - \theta$. Banker *et al.* (1984) divided VRS into two types: TE under VRS or pure technical efficiency (PTE) and scale efficiency. TE (VRS) or PTE refers to the ability of using the available resources through firms' managers. On the other hand, SE refers to the ability of firms to exploit economies of scale and produce optimal outputs under CRS. Banker *et al.* (1984) defined CRS as a linear programme considering VRS by adding the convexity $N1' \lambda = 1$, where $N1$ is a $N \times 1$ vector of ones. Even more, Banker *et al.* (1984) applied VRS as:

$$\text{Min}_{\theta, \lambda} \theta$$

$$\text{s.t. } -y_i + Y\lambda \geq 0$$

$$\theta x_i - X\lambda \geq 0$$

$$N1' \lambda = 1$$

$$\lambda \geq 0$$

4.4.5 Advantages and limitations of DEA

By comparing DEA with SFA (the most common indicators), we can conclude the following advantages of DEA:

1. DEA can calculate the efficiency using multiple inputs and outputs.
2. There is no restriction in choosing the type of inputs and outputs compared to SFA which only deals with cost and profit functions.
3. DEA identifies the DMU's which are inefficient.
4. It can give accurate results of efficiency if the peers are unified such as banks.

Whereas, the limitations are as follows:

1. DEA is a deterministic technique rather than statistical.
2. It could not compare the scores of two different studies.
3. It neglects the error and there is sensitivity against the error.
4. DEA is sensitive to the size of the sample, inputs and inputs' specification.

However, other efficiency indicators can be seen in Appendix 4.

4.5 Inputs to calculate the efficiency indicator

From recent studies, we can extract some useful inputs that can be used in the study. In the literature, many inputs have been used e.g., employees, deposits, terminals, number of accounts, suppliers, computers, location, acquired equipment, funds from customer, loanable funds, space, rent, automated teller machines (ATMs), counter transactions, interest costs, non-interest costs, expenses, assets, operating costs, capital stock, marketing, capital, number of loan accounts, number of mortgage accounts, number of cheque accounts, credit applications, number of branches, current accounts, saving accounts, net worth, borrowings, capital stocks and size. However, the highest valuable inputs which can be used in this study are (Brooks, 2010):

1. Fixed assets: is a tangible (physical) asset that the company owns such as property, automobiles, plants and equipment. According to the literature review

above in chapter three, fixed assets have been used as inputs (Rosman *et al.*, 2014; Zhang & Matthews, 2012; Assaf *et al.*, 2011; Hassan, 2006).

2. Deposits short term funding: is the amount of money that banks take from clients, deposits can be through cash or cheque. Some researchers used the deposits as inputs such as Das and Ghosh (2009) on Indian conventional banks (also, Rosman *et al.*, 2014 used deposits short term funding as inputs).

3. Equity: is the amount of money which constructs the capital of a company; it is represented as percentages of ownership that allow owners to earn profits as percentages of sharing. Equity has been used as an input in many studies (Hadad *et al.*, 2012; Olson & Zoubi 2011; Satub *et al.*, 2010).

4.6 Outputs to calculate the efficiency indicator

The outputs of the previous studies are: profits, revenues, return on assets (ROA), return on equity (ROE), deposits, number of products, number of customers, loans, dividends, number of transactions, advances, insurance commission, net profit, customer loyalty, mortgage loans, customer response, balance of current account, number of accounts, investments, investment on securities, sales and customer satisfaction.

The chosen data for this study are fixed assets, (deposits and short term funding) and equity as inputs, whereas the outputs are net income, total securities and loans (Brooks, 2010):

1. Net income: is the result of revenue minus expenses, costs, depreciation and tax. Hadad *et al.* (2012) Ho and Zhu (2004) used net income as an output to find DEA.

2. Total securities: are financial instruments supported by physical assets; it has three types: equity securities (shares), debt securities (bonds) and derivatives contracts (options) which can be traded in second markets. Total securities have been used as outputs in many studies (see Assaf *et al.*, 2011; Feng & Serletis, 2010).

3. Loans: are the amount of money that banks give to customers to be repayable on an agreed date between the bank and client including the interest rate that can

be raised in case of not paying on the due date. The most used output was loans such as Rosman *et al.* (2014), Abdul-majid *et al.* (2011) and Al Shamsi *et al.* (2009).

In this study, we use three inputs and outputs as three was the average number of inputs and outputs used by recent researchers according to the literature review in chapter three. In terms of inputs, the minimum number of inputs was one input (Al-Sharkas *et al.*, 2008). The maximum number of inputs was six inputs (Drake and Howcroft, 2002). On the other hand, the minimum number of outputs was one output (Baten and Kamil, 2010), whereas the maximum number of outputs was five (Drake *et al.*, 2009). The researcher of this study is trying to find the most relevant mixture of inputs and outputs through Bankscope. In addition, three inputs and three outputs give accurate results and make the balance between the inputs and outputs. Additionally, the most available inputs and outputs were the selected data above in the Bankscope database. One of the main advantages of DEA is choosing any type of inputs (current or fixed assets) and outputs as mentioned before. Hence, this study tries to estimate efficiency measures through the main banking activities such as using deposits to generate loans. In addition, equity and fixed assets are compulsory to operate banks. Evermore, securities and net income are highly important to banks.

4.7 Data description of inputs and outputs used in DEA estimations

DEA was employed using an intermediation (input-oriented) approach after using three inputs; fixed assets, deposits and short term funding and equity. On the other hand, there are three outputs selected net income, securities and loans which were extracted from Bankscope database. Table 4.2 below illustrates the data description of inputs and outputs used to obtain DEA estimations for Islamic, conventional and socially responsible banks during the period 2005-2012.

From Table 4.2 below, we can observe that the total observation is 2423 observations divided into 1827, 284 and 312 observations for conventional, socially responsible and Islamic banks, respectively. The socially responsible banks have the highest means of fixed assets (508.30 million USD), equity (3330.74 million USD), net income (442.74 million USD) and loans (23444.43

million USD). While, the conventional banks are leading in averages of deposits and short term funding (29392.34 million USD) and securities (22418.61 million USD) In contrast, the lowest means of inputs and outputs were attained by Islamic banks.

Table 4.2: Inputs and outputs data used in DEA estimations

Type	Data Description					
	Inputs					
	Variables (Million US\$)	Obs	Mean	Std. Dev.	Min	Max
Islamic Banks	Fixed assets	312	205.4659	438.8246	0.1	3084.4
	Deposits & Short term funding	312	6413.603	11623.06	0.04	87855.43
	Equity	312	1015.166	1419.184	8.61	9725
	Outputs					
	Net income	312	122.0563	316.6348	-559.4	2102.6
	Securities	312	741.0557	1373.682	1.03	10901.4
	Loans	312	4967.355	8991.731	0.5	58681.78
Conventional Banks	Inputs					
	Fixed assets	1827	313.1431	1605.954	0	28031.7
	Deposits & Short term funding	1827	29392.34	122116.9	0.06	1369820
	Equity	1827	2578.103	9623.323	0.02	100757.6
	Outputs					
	Net income	1827	167.0845	1332.514	-19801.5	16662.9
	Securities	1827	22418.61	129049.9	0	1881055
	Loans	1827	22696.33	99842.09	0.01	1104887
Socially Responsible Banks	Inputs					
	Fixed assets	284	508.3079	2075.199	0.1	16888.57
	Deposits & Short term funding	284	26134.31	96256.97	31.2	729536.9
	Equity	284	3330.748	11666.04	3.2	75455.86
	Outputs					
	Net income	284	442.7419	2220.969	-9026.8	17351.66
	Securities	284	4372.075	12204.02	0	77597.68
	Loans	284	23444.43	91484.12	6.8	743053.5
All Banks	Inputs					
	Fixed assets	2423	322.1532	1574.239	0	28031.7
	Deposits & Short term funding	2423	26051.59	111359.6	0.04	1369820
	Equity	2423	2465.067	9292.401	0.02	100757.6
	Outputs					
	Net income	2423	193.5962	1391.534	-19801.5	17351.66
	Securities	2423	17512.04	112463.4	0	1881055
	Loans	2423	20501.12	92409.25	0.01	110488

4.8 Methodology of profitability

4.8.1 Introduction

One of the main aims of banks is maximising profits and minimising costs. With regard to profitability ratios, the values of ratios reflect how well the financial performance is; higher values mean the performance is better. In this study, the determinants of profitability will be identified through using the profitability ratios as dependent variables and treating bank-specific and macroeconomic variables as independent variables for all Islamic, conventional and socially responsible banks for the period 2005-2012. However, more profits lead to more experienced employees and better quality assets; for example, high security software and modern computers raise the efficiency of work and save time, both of them are costly, which needs high profits to cover their expenses.

4.8.2 Profitability measures

The major and most common used ratios in the recent studies are return on assets (ROA), return on equities (ROE) and net interest margin (NIM):

4.8.2.1 Return on assets (ROA)

ROA is an indicator that shows how efficiently the resources (total assets) of firms are used by the management to generate profits (Short, 1979). The ROA is defined as net income divided by total assets of the firm (Mamatzakis *et al.*, 2015). Guillén *et al.* (2014) argue that higher ROA indicates that the firm is more efficient in using its resources. However, the ROA indicator is used as a dependent in many studies (Apergis, 2014; Ćurak *et al.* 2012; Tan & Floros, 2012).

4.8.2.2 Return on equities (ROE)

According to Guillén *et al.* (2014), ROE is a ratio defined as net income over total shareholders' equities. The ROE reflects the abilities of management to use the shareholders' funds effectively (more ROE means that the management in utilising the shareholders capital is more efficient). Many studies examined ROE as an explained variable (Beck *et al.*, 2013; Lee & Kim, 2013; Olson & Zoubi, 2011).

In conclusion, this study employs ROA and ROE as explained variables using the following formulas:

ROA = Net Income / Total Assets.....(4)

ROE = Net Income/ Total Equity.....(5)

Where: ROA: return on assets

ROE: return on equity

4.8.2.3 Net interest margin (NIM)

Demirguc-Kunt and Huizinga (1999) state that NIM is defined as the value of net interest margin to total earning assets. NIM calculates the profits generated from lending investment. This ratio represents the effectiveness of interests' investment. Higher NIM ratio means that the interest revenue is better and the investment is valuable. In case NIM is negative, then the interest expense is higher than interest revenues which raise the risk of loss. The income interest can occur through lending interests and bonds' revenues. On the other side, interest expenses are achieved from paying interests such as paying deposit interests to clients and borrowing interests. According to total earning assets, it includes any assets can produce income, for example, the investment in stocks, bonds, income from rental property, certificates of deposits can be earning assets. Regarding Islamic banks interest-free investment is representing the net interest margin ratio. The NIM can be used in this study as an explained variable using the following ratio (Bankscope, 2015):

NIM = Net Interest Income / Total Earning Assets.....(6)

4.9 Methodology of stability and measures

The stability of banks is determined by the amount of risk that the bank can be exposed to. This risk can lead to achieving more loss and ending up bankrupt. The main indicators to measure the stability are z-score and capital ratio. Williams (2014) defined z-score as the sum of average ROA and average capital divided by the range volatility of ROA. Williams (2014) mentioned that the larger value of z-score means that the firm is further from bankruptcy and more stabilised. However, after the global financial crisis (GFC) that occurred in 2007, measuring stability has become an important issue. According to capital ratio, this calculated as equity to total assets that measures the proportion of the total assets that are financed by

stockholders. Higher capital raises the stability due to the readiness of financial support in case of any unexpected loss or financial crisis occurred (Horváth *et al.*, 2014). Some other stability indicators have been used in the literature such as non-performing loans or NPL (credit risk) and non-interest income (NII). The NPL has been defined by Srairi (2013) as the ratio of non-performing loans over total loans. Regarding the NII, Nguyen *et al.* (2012) used NII as total non-interest income to total assets.

This study employs z-score as an explained variable to describe stability. Boyd *et al.* (1993) proposed the z-score formula:

$$Z - score = \frac{ROA + E/TA}{S.D. ROA} \dots\dots\dots(7)$$

Where: ROA: return on assets
E/TA: equity to total assets (or capital) ratio
S.D. ROA: standard deviation of return on assets

Higher z-score indicates more financial stability and less bankruptcy (default) risks.

According to capitalisation ratio, Horváth *et al.* (2014) employed the capital ratio as follows:

$$\text{Capital ratio} = \text{Equity} / \text{Total Assets} \dots\dots\dots(8)$$

4.10 Research questions

After choosing the right methods to analyse the data, this study is able to answer the research questions which are:

Q₁: Are Islamic, conventional, and socially responsible banks efficient, profitable and stabilised over the period? Which type of bank is the most efficient, profitable and stable?

Q₂: What are the determinants of efficiency, profitability and stability in Islamic, conventional and socially responsible banks? Are the determinants different for these bank types?

Q₃: How do the internal and external factors affect the efficiency, profitability and stability? Is the influence positive or negative?

The research method is a tool that helps to find the answers to the questions of research to reach the research objectives. The importance of this study is in studying the banking industry of countries that provide oil and natural gas which is considered to be nowadays the best income maximiser of GCC countries (which is part of the Middle Eastern region) and the rest of the MENA countries which have a large number of Islamic banks. Islamic, conventional and socially responsible banks in MENA and countries with socially responsible banks across the world and the UK (which has Islamic, conventional and socially responsible banks) are compared in terms of efficiency, profitability and stability over the period 2005-2012. Regarding the UK banking sector, it is considered to be one of the best countries in the world for manufacturing industry such as the automotive manufacturing sector and aerospace industry. In addition, London was classified as the world's largest financial centre in the world in 2008 according to MasterCard research (Worldwide Centres of Commerce Index, 2008) which made the researcher choose the UK with the Al Rayan Bank (formerly: Islamic Bank of Britain) in their banking system; so, this study is based on the largest financial hub of the world.

4.11 Determinants of efficiency, profitability and stability

There are two different types of independent variables; industry-specific (bank-specific) variables and country-specific (macroeconomic) variables. This study identifies the determinants of efficiency, profitability and stability of Islamic and conventional banks, whether industry-specific variables or country-specific variables.

4.12 The independent variables definitions

4.12.1 Bank-specific (internal) variables

These types of variables are related to bank factors. In this study, there are six industry-specific variables; size, capital ratio, loans intensity, credit risk, ROA, financial leverage, deposit ratio, operating leverage, age, z-score, ownerships (foreign, domestic, government) and listing (Bankscope, 2013). Another name for industry-specific variables is bank characteristics (Demirgiic-Kunt and Huizinga, 1999).

1. Bank size

This factor represents the bank's total assets. To ease the data, natural logarithm of bank's total assets will be used. Tan and Floros (2013) investigated size as a determinant of efficiency in China and they used the logarithm of total assets. For profitability, Lee and Kim (2013) examined the effect of bank size on profitability in Japan. Focusing on stability, Bourkhis and Nabi (2013) analysed the stability of Islamic and commercial banks. The results suggest that smaller banks are less risky and more stabilised.

2. Capital (adequacy) ratio (or leverage intensity)

It indicates the ratio of equity divided by total assets. This ratio shows the size of capital compared with total assets. Bank regulators strive to score more than a minimum adequate level to reduce the probability of bankruptcy (Apergis, 2014). Gardener (2012) examined the capital ratio (also, known as capital risk) and his results show that banks with higher capital were more efficient than banks with lower capital in terms of technical and cost efficiencies. In contrast, there was a significant and negative relationship between the capital ratio and the allocative efficiency in South East Asian banking over the period 1998-2004. For profitability, Ćurak *et al.* (2012) argued that capital ratio reduces the ROA. Regarding stability, Williams (2014) suggests that banks attaining higher capital ratios are far away from bankruptcy.

3. Loan intensity

This ratio is calculated as loans over total assets. This shows the liquidity of loans provided by banks using the available assets over a specific period. Many studies have concentrated on loan intensity as an explanatory variable for efficiency (Garza-Gracia, 2012; Sufian, 2009; Psiouras, 2006). These studies concluded that there was a positive relationship between loan intensity and efficiency, thus an increase in loans raises efficiency through lower costs and leads to better quality loans (Isik & Hassan, 2003). Referring to profitability, most studies found that there is a positive relationship between profitability ratios and loan intensity (Olson & Zoubi, 2011; Sufian & Habibullah, 2010). Regarding stability, some studies suggested that more loan intensity leads to lower z-score which increases the likelihood of bankruptcy such as Kohler (2015).

4. Credit (liquidity) risk

It is a ratio calculated as loans divided by deposits. This ratio indicates the extent of risk of lending (using the deposits), whether high or low risk depends on the ratio. Hou *et al.* (2014) argued that reducing the credit risk in banks is maximising the efficiency and allows banks to be able to cover the withdrawals of clients. Higher credit risk means that banks rely on borrowed funds rather than deposits for lending. However, this variable has been used by Chitan (2012) in terms of profitability. They found that credit risk had a significant negative impact on profitability which means that shareholders are exposed to less risk from lending more. Referring to stability, Jeon and Lim (2013) indicate that Korean savings banks which provide more loans achieve less stability (z-score). Nguyen and Nghiem (2015) confirmed that capital ratio was affected significantly and negatively in Indian banking sector through the period 1990-2011.

5. Return on assets (ROA)

The ROA is a profitability ratio concerned with earnings which comes from using the total assets of the firm. However, the equation of ROA can be calculated as net profit divided by total assets (Garza-Gracia, 2012). Additionally, many studies have examined the impact of ROA on efficiency in the banking sector (Garza-Gracia, 2012; Sufian, 2009). As a result, the relationship between ROA and efficiency was significantly positive, the more ROA (profitability) achieved the more efficient banks can be. However, ROA has been used in the literature as an explanatory variable for z-score (explained) such as Ghosh (2014) and Srairi (2013). As a result, ROA has not had any effect on z-score in these studies.

6. Financial leverage

Abu-Alkheil *et al.* (2012) defined financial leverage as total assets over total equity. This ratio finds the amount of financed assets by shareholders' equity. They found that the financial leverage ratio decreases the efficiency (negative correlation).

7. Deposit ratio

García-Herrero *et al.* (2009) defined the deposit ratio as deposits over total assets. This ratio can determine the risk of accepting deposits from clients and how to

invest the deposits compared to total assets. However, deposit ratio has been used in this study as an explanatory variable to explain profitability ratios.

8. Operating leverage

Operating is a ratio calculated as fixed assets to total assets (Srairi, 2013). This shows the financed fixed assets using total assets of the firm. However, Srairi's (2013) findings suggest that operating leverage ratio raises the stability over the period 2005-2009 in Islamic and conventional banks in the MENA region.

9. Age

Age of banks is counted as years of banks' operation. Akhigbe and McNulty (2005) examined the age of banks, and they found that older banks are more efficient than new banks in USA for the period 1995 to 2001. However, in this study we examined age as a log of years since establishment. Regarding Beck *et al.* (2005), new banks in Nigeria were able to achieve more profits than older banks during the period 1990-2001. Moreover, older banks are more stabilised than new banks according to Lee and Chih's (2013) research.

10. Z-score

Z-score has been used as an independent variable following Apergis' (2014) approach. Apergis (2014) found a negative correlation between z-score and ROA, with more profits leading to less stability in the US during the period 2000-2013. Sufian and Habibullah (2009) argue that risk reduces the efficiency in their study.

11. Ownership

Many studies used ownership as an independent variable in terms of efficiency literature. For example, Gardener *et al.* (2012) divided banks into three parts; foreign, private and state banks. They found that foreign banks are the most efficient banks in the South East Asian region over the period 1998-2004. Referring to profitability literature, Lee and Kim (2013) investigated that foreign international banks have more ability to improve the performance than the domestic banks in Korea. Regarding stability, Mirzaei's, *et al.* (2013) empirical results reveal that foreign banks are assume to have lower risk of failing. This

study represents ownership as the main dummy for foreign, domestic and government banks.

12. Listing

This variable can be examined as dummy as 1 for the listed banks and 0 for the unlisted banks. The listing dummy compares between the listed and unlisted banks and shows which banks are more efficient, profitable and stable. Yudistira (2004) argued that listed Islamic banks are more efficient than unlisted banks. Saghi-Zedek and Tarazi (2015) proved that listed banks are more profitable than unlisted. Finally, Wang *et al.* (2015) confirmed that listed banks are more stable and less risky than unlisted banks.

4.12.2 Macroeconomic (external) variables

The macroeconomic variables are the external factors of the economy as a whole. There are four macroeconomic variables used in this study including GDP, inflation, market capitalisation, global financial crisis (GFC) and control of corruption (World Bank, 2013).

1. GDP

The gross domestic product is the sum of local market values of services and goods under political rules. The GDP is the main indicator of the amount of output (production) for governments (World Data Atlas, 2012). Hermes and Nhung (2010) found a positive relationship between efficiency and the GDP in the sample of banks used. In most studies, GDP increases the profitability such as Dedu and Chitan's (2013) study. Regarding stability, Tan and Floros (2013) illustrate that higher GDP in China leads to a higher z-score (more stability).

2. Inflation

Is an economic situation that indicates the rise in prices of services and goods over a determined period in countries; it represents in percentages the indicators of inflation shown annually. However, according to Economics Help Organisation (2013), inflation can happen in any country due to:

- a. Rise in oil prices
- b. Rise in shipment prices
- c. Increase of labour costs

- d. Increase in demand
- e. Rise in population
- f. Scarcity in resources
- g. Increase of cost of raw material
- h. Printing more money
- i. Higher taxes
- j. Decline in productivity
- k. Rise in house prices

Hermes and Nhung (2010) found that the inflation had not significantly influenced the efficiency. Therefore, this study examines the impact of the inflation on banks' efficiency. On the other side, Garza-Gracia (2012) showed that an increase in inflation reduced the banks' efficiency in Mexico during the period 2001-2009. As expected, inflation reduces the profitability in most studies due to decline in liquidity power of the population. Inflation was also used in the literature of profitability in banking such as Căpraru and Ihnatov's (2014) study. In terms of stability, Cubillas and González (2014) suggest that inflation decreases the stability and raises the insolvency risk.

3. Market capitalisation

Market capitalisation (MC) is an annual rate that indicates the growth of a stock market considering GDP. Vu and Nahm (2013) found that there was a positive relationship between MC and efficiency. Pasiouras and Kosmidou (2007) examined the stock market influence on the profitability and they found a positive relationship. Regarding stability, Nguyen *et al.* (2012) show that the market capitalisation increases the stability of banks.

4. Global financial crisis

Most banks have been affected by the global financial crisis that occurred in August 2007. This crisis was the result of many direct and indirect factors, but it started when BNP Paribas terminated withdrawals from three hedge funds. Bankruptcy also happened after the huge loss in the American mortgages. It was considered the worst regression since the financial crisis of the 1930s. However, this crisis has negatively affected the entire world; as the GDP reduced internationally following the crisis, the world stock markets fell across the world, the large financial institutions collapsed or were bought out, and governments in even the wealthiest nations had to come up with rescue packages to bail out their

financial systems (World Bank, 2014). In this study, we include the financial crisis to estimate its impact upon the efficiency, profitability and stability in Islamic, conventional and socially responsible banks. In fact, Noor and Ahmed (2011) found that there was no impact of the global financial crisis (GFC) and Asian financial crisis (AFC) that happened in 1997 upon the ROE but Noor and Ahmed (2012) conducted a study proving that AFC influenced the efficiency positively and GFC affected the efficiency negatively in Islamic banks over the period 1992-2009. William's (2014) findings could not show evidence of a correlation between GFC and z-score. In this study, financial crisis is a dummy for three periods: pre-crisis, during crisis and post crisis.

5. Control of corruption

This variable is showing the percentage of corruption control, higher rate indicates better control. Chortareas *et al.* (2012) found that increasing in controlling of corruption led to higher efficiencies in European banks. According to profitability, Demirguc-Kunt and Huizinga (1999) approved that corruption influencing the profits of banks badly. Regarding the stability, Hoque *et al.* (2015) found insignificant relationship between stability in European banking sector and corruption.

The main source of the independent variables above is World Bank (2013). However, this thesis is answering the research questions in the empirical results chapter.

This study reveals if the efficiency, profitability and stability of Islamic, conventional and socially responsible banks are influenced by these variables over the period 2005-2012. Table 4.3 summarises the method of use in the model of each explanatory variable.

In terms of bank-specific variables, it is observable that the conventional banks have the highest total assets (size) scoring mean equalling 8.16 million USD; also, conventional banks achieved the largest mean ROA (10%) in the group as in Table 4.4 below. While, the largest average capital ratios were obtained by the Islamic banks (30.5%). However, according to the loan intensity ratio, socially

Table 4.3: Definitions and descriptions for the explanatory variables

Variable Name	Notation	Description
Bank size	LTA	The natural logarithm of total assets
Capital ratio	EQTA	The ratio of equity to total assets
Loan intensity	LOANSTA	Loans over total assets ratio
Credit risk	LOANSDEPO	Loans to deposits ratio
Financial leverage	TAEQ	The ratio of total assets to equity
Deposit ratio	DEPOSITSTA	Deposits to total assets ratio
Return on assets	ROA	Net income over total assets ratio
Operating ratio	FATA	The ratio of fixed assets to total assets
Bank age	LAGE	The natural logarithm of time since establishment
Z-score	LOGZ	Logarithm of z-score
Foreign banks	FORE	Dummy variable: 1 for foreign ownership, 0 otherwise
Domestic banks	DOM	Dummy variable: 1 for domestic ownership, 0 otherwise
Government banks	GOV	Dummy variable: 1 for government ownership, 0 otherwise
Listing*	LISTED	Dummy variable: 1 for listed banks, 0 unlisted banks
GDP	LGDP	Logarithm of gross domestic production
Inflation	INFLATION	Inflation rates
Market capitalisation	MCAP	Market capitalisation to GDP ratio
Global financial crisis	GFC	Dummy variable: 1 for the period 2007-2009, 0 otherwise
Corruption control*	CCONTROL	Percentage of controlling corruption by government

* Additional variable

responsible banks are leading in terms of providing loans (42.2%). According to macroeconomic variables, the greatest GDP was found to be in the countries of the socially responsible banks scoring averages of 26.58. Focusing on inflation rates, the lowest mean inflation was attained by conventional banks' countries (5.70%) then Islamic banks' countries (9.90%) and socially responsible banks' countries (12.66%).

4.13 Efficiency models and hypotheses

OLS and fixed effects models are run in this study due to finding the determinants of banks' efficiency and the regression can be as follows:

- Main test:

$$Eff_{it} = \alpha + \beta_1 LTA_{it} + \beta_2 EQTA_{it} + \beta_3 LOANSTA_{it} + \beta_4 LOANSDEPO_{it} + \beta_5 TAEQ_{it} + \beta_6 ROA_{it} + \beta_7 LAGE_t + \beta_8 FORE_i + \beta_9 DOM_i + \beta_{10} GOV_i + \beta_{11} LGDP_t + \beta_{12} INFLATION_t + \beta_{13} MCAP_t + \beta_{14} GFC_t + \varepsilon_{it} \dots \dots \dots (9)$$

$i = 1 \dots n; t = 1 \dots n$

The dependent variables are the efficiency scores, as derived from DEA which is Eff_{it} as TE (or CRS), PTE (or VRS) and SE, i is the observations, t is time, α is the constant, β denotes the coefficient of variables and ε_{it} is the error term. Whereas

Table 4.4: Independent variables to specify determinants of efficiency, profitability and stability

Islamic Banks	Bank-specific Variables						Socially responsible Banks	Bank-specific Variables				
	Variables	Obs	Avr.	S.D.	Min	Max		Obs	Avr.	S.D.	Min	Max
	Log (total assets)	312	7.732	1.843	0.73	11.48		284	7.858	2.251	3.54	13.77
	Capital ratio	312	0.249	0.309	0.02	4.01		284	0.305	0.326	0.01	0.96
	Loan intensity	312	0.469	0.270	0	2.78		284	0.424	0.286	0	1.83
	Credit risk	312	2.559	23.805	0	417.5		284	0.748	0.264	0.02	2.09
	Deposit ratio	312	0.667	0.327	0	4.16		284	0.823	0.191	0.25	3.19
	ROA	312	0.009	0.150	-0.87	2.2		284	0.005	0.011	-0.08	0.039
	Log (Z-score)	312	2.622	1.002	-1.72	5.51		284	3.898	1.165	0.92	6.26
	Financial leverage	312	8.044	6.676	0.25	58.27		284	16.793	17.360	1.83	198.38
	Operating leverage	312	0.022	0.028	0	0.37		284	0.013	0.014	0	0.1
	Age	312	3.053	0.628	1.95	4.5		284	3.613	0.808	2.08	5.16
	Foreign (Ownership)	312	0.321	0.467	0	1		284	0.271	0.445	0	1
	Domestic (Ownership)	312	0.426	0.495	0	1		284	0.588	0.493	0	1
	Government (Ownership)	312	0.253	0.436	0	1		284	0.225	0.419	0	1
	Listing*	312	0.474	0.500	0	1		284	0.190	0.393	0	1
	Macroeconomic Variables							Macroeconomic Variables				
	Log (GDP)	312	25.426	1.442	22.25	28.67		284	26.589	1.879	21.65	30.38
	Inflation	312	0.099	0.099	-0.05	0.53		284	1.266	3.449	-0.01	11.04
	Market capitalisation	312	0.613	0.515	0	2.99		284	0.554	0.565	0	2.99
Global financial crisis	312	0.397	0.490	0	1	284	0.387	0.487	0	1		
Corruption control*	312	55.614	25.028	8.13	94.63	284	75.547	28.104	3.9	100		
Conventional Banks	Bank-specific Variables						All Banks	Bank-specific Variables				
	Log (total assets)	1827	8.161	2.119	-2.37	14.91		2423	8.070	2.107	-2.37	14.91
	Capital ratio	1827	0.140	0.180	0.01	5.23		2423	0.231	0.229	0.00504	5.23
	Loan intensity	1827	0.439	0.352	0	5.32		2423	0.441	0.336	0	5.32
	Credit risk	1827	0.937	12.274	0	518.86		2423	1.124	13.662	0	518.86
	Deposit ratio	1827	0.800	0.473	0	8.17		2423	0.786	0.434	0	8.17
	ROA	1827	0.010	0.035	-0.44	0.86		2423	0.010	0.062	-0.8734	2.19981
	Log (Z-score)	1827	2.985	1.085	-3.27	5.19		2423	3.045	1.134	-3.27	6.2603
	Financial leverage	1827	12.489	13.066	0.19	191.61		2423	12.421	13.204	0.19	198.38
	Operating leverage	1827	0.013	0.016	0	0.12		2423	0.014	0.018	0	0.3743
	Log (age)	1827	3.717	0.724	1.95	5.77		2423	3.619	0.756	1.94591	5.77
	Foreign (Ownership)	1827	0.467	0.499	0	1		2423	0.426	0.495	0	1
	Domestic (Ownership)	1827	0.400	0.490	0	1		2423	0.426	0.495	0	1
	Government (Ownership)	1827	0.137	0.344	0	1		2423	0.162	0.369	0	1
	Listing*	1827	0.408	0.491	0	1		2423	0.391	0.488	0	1
	Macroeconomic Variables							Macroeconomic Variables				
	Log (GDP)	1827	26.098	1.831	22.25	28.67		2423	26.069	1.815	21.6488	30.3837
	Inflation	1827	0.057	0.086	-0.1	1		2423	0.204	1.243	-0.1	11.0444
	Market capitalisation	1827	0.891	1.908	0	28.67		2423	0.816	1.684	0	28.67
	Global financial crisis	1827	0.391	0.488	0	1		2423	0.392	0.488	0	1
Corruption control*	1827	62.350	28.046	1.46	94.63	2423	63.030	28.135	1.46	100		

* Additional variable

the independent variables are size, capital ratio, loans intensity, credit risk, financial leverage, ROA, age, ownership, GDP, inflation, market capitalisation, financial crisis (GFC).

Hypotheses of variables (main test):

- H1₀: There is no impact between the efficiency and size
- H2₀: There is no impact between the efficiency and capital ratio
- H3₀: There is no impact between the efficiency and loans intensity
- H4₀: There is no impact between the efficiency and credit risk
- H5₀: There is no impact between the efficiency and financial leverage
- H6₀: There is no impact between the efficiency and ROA
- H7₀: There is no impact between the efficiency and age
- H8₀: There is no impact between the efficiency and foreign ownership
- H9₀: There is no impact between the efficiency and domestic ownership
- H10₀: There is no impact between the efficiency and government ownership
- H11₀: There is no impact between the efficiency and GDP
- H12₀: There is no impact between the efficiency and inflation
- H13₀: There is no impact between the efficiency and market capitalisation
- H14₀: There is no impact between the efficiency and global financial crisis

The hypotheses for the main test can be displayed in Figure 4.3 below, which simplifies the model that links efficiency with the explanatory variables

- Additional test:

$$Eff_{it} = \alpha + \beta_1 LTA_{it} + \beta_2 EQTA_{it} + \beta_3 LOANSTA_{it} + \beta_4 LOANSDEPO_{it} + \beta_5 TAEQ_{it} + \beta_6 ROA_{it} + \beta_7 LAGE_t + \beta_8 FORE_i + \beta_9 DOM_i + \beta_{10} GOV_i + \beta_{11} LISTED_i + \beta_{12} LGDP_t + \beta_{13} INFLATION_t + \beta_{14} MCAP_t + \beta_{15} GFC_t + \beta_{16} CCONTROL_t + \varepsilon_{it} \dots \dots \dots (10)$$

$i = 1 \dots n; t = 1 \dots n$

The additional test has two added variables to the main model: listing and corruption control.

Hypotheses of variables (additional test):

- H1₀: There is no impact between the efficiency and size
- H2₀: There is no impact between the efficiency and capital ratio
- H3₀: There is no impact between the efficiency and loans intensity
- H4₀: There is no impact between the efficiency and credit risk
- H5₀: There is no impact between the efficiency and financial leverage
- H6₀: There is no impact between the efficiency and ROA
- H7₀: There is no impact between the efficiency and age
- H8₀: There is no impact between the efficiency and foreign ownership
- H9₀: There is no impact between the efficiency and domestic ownership
- H10₀: There is no impact between the efficiency and government ownership
- H11₀: There is no impact between the efficiency and listing

- H12₀: There is no impact between the efficiency and GDP
H13₀: There is no impact between the efficiency and inflation
H14₀: There is no impact between the efficiency and market capitalisation
H15₀: There is no impact between the efficiency and global financial crisis
H16₀: There is no impact between the efficiency and corruption control

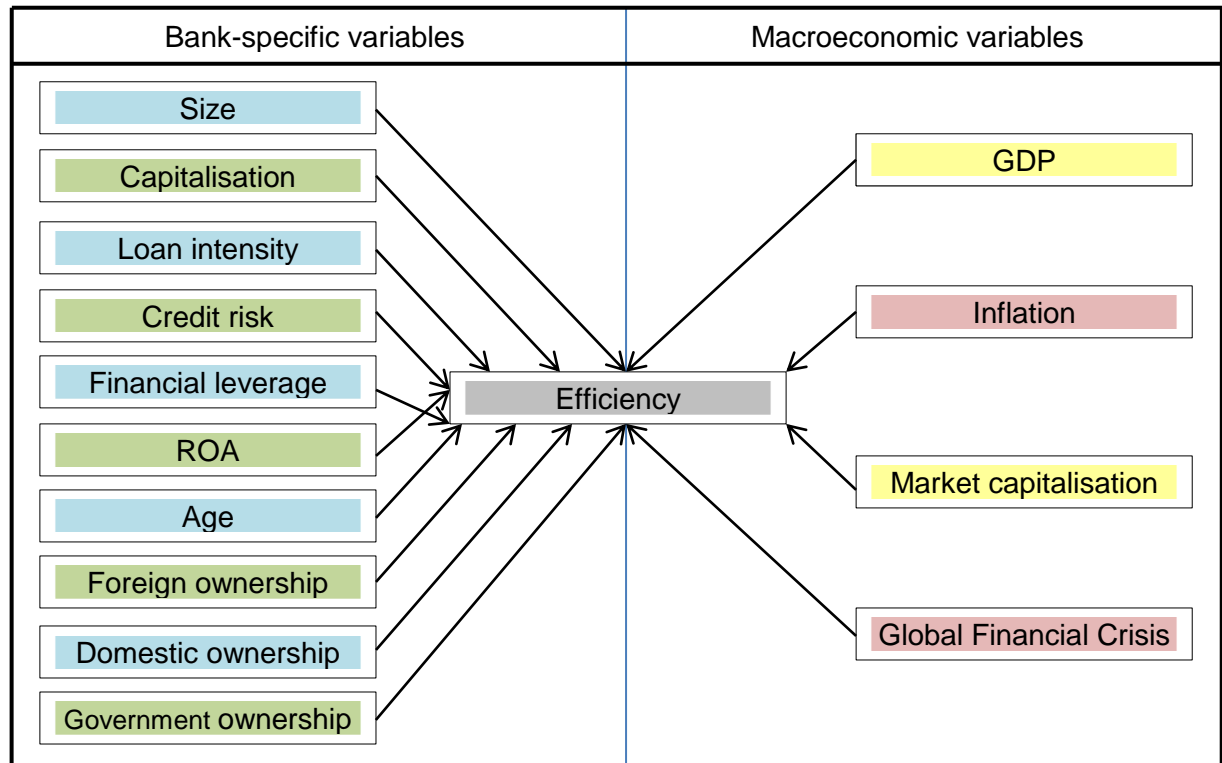


Figure 4.3: Hypotheses of efficiency for the main test

Before analysing data, we can conduct an expected sign that can be affecting the efficiency for each explanatory variable for Islamic, conventional and socially responsible banks as in the Table 4.5 below. The size of bank (total assets) is highly expected to affect the efficiency positively due to larger banks have the ability to maximise the outputs (e.g. net income) more than smaller banks. Even capital ratio can raise the efficiency as well capitalised banks can prove more services and operations which lead to higher efficiency. According to loan intensity, loans allow banks from achieving more revenues from interests so, greater loans would increase the profits and efficiency.

Focusing on credit risk (deposits to loans ratio), this variable can be strongly a negative determinant for efficiency due to higher credit risk indicates the disability of banks to return the deposits of customers. However, based on the recent studies, the majority of studies confirmed that ROA and age of banks are

Table 4.5: Expected variables' impact on efficiency

N	Determinants	Expected signs
1	Size	Positive
2	Capital ratio	Positive
3	Loan intensity	Positive
4	Credit risk	Negative
5	Financial leverage	Positive
6	ROA	Positive
7	Age	Positive
8	Foreign banks	Positive
9	Domestic banks	Negative
10	Government banks	Positive / Negative
11	Listing*	Positive
12	GDP	Positive
13	Inflation	Negative
14	Market capitalisation	Positive
15	Global financial crisis	Negative
16	Corruption control*	Positive

* Additional variable

significantly and positively affecting the efficiency in banking sector. Regarding the ownership, foreign banks are expected to support the efficiency due to availability of high capital and experience compared to domestic banks which is predicted to decrease the efficiency. On the other side, government can affect the efficiency positively or negatively based on the literature review. Regarding to the macroeconomic variables, GDP growth and market capitalisation predicted to enhance the efficiency while, inflation and the global financial crisis are anticipated to impact the efficiency negatively. According to the additional variables, listed banks in stock market are highly expected to be more efficient due to better control and supervision. Moreover, more controlling of corruption can lead to better efficiency measures, because corruption discourages employees to be more productive.

4.14 Profitability models and hypotheses

According to profitability, the relationship between ROA, ROE or NIM and independent variables is found through OLS and fixed effects regression. In this research, there are 12 hypotheses which could explain the ROA, ROE or NIM. However, the regression of profitability and its independent variable is:

- Main test:

$$Pro_{it} = \alpha + \beta_1 LTA_{it} + \beta_2 EQTA_{it} + \beta_3 LOANSTA_{it} + \beta_4 LOANSDEPO_{it} + \beta_5 DEPOSITSTA_{it} + \beta_6 LAGE_t + \beta_7 LOGZ_{it} + \beta_8 FORE_i + \beta_9 DOM_i + \beta_{10} GOV_i + \beta_{11} LGDP_t + \beta_{12} INFLATION_t + \beta_{13} MCAP_t + \beta_{14} GFC_t + \varepsilon_{it} \dots \dots \dots (11)$$

$$i = 1....n; t = 1....n$$

The dependent variables are profitability ratios (ROA, ROE and NIM), i is the observations, t is time, α is the constant, β denotes the coefficient of variables and ε_{it} is the error term. While the independent variables are size, capital ratio, loans intensity, credit risk, deposit ratio, age, z-score, ownership, GDP, inflation, financial crisis (GFC).

Hypotheses of variables (main test):

- H1₀: There is no impact between the profitability and size
- H2₀: There is no impact between the profitability and capital ratio
- H3₀: There is no impact between the profitability and loans intensity
- H4₀: There is no impact between the profitability and credit risk
- H5₀: There is no impact between the profitability and deposit ratio
- H6₀: There is no impact between the profitability and age
- H7₀: There is no impact between the profitability and z-score
- H8₀: There is no impact between the profitability and foreign ownership
- H9₀: There is no impact between the profitability and domestic ownership
- H10₀: There is no impact between the profitability and government ownership
- H11₀: There is no impact between the profitability and GDP
- H12₀: There is no impact between the profitability and inflation
- H13₀: There is no impact between the profitability and market capitalisation
- H14₀: There is no impact between the profitability and global financial crisis

However, Figure 4.4 below explains the frame work of profitability factors.

- Additional test

$$Pro_{it} = \alpha + \beta_1 LTA_{it} + \beta_2 EQTA_{it} + \beta_3 LOANSTA_{it} + \beta_4 LOANSDEPO_{it} + \beta_5 DEPOSITSTA_{it} + \beta_6 LAGE_t + \beta_7 LOGZ_{it} + \beta_8 FORE_i + \beta_9 DOM_i + \beta_{10} GOV_i + \beta_{11} LISTED_i + \beta_{12} LGDP_t + \beta_{13} INFLATION_t + \beta_{14} MCAP_t + \beta_{15} GFC_t + \beta_{16} CCONTROL_t + \varepsilon_{it}.....(12)$$

$$i = 1....n; t = 1....n$$

The additional test has two added variables to the main model: listing and corruption control.

Hypotheses of variables (additional test):

- H1₀: There is no impact between the profitability and size
- H2₀: There is no impact between the profitability and capital ratio
- H3₀: There is no impact between the profitability and loans intensity
- H4₀: There is no impact between the profitability and credit risk
- H5₀: There is no impact between the profitability and deposit ratio
- H6₀: There is no impact between the profitability and age
- H7₀: There is no impact between the profitability and z-score
- H8₀: There is no impact between the profitability and foreign ownership
- H9₀: There is no impact between the profitability and domestic ownership
- H10₀: There is no impact between the profitability and government ownership
- H11₀: There is no impact between the profitability and listing

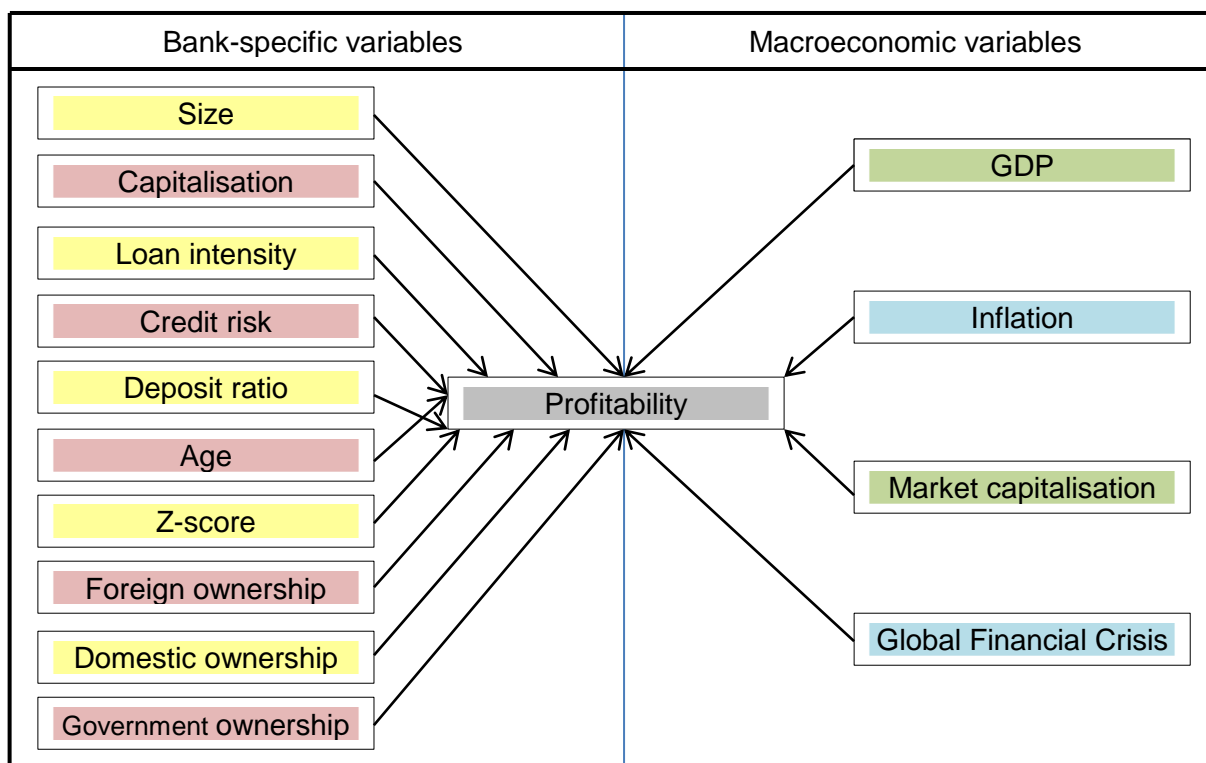


Figure 4.4: Hypotheses of profitability for the main test

H12₀: There is no impact between the profitability and GDP

H13₀: There is no impact between the profitability and inflation

H14₀: There is no impact between the profitability and market capitalisation

H15₀: There is no impact between the profitability and global financial crisis

H16₀: There is no impact between the profitability and corruption control

Before analysing the data, we can anticipate the relationship between the profitability ratios and their determinants (see Table 4.6 below). The size is highly expected to influence the profits positively, because stronger banks in assets can operate more which increase the probability of attaining more profits. In addition, the providing more services by banks can reduce the risk of achieving loss.

According to capitalisation, also banks with greater capital are less risky. Furthermore, deposits (deposit ratio) and loans (loan intensity) which considered being the most important operations in banking sector are predicted to be a positive determinants. The reason behind this can be accepting more deposits, allow banks to invest and lend more which improve the earnings. However, the credit risk can be very risky and can affect the profitability ratios negatively as increasing in credit risk could not allow banks from paying the deposits back to the customers. Moreover, age of banks is highly important to enhance the profits. The

Table 4.6: Predicted signs that impact profitability

N	Determinants	Expected signs
1	Size	Positive
2	Capital ratio	Positive
3	Loan intensity	Positive
4	Credit risk	Negative
5	Deposit ratio	Positive
6	Age	Positive
7	Z-score	Positive
8	Foreign banks	Positive
9	Domestic banks	Negative
10	Government banks	Positive
11	Listing*	Positive
12	GDP	Positive
13	Inflation	Negative
14	Market capitalisation	Positive
15	Global financial crisis	Negative
16	Corruption control*	Positive

* Additional variable

older banks have better experience in banking sector than new banks. Regarding to the stability ratio (z-score), based on the recent studies, stable banks are always more profitable than banks exposing higher insolvency risks. Regarding the ownership, foreign and public banks are expected to affect the banking systems positively, because foreign and public banks have more capital than domestic banks. Focusing on industry-specific factors, the economic (GDP) and stock market growth can help banking sector in maximising earnings due to availability of higher individual wealth in developed countries. In contrast, inflation and global financial crisis are strongly predicted to affect the banking systems negatively. Regarding the additional factors, listed banks are anticipated to have greater profitability ratios than unlisted banks, because listed banks can get more funds from the financial traders in the financial markets. Moreover, control of corruption may support the profits as control of corruption allows bankers to be more effective.

4.15 Stability models and hypotheses

The dependent variable that represents the stability in this study are z-score and capital ratio. However, the relationship between stability (z-score and capital ratio) and the independent variables is determined by running OLS' and fixed effects' regression as follows:

- Main test:

$$Sta_{it} = \alpha + \beta_1 LTA_{it} + \beta_2 LOGZ_{it}/EQTA_{it} + \beta_3 LOANSTA_{it} + \beta_4 LOANSDEPO_{it} + \beta_5 ROA_{it} + \beta_6 FATA_{it} + \beta_7 LAGE_t + \beta_8 FORE_i + \beta_9 DOM_i + \beta_{10} GOV_i + \beta_{11} LGDP_t + \beta_{12} INFLATION_t + \beta_{13} MCAP_t + \beta_{14} GFC_t + \varepsilon_{it} \dots \dots \dots (13)$$

$i = 1 \dots n; t = 1 \dots n$

As mentioned, Sta_{it} denotes the dependent variables which are the z-score or capital ratio (stability's indicators), i is the observations, t is time, α is the constant, β denotes the coefficient of variables and ε_{it} is the error term. On the other side, the independent variables are size, z-score/capital ratio, loans intensity, credit risk, ROA, operating leverage, age, ownership, GDP, inflation, market capitalisation, financial crisis (GFC).

Hypotheses of variables (main test):

- H1₀: There is no impact between the stability and size
- H2₀: There is no impact between the stability and z-score or capital ratio
- H3₀: There is no impact between the stability and loans intensity
- H4₀: There is no impact between the stability and credit risk
- H5₀: There is no impact between the stability and ROA
- H6₀: There is no impact between the stability and operating leverage
- H7₀: There is no impact between the stability and age
- H8₀: There is no impact between the stability and foreign ownership
- H9₀: There is no impact between the stability and domestic ownership
- H10₀: There is no impact between the stability and government ownership
- H11₀: There is no impact between the stability and GDP
- H12₀: There is no impact between the stability and inflation
- H13₀: There is no impact between the stability and market capitalisation
- H14₀: There is no impact between the stability and global financial crisis

Figure 4.5 below explains the factors that could affect stability.

- Additional test:

$$Sta_{it} = \alpha + \beta_1 LTA_{it} + \beta_2 LOGZ_{it}/EQTA_{it} + \beta_3 LOANSTA_{it} + \beta_4 LOANSDEPO_{it} + \beta_5 ROA_{it} + \beta_6 FATA_{it} + \beta_7 LAGE_t + \beta_8 FORE_i + \beta_9 DOM_i + \beta_{10} GOV_i + \beta_{11} LISTED_i + \beta_{12} LGDP_t + \beta_{13} INFLATION_t + \beta_{14} MCAP_t + \beta_{15} GFC_t + \beta_{16} CCONTROL_t + \varepsilon_{it} \dots \dots \dots (14)$$

$i = 1 \dots n; t = 1 \dots n$

$LISTED_i$ and $CCONTROL_t$ are treated as additional variables.

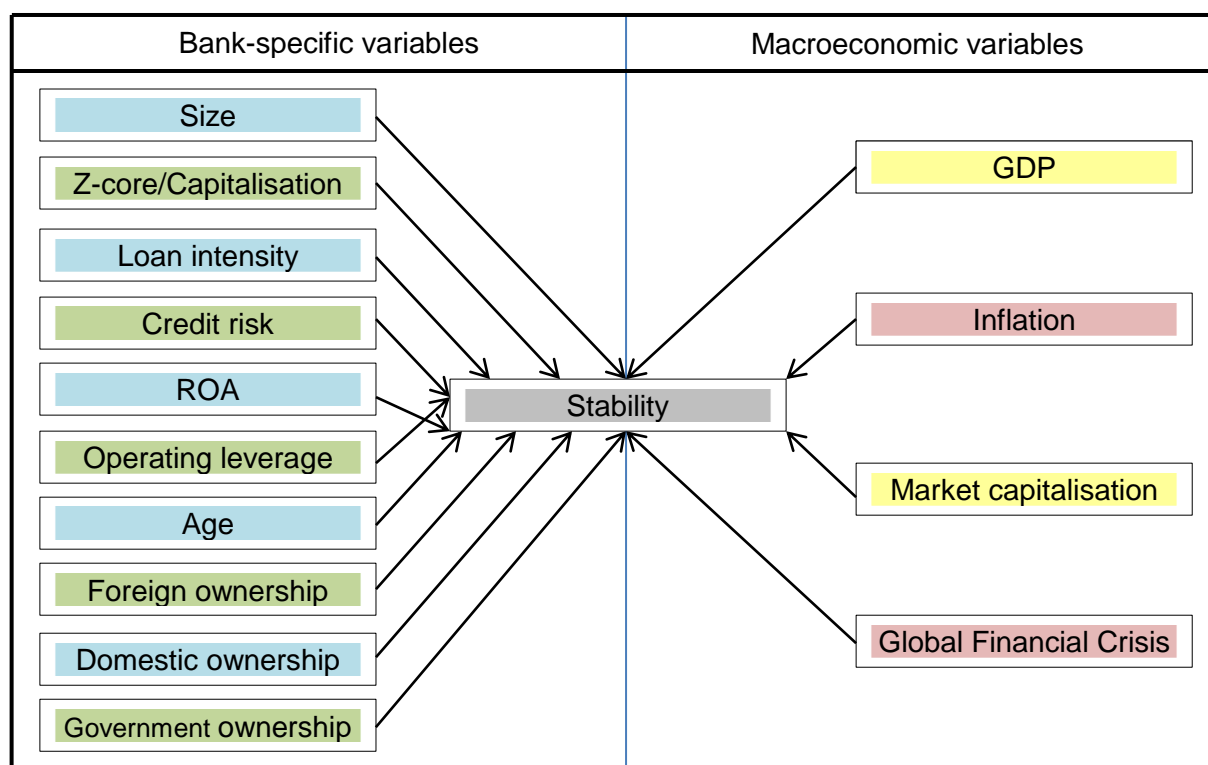


Figure 4.5: Hypotheses of stability for the main test

Hypotheses of variables (additional test):

- H1₀: There is no impact between the stability and size
- H2₀: There is no impact between the stability and z-score or capital ratio
- H3₀: There is no impact between the stability and loans intensity
- H4₀: There is no impact between the stability and credit risk
- H5₀: There is no impact between the stability and ROA
- H6₀: There is no impact between the stability and operating leverage
- H7₀: There is no impact between the stability and age
- H8₀: There is no impact between the stability and foreign ownership
- H9₀: There is no impact between the stability and domestic ownership
- H10₀: There is no impact between the stability and government ownership
- H11₀: There is no impact between the stability and listing
- H12₀: There is no impact between the stability and GDP
- H13₀: There is no impact between the stability and inflation
- H14₀: There is no impact between the stability and market capitalisation
- H15₀: There is no impact between the stability and global financial crisis
- H16₀: There is no impact between the stability and corruption control

However, before analysing the stability's determinants, we can anticipate the association between the stability indicators (z-score and capital ratios) and their determinants as in Tables 4.7 below. Based on Table 4.7 below, we can summarise that z-score and capital ratios can influence each other positively. In addition, size, loan intensity, ROA, operating leverage, age, foreign ownership,

public ownership, GDP and market capitalisation could enhance stability. On the other side, the stability expected to be influenced negatively by credit risk, domestic ownership, inflation and the global financial crisis. For the additional test, the listing and control of corruption are highly expected to impact the stability positively.

Table 4.7: Anticipated signs of stability determinants

N	Determinants	Expected signs
1	Z-score/Capital ratio	Positive
2	Size	Positive
3	Loan intensity	Positive
4	Credit risk	Negative
5	ROA	Positive
6	Operating leverage	Positive
7	Age	Positive
8	Foreign banks	Positive
9	Domestic banks	Negative
10	Government banks	Positive
11	Listing*	Positive
12	GDP	Positive
13	Inflation	Negative
14	Market capitalisation	Positive
15	Global financial crisis	Negative
16	Corruption control*	Positive

* Additional variable

4.16 Software to measure efficiency

The researcher found that the most accurate results can be obtained after using DEA to find the appropriate efficiencies through Frontier Analyst software, Version 4.0 (Banxia Holdings Ltd, 2012) which was used by Mostafa (2007a).

4.17 Comparison between statistical models

The optimal used statistical models conducted in the literature to find the determinants of efficiency, performance and stability are:

1. Ordinary least squares (OLS).
2. Fixed effects regression or least squares dummy variables model.

Table 4.8 below shows the difference between OLS and fixed effects models.

Table 4.8: The difference between OLS and fixed effects models

Factor	OLS	Fixed effects
Style	Linear regression	Linear regression
Model	$y = \alpha + \beta x + u$	$y = \alpha + \delta + \beta x + u$
characteristic	Represents linear model between dependent and independent variables	The regression varied by a fixed amount for each individual
Ideal	Large sample	Large sample
Error terms	Normally distributed	Independently normally distributed and correlated with independent variables
Can be applied	Panel data, cross sectional data and time series data	Panel data
Proposed	Rao, 1965	Taft & Lewis, 1958

Source: Adopted from different sources (Rao, 1965; Taft & Lewis, 1958)

The Hausman test reported a robust evidence to employ fixed-effects model rather than random effects model. The fixed effects which run by the least square dummy variable (LSDV) procedure is expected to estimate high significance of the likelihood ratios test. Furthermore, the fixed effects model is supported by the absence of heteroscedasticity which means that the variance of each model's residual is equal for all banks (Mirzaei, *et al.*, 2013). Referring to the literature, the most common models used to analyse the determinants of efficiency, profitability and stability in the banking sector are OLS and fixed effects models. For efficiency studies, OLS has been used by Han *et al.* (2012) Fang *et al.* (2011) and Abu-Alkheil *et al.* (2012) and they conclude that OLS assumes normality and homoskedasticity of the error term; whereas, fixed effect has been run by Sufian and Habibullah (2009) and Hermes and Nhung (2010). Regarding profitability studies, Delis (2012) employed OLS to find the determinants of Islamic and conventional banks performance in the GCC region, while Lee and Kim (2013) used fixed effect regression to analyse bank performance and their determinants in Korea. Referring to stability, Jeon and Lim (2013) examined OLS and fixed effects in their study to reveal the determinants of stability using z-score as a stability indicator. Table 4.9 below shows the recent studies using OLS and fixed effect models in efficiency, profitability and stability in banking to find the determinants (in efficiency, profitability and stability) based on the literature review.

Table 4.9: Studies used OLS and fixed effects models in the literature review

Study (Efficiency)	Study (Profitability)	Study (Stability)
El-Moussawi and Obeid (2010) OLS	Petria <i>et al.</i> (2015) Fixed effects	Tabak <i>et al.</i> (2015) OLS and Fixed effects
Yudistira (2004) OLS	Apergis (2014) OLS and Fixed effects	Kohler (2015) Fixed effects
Mamatzakakis <i>et al.</i> (2015) Fixed effects	Rumler and Waschiczek (2014) OLS and Fixed effects	Chalermchatvichien <i>et al.</i> (2014) OLS
Tabak <i>et al.</i> (2013) OLS	Lee and Kim (2013) Fixed Effects	Williams (2014) Fixed effects
Zhang and Matthews (2012) OLS and Fixed effects	Shehzad <i>et al.</i> (2013) OLS and Fixed effects	Fu <i>et al.</i> (2014) Fixed effects
Han <i>et al.</i> (2012) OLS	Dedu and Chitan (2013) Fixed Effects	Anginer <i>et al.</i> (2014) OLS
Fang <i>et al.</i> (2011) OLS and Fixed effects	Kutan <i>et al.</i> (2012) OLS and Fixed effects	Dong <i>et al.</i> (2014) OLS
Satub <i>et al.</i> (2010) Fixed effects	Tan and Floros (2012) Fixed Effect	Dima <i>et al.</i> (2014) Fixed effects
Sufian and Habibullah (2009) OLS and Fixed effects	Chitan (2012) OLS	Gulamhussen <i>et al.</i> (2014) OLS and Fixed effects
Chiou (2009) OLS	Delis <i>et al.</i> (2012) OLS	Jeon and Lim (2013) OLS and Fixed effects
Hermes and Nhung (2010) Fixed effects	Haan and Poghosyan (2012) Fixed Effects	Beck <i>et al.</i> (2013a) Fixed effects
Yildirim and Philippatos (2007) Fixed effects	Barry <i>et al.</i> (2011) OLS	Bertay <i>et al.</i> (2013) Fixed effects
Johnes <i>et al.</i> (2014) Fixed effects	Manlagnit (2011) Fixed Effects	Barakat and Hussainey (2013) Fixed effects
Assaf <i>et al.</i> (2011) OLS	Olson and Zoubi (2011) Fixed effects	Srairi (2013) OLS

4.18 Software of statistical models

The practical software to get the efficiency measures is Frontier Analyst. As a second stage, STATA 14 software investigates the determinants of efficiency in Islamic, conventional and socially responsible banks through the OLS and fixed effects models. Most studies used STATA software to find determinants of efficiency (Spulbăr & Nitoi, 2014), performance (Mollah & Zaman, 2015) and stability (Nguyen, 2012) in the banking sector.

4.19 Summary

This chapter explained the methodology of gathering data. In addition, the methods of estimating efficiency, profitability and stability in banking were shown. Furthermore, a brief explanation of independent variables was also indicated. After that, the models of estimating the relationship between the dependent variables (efficiency, profitability and stability) and independent variables were given. This

chapter also described the data including the observations, means, standard deviations, minimum values and maximum values.

Chapter Five: Results and Discussion of Efficiency

5.1 Descriptive statistics

Three inputs and three outputs are used in this study to calculating DEA measures. The inputs are fixed assets, deposits and short-term funding, and equity. The outputs are net income, total securities and total loans. However, the results of efficiency are divided into two stages in this chapter as the first stage is efficiency estimations and the second stage is finding the determinants of efficiency following Sufian's (2009) approaches (OLS and FEM). In general, DEA method is decomposed into three estimators namely, the technical efficiency (CRS), pure technical efficiency (VRS) and scale efficiency (SE), the study period of 2005-2012 for Islamic, conventional and socially responsible banks. Table 5.1 concludes a description of the efficiency estimators for Islamic, conventional, socially responsible and all banks. Appendices 5, 6 and 7 explain full details of efficiency estimators.

It is observable in Table 5.1 that socially responsible banks scored the highest averages in efficiency measures during the period as 0.948, 0.978 and 0.966 for mean TE, PTE and SE, respectively (*H1* is accepted). The reason behind high efficiency is due to providing more social services leads to raise the competitiveness and customers trust worthy which banks are seeking to achieve (Petrovic-Randelovic *et al.*, 2015). In addition, one of the main roles of socially responsible banks is saving resources (inputs) so, this could be the reason of great efficiency measures. In other words, SRBs use lower amount of inputs to generate maximum outputs (services). In contrast, the lowest scores were achieved by conventional banks at 0.823, 0.881 and 0.927 for mean TE (CRS), TE (VRS) and SE, respectively. Based on Table 5.1, the standard deviation is quite low, which means that the measures are relatively consistent. In a comparison between the Islamic and conventional banking sectors, Rattab *et al.* (2010) Mokhtar *et al.* (2007) investigated how Islamic banks attained better efficiencies in their studies, which are consistent with this thesis. In contrast, Shahid *et al.* (2010) and Johnes *et al.* (2009) found that conventional banks were more efficient than Islamic banks. According to all banks measures, Table 5.1 shows that mean SE

(0.944) is the highest efficiency indicator compared to means TE (0.932) and PTE (0.884).

Table 5.1: A description of the efficiency estimators of the whole sample

Type	Estimator	Obs	Mean	Std. Dev.	Min	Max
Islamic Banks	TE	312	0.883	0.1761	0.240	1
	PTE	312	0.936	0.1375	0.250	1
	SE	312	0.940	0.1081	0.490	1
Conventional Banks	TE	1827	0.823	0.2450	0.040	1
	PTE	1827	0.881	0.2149	0.140	1
	SE	1827	0.927	0.1336	0.040	1
Socially Responsible Banks	TE	284	0.948	0.1313	0.090	1
	PTE	284	0.978	0.8663	0.280	1
	SE	284	0.966	0.9392	0.090	1
All Banks	TE	2423	0.884	0.2302	0.043	1
	PTE	2423	0.932	0.1982	0.043	1
	SE	2423	0.944	0.1271	0.247	1

5.1.1 First stage results: DEA measures

Referring to the literature review, there are many studies examined DEA indicators and used them as dependent variables (for instance, Johnes, *et al.* 2014; Rosman *et al.*, 2014.; Garza García, 2012; Assaf *et al.* 2011; El-Moussawi & Obeid, 2010; Chiou, 2009; Sufian, 2009; Sufian & Habibullah, 2009; Pasiouras, 2008; Grigorian & Manole, 2002; Casu & Molyneux, 2003). According to the efficiency estimation in this study, Appendix 5 illustrates that there are 43 Islamic banks in the sample from MENA countries and the UK. From the sample, only three Islamic banks (6.97% of the sample) were found to be efficient during the period under the intermediation approach, e.g. maintained having a perfect efficiency scoring of 1 for the whole period. These banks are Noor Islamic Bank in the UAE, and Khaleeji Bank and Arcapita Bank in Bahrain for the three efficiency measures. The three efficient Islamic banks were not affected in 2007 by the global financial crisis. In particular, three Islamic banks (6.97%) were efficient under TE (CRS) and three banks scored full efficiency for SE, whereas 13 banks (30.23%) were found to be efficient under TE (VRS), which means the remaining 30 (69.77%) Islamic banks could not reach the VRS frontier. However, the rest of the Islamic banks need to increase their efficiency by finding optimal strategies of reducing their inputs and increasing outputs. Overall, the mean efficiency scores for Islamic banks are 0.883, 0.936 and 0.940 for TE (CRS), TE (VRS) and SE, respectively. As a result, Islamic

banks can reach the efficiency frontier through reducing their inputs by 11.70%, 6.40% and 6% for TE, PTE and SE, respectively.

Appendix 6 reveals 242 conventional banks from the MENA region and the UK. According to efficiency, 11 conventional banks (4.54%) were fully efficient during the period for the three estimators TE (CRS), TE (VRS) and SE. In particular, 11 (4.54%) efficient banks for TE (CRS) and 47 (19.42%) banks scored efficient measures for TE (VRS). Additionally, 15 conventional banks (6.19%) achieved SE efficiently. Overall, the average efficiencies were equal to 0.823, 0.881 and 0.927 for TE, PTE and SE, respectively. In general, conventional banks need to minimise their inputs by 17.70% for TE, 11.90% for PTE and 7.30% for SE.

Focusing on SRBs, Appendix 7 indicates that 11 (39.28%) socially responsible banks were efficient (out of 38 SRBs) over the period 2005-2012 under TE (CRS), TE (VRS) and SE approaches. According to efficient socially responsible banks, 12 (42.85%) socially responsible banks were found to be efficient under the TE frontier, 19 (64.28%) banks achieved efficient mean TE (VRS) and 11 (39.28%) socially responsible banks scored full efficiency measures following the SE approach. Generally, the highest mean efficiency was scored through PTE (0.978), then SE (0.966) and TE (0.948) during the period. However, socially responsible banks can be fully efficient when they reduce the inputs by 5.20%, 2.20% and 3.40% for TE, PTE and SE, respectively. In comparison, socially responsible banks achieved the highest mean efficiency measures over the period 2005-2012 compared to Islamic and conventional banks. In other words, socially responsible banks are more efficient than Islamic and conventional banks.

However, we can explain the efficiency measures by country to find which countries have efficient banks in the sample during the period regardless of the banking type. Table 5.2 illustrates the difference between the averages of efficiency scores for the countries used across the world in descending order of GDP.

Table 5.2 reveals that four (10.81% of the sample) countries have fully efficient banks: Germany, Canada, Australia and Spain. However, nine (24.32%) countries reached the TE (VRS) efficiency frontier. In contrast, the least technical and scale

Table 5.2: Averages of efficiency measures by country

N	Country	Mean TE	Mean PTE	Mean SE	Banks in the sample	Number of Banks
1	USA	0.982	1	0.982	Socially Responsible Banks	1 SRB
2	Germany	1	1	1	Socially Responsible Banks	3 SRB
3	France	0.970	0.985	0.984	Socially Responsible Banks	1 SRB
4	UK	0.932	0.978	0.951	Islamic, Conventional and Socially Responsible Banks	3 IB, 74 CB and 6 SRB
5	Canada	1	1	1	Socially Responsible Banks	1 SRB
6	Australia	1	1	1	Socially Responsible Banks	1 SRB
7	Spain	1	1	1	Socially Responsible Banks	1 SRB
8	Netherlands	0.941	1	0.941	Socially Responsible Banks	2 SRB
9	Saudi Arabia	0.953	0.983	0.968	Islamic and Conventional Banks	3 IB and 9 CB
10	Switzerland	0.991	0.996	0.995	Socially Responsible Banks	1 SRB
11	Norway	0.966	0.979	0.986	Socially Responsible Banks	1 SRB
12	Austria	0.997	1	0.997	Socially Responsible Banks	1 SRB
13	UAE	0.960	0.988	0.971	Islamic and Conventional Banks	6 IB and 17 CB
14	Iran	0.812	0.862	0.939	Islamic and Socially Responsible Banks	7 IB and 1 SRB
15	Denmark	0.981	1	0.981	Socially Responsible Banks	5 SRB
16	Israel	0.763	0.902	0.848	Conventional Banks	8 CB
17	Egypt	0.536	0.577	0.923	Islamic and Conventional Banks	2 IB and 21 CB
18	Iraq	0.767	0.912	0.842	Conventional Banks	2CB
19	Algeria	0.516	0.631	0.821	Islamic, Conventional and Socially Responsible Banks	1 IB, 9 CB and 3 SRB
20	Qatar	0.954	0.987	0.965	Islamic and Conventional Banks	3 IB and 6 CB
21	New Zealand	0.974	0.976	0.998	Socially Responsible Banks	1 SRB
22	Kuwait	0.982	0.991	0.991	Islamic and Conventional Banks	2 IB and 6 CB
23	Bangladesh	0.942	0.979	0.962	Socially Responsible Banks	1 SRB
24	Morocco	0.910	0.949	0.957	Conventional and Socially Responsible Banks	8 CB and 1 SRB
25	Oman	0.972	0.985	0.986	Conventional Banks	7 CB
26	Syria	0.776	0.866	0.844	Conventional Banks	5 CB
27	Libya	0.573	0.627	0.901	Conventional Banks	5 CB
28	Tunisia	0.775	0.908	0.846	Islamic, Conventional and Socially Responsible Banks	1 IB, 8 CB and 2 SRB
29	Lebanon	0.670	0.764	0.869	Conventional Banks	28 CB
30	Yemen	0.762	0.851	0.893	Islamic and Conventional Banks	4 IB and 1 CB
31	Jordan	0.915	0.961	0.951	Islamic and Conventional Banks	1 IB and 7 CB
32	Bahrain	0.948	0.983	0.963	Islamic and Conventional Banks	9 IB and 15 CB
33	Bolivia	0.937	1	0.937	Socially Responsible Banks	2 SRB
34	Nepal	0.942	0.953	0.988	Socially Responsible Banks	1 SRB
35	Mongolia	0.875	0.965	0.899	Socially Responsible Banks	1 SRB
36	Malta	0.897	0.934	0.956	Conventional and Socially Responsible Banks	4 CB and 1 SRB
37	Palestine	0.927	0.969	0.955	Islamic and Conventional Banks	1 IB and 2 CB
	All Banks	0.884	0.932	0.944	Islamic, Conventional and Socially Responsible Banks	323 banks (43 IB, 242 CB and 38 SRB)

efficiency measures were scored by Algeria as 0.516 and 0.821, respectively. Regarding the PTE, the minimum average achieved by Egyptian banks (0.577). Overall, the efficiency of all 323 banks in the 37 countries in this study indicate a relatively high efficiency of 0.884, 0.931 and 0.955 for mean TE, PTE SE, respectively, which means that these banks can be fully efficient through

reducing average inputs by 11.60%, 6.90% and 4.50% for TE, PTE and SE, respectively.

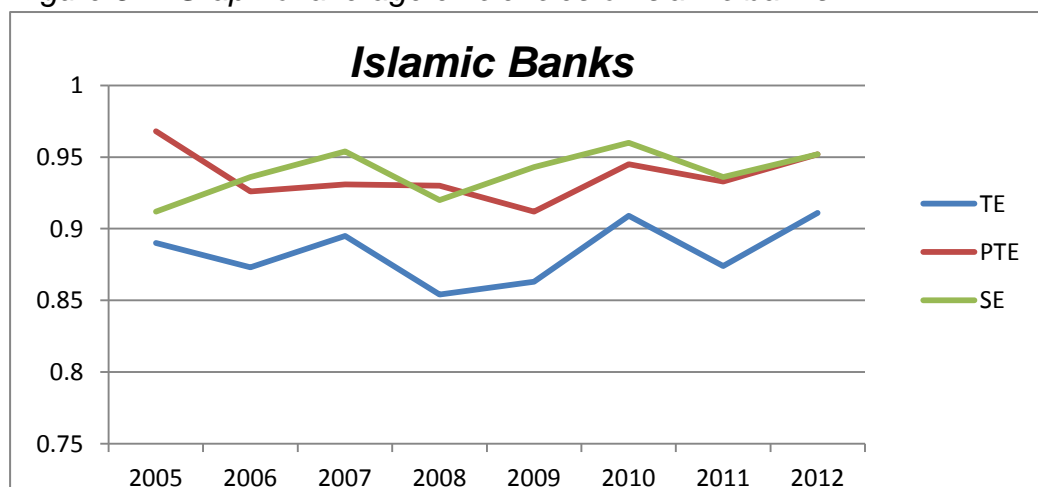
The banks in this study need to be efficient by reducing a specific amount of inputs. Thus, Appendix 8 illustrates averages of TE (CRS), PTE (VRS) and SE, which ease calculating the inefficiency measures as a next step for Islamic, conventional and socially responsible banks during the period 2005-2012.

Appendix 8 illustrates that the highest average efficiencies were attained by socially responsible banks for TE, PTE and SE scoring 0.948, 0.978 and 0.966, respectively. After that, the Islamic banks are moderate in achieving average efficiencies of 0.883, 0.936 and 0.940 for TE (CRS), TE (VRS) and SE, respectively. Lastly, the weakest efficiency scores were attained by the conventional banks obtaining the lowest means as TE (CRS), TE (VRS) and SE equal to 0.823, 0.881 and 0.927, respectively. Generally, all banks in the sample scored a higher mean PTE equals to 0.932 and lower average TE equals 0.932. This means that all banks perform under the variable returns assumption better than the constant return function, which is consistent with the results of Abu-Alkheil *et al.* (2012) and Yudistira (2004). In 2010, the banks experienced the year of the greatest technical efficiency (0.904) and scale efficiency (0.959). According to pure technical efficiency, the most efficient year was in 2005, scoring mean PTE equal to 0.949.

Overall, in 2008 and 2009 efficiency measures collapsed, which means that there was inefficiency in this period due to banks encountering hurdles in finding optimal combinations of varied inputs to generate the desired outputs. Another reason for collapse could be the influence of the global financial crisis (GFC). This study examines the impact of the GFC on efficiency through OLS and fixed effects regressions. Additionally, in 2009, the mean TE (CRS) for all banks was the least (0.867) because banks in 2009 had no ability to use the available inputs efficiently compared with the rest of the period. Also, the low efficiency could be due to the GFC. However, the findings show that the inefficiency occurred due to the technical efficiency under CRS function rather than the scale efficiency and technical efficiency under VRS.

Islamic banks in particular experienced a sharp reduction in 2008 according to TE and SE measures (0.854 and 0.920, respectively) which affected the Islamic banks' financial performance negatively. In terms of PTE, the minimum efficiency was obtained in 2009 (0.912) as seen in Figure 5.1 below. In contrast, the maximum means TE (0.911) and PTE (0.952) were scored in 2012, whereas the highest average SE was in 2010, equal to 0.960. Overall, Islamic banks have the moderate efficiency measures in the group during the period, scoring means of TE, PTE and SE equal to 0.883, 0.936 and 0.940, respectively. Based on Figure 5.1 below, we can conclude that the TE and SE averages are similar in terms of volatility. In detail, the efficiency graphs of means of TE and SE collapsed in 2006, 2008 and 2011. In contrast, the TE and SE recovered in 2007 and the period 2008-2010, as well as in year 2012. On the other hand, PTE has a different efficiency graph, declining sharply in 2006, 2009 and 2011, whereas there was an improvement in 2010 and 2012.

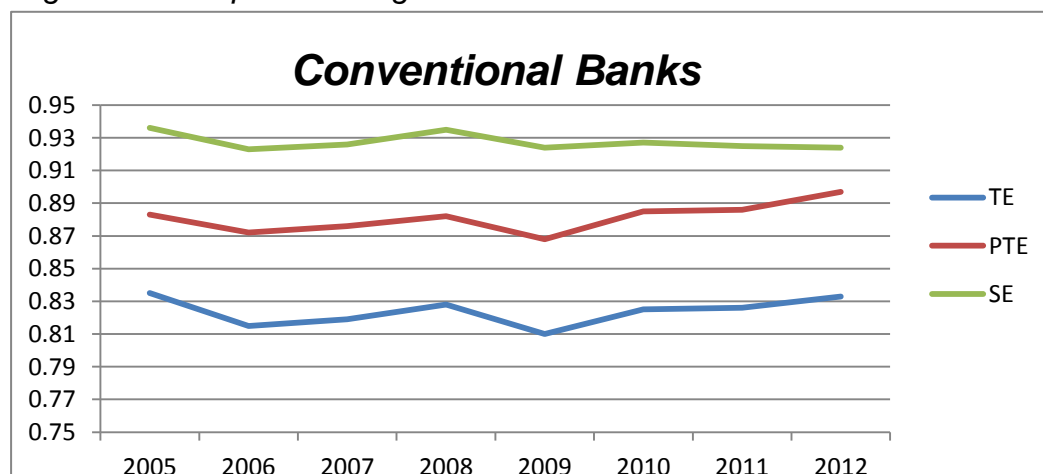
Figure 5.1: Graph of average efficiencies of Islamic banks



Concentrating on conventional banks efficiency, Appendix 8 indicates that the maximum mean efficiency attained by conventional banks in 2005 for means TE (0.835) and SE (0.836) while, in terms of the PTE approach, the highest average efficiency was obtained in 2012 (0.897). On the other hand, the minimum averages of TE and PTE were achieved in 2009 (0.810 and 0.868, respectively), but for mean SE, the lowest average occurred in 2006 (0.923). Overall, the efficiency measures are the lowest over the period compared to Islamic and

socially responsible banks, scoring means of 0.823, 0.881 and 0.927 for TE, PTE and SE, respectively. However, Figure 5.2 below reveals that there is a similarity in fluctuation in the TE and PTE indices as the major breakdown was in 2009 and higher efficiency occurred in 2012. According to the SE graph, the efficiency varied from 0.923 in 2006 to 0.936 in 2005.

Figure 5.2: Graph of average efficiencies of conventional banks

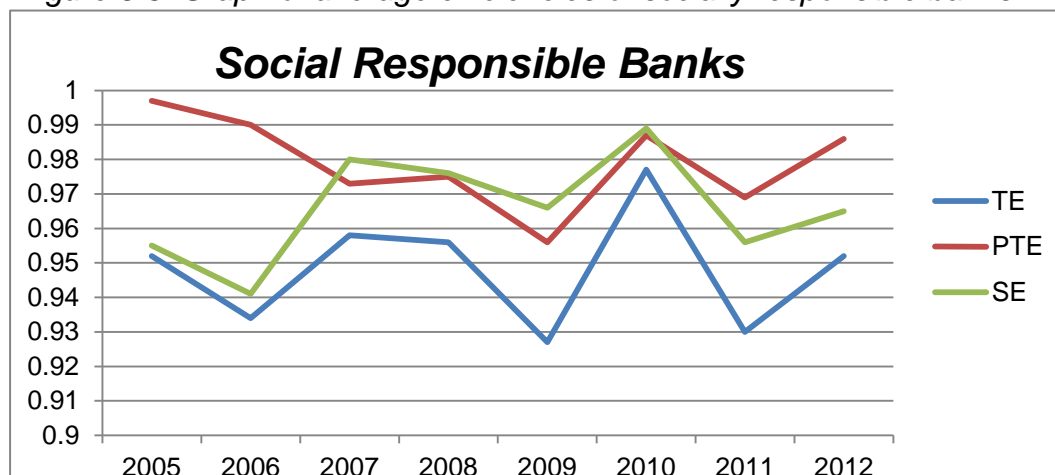


Focusing on socially responsible banks, the socially responsible banks' the most efficient year was 2010 according to TE and SE scoring of 0.977 and 0.989, while the largest mean PTE was in year 2005 (0.997). In contrast, the lowest efficiency was in 2009 for TE (0.927) and PTE (0.956) averages, whereas the minimum efficiency was in 2006 for mean SE equal to 0.941 (refer to Table 5.1 above). To sum up, Islamic banks perform better than conventional banks, which is consistent with the studies of Rattab *et al.* (2010) and Mokhtar *et al.* (2007). In contrast, Shahid *et al.* (2010) and Johnes *et al.* (2009) claim that conventional banks attain better efficiencies than Islamic banks do.

TE and SE indicators have the same volatility over the period (see Figure 5.3 below). All efficiency graphs fluctuated sharply as the technical and scale efficiencies declined for the periods: 2005-2006, 2007-2009 and 2010-2011. According to the PTE graph, the efficiency drops over the periods: 2005-2007, 2008-2009 and 2010-2011. In contrast, the efficiency indicators increased for the periods 2006-2007, 2009-2010 and 2011-2012 for TE and SE, but PTE rose in the 2009-2010 and 2011-2012 periods. Overall, the maximum means for TE, PTE and SE were attained by socially responsible banks compared to Islamic and

conventional banks, where they were equal to 0.948, 0.978 and 0.966, respectively.

Figure 5.3: Graph of average efficiencies of socially responsible banks



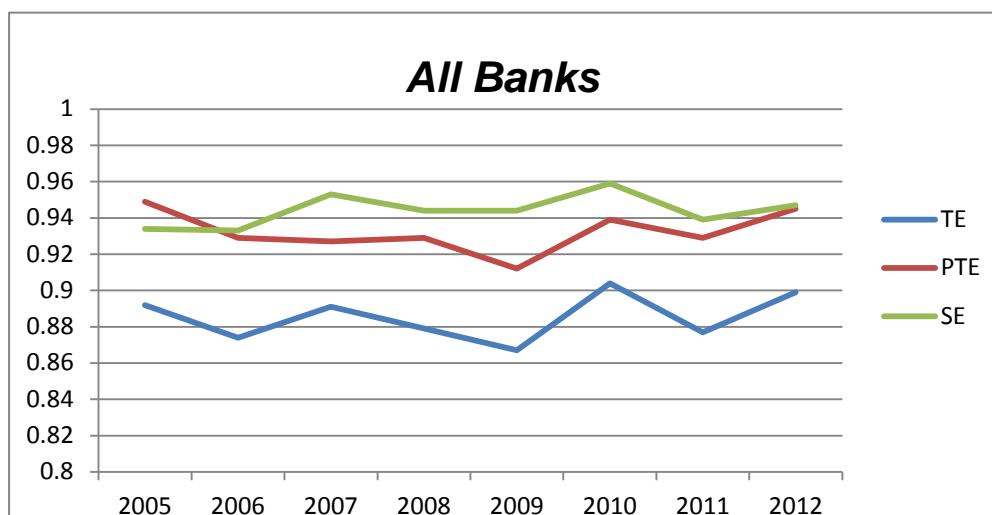
In general, all the banks achieved high relative efficiency as all the mean efficiency measures were 0.884, 0.932 and 0.944 for means TE, PTE and SE, respectively. In 2010, average TE (0.904) and SE (0.959) were found to be the highest, but the maximum mean PTE (0.949) was attained in 2005. On the other hand, the least TE and PTE were scored in 2009 as mean TE equal to 0.867 and average PTE is 0.912 in 2009. According to the SE approach, the minimum efficiency occurred in 2006 (mean SE = 0.933).

Figure 5.4 below indicates that all banks experienced similar fluctuations in TE, PTE and SE graphs. More accurately, the TE and SE averages collapsed in 2006, 2009 and 2011 when the TE and SE went up in 2007, 2010 (all banks improved their efficiency) and 2012. According to PTE, it is observable that the graph declined in 2006, 2009 and 2011, and PTE changed slightly from 2007 to 2008. Furthermore, SE graph, increased in 2010 and 2012. Overall, the averages of TE in the Islamic and conventional banks were less than PTE and SE over the period 2005-2012, which is consistent with the results of Abu-Alkheil *et al.* (2012).

Banks are like any profitable firm that strives to minimise the inputs i.e. fixed assets and maximise the outputs i.e. net income. Appendix 9 explains the input waste percentages (inefficiency measures); lower percentage means the waste of inputs was low.

The inefficiency measures draw a great interest to bankers which can provide valuable directions and opportunities for further improves in banks' operations which increase the capabilities of banks to be more competitive.

Figure 5.4: Graph of average efficiencies of all banks



Overall, banks need to improve their efficiency by reducing some amounts of inputs (level of inefficiency) as in Appendix 9.

Appendix 9 concludes the reduction ratio of inputs to reach the efficient frontiers which are equal to 1. We can see that the marked (highlighted) values in Appendix 9 indicate the maximum inefficient year, in these years banks need to reduce the greatest amount of inputs and generate the current amount of outputs (input-oriented approach).

Regarding the Islamic banks, in 2008, the minimum average TE was attained. In order to be efficient in 2008, Islamic banks required to reduce 14.60% of inputs. In 2009, the PTE average was the lowest value scoring inefficiency equal to 8.80%. Additionally, 2006 was the most inefficient year for SE as Islamic banks needed to minimise the highest inputs (8.80%). Overall, the average inputs for Islamic banks could be cut by 11.70%, 6.40% and 6% to reach TE, PTE and SE efficiency frontiers, respectively.

Focusing on the conventional banks, the most inefficient year was in 2009 in terms of TE and PTE results and 2006 with respect to the SE measure. In 2009, conventional banks could be completely efficient by lowering 19% and 13% of

inputs for TE and PTE, respectively. In 2006, inputs had to be reduced by 7.70% to reach the SE frontier. Overall, the mean of inefficiency measures for the whole period (2005-2012) for the conventional banks are equal to 17.70%, 11.90% and 7.30% for the TE, PTE and SE, respectively (see Figure 5.5 below).

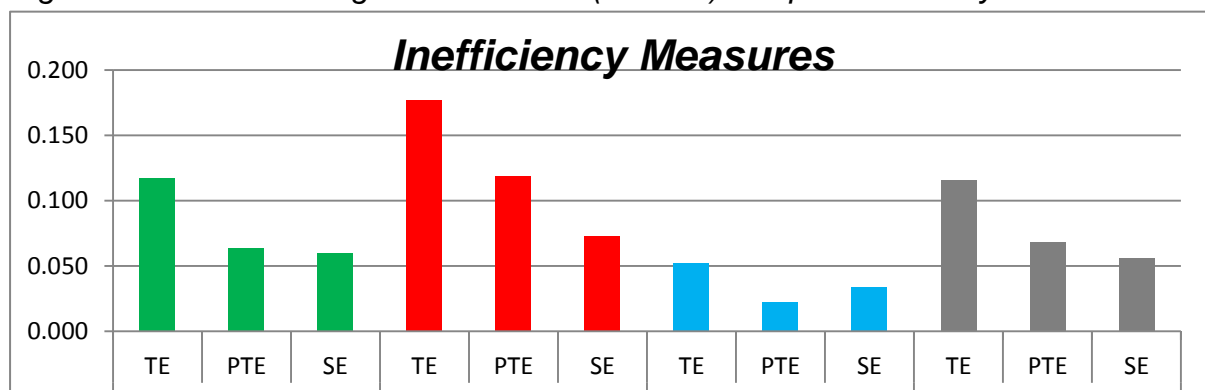
However, the socially responsible banks are considered to be the most efficient banks in this study. Therefore, the lowest inefficiency scores were attained by socially responsible banks as the target of reduction for inputs, with a mean TE ratio equalling 5.20%, mean PTE ratio equalling 2.20% and SE ratio equalling 3.40%. In particular, the most inefficient year for TE (7.30% cut in inputs required) and PTE (4.40%) was 2009 as the conventional banks, while the SE inefficiency was worst in 2006 (5.90% input reduction needed).

As a result, all banks needed 11.60%, 6.80% and 5.60% of reduction in inputs for TE, PTE and SE, respectively. Generally, the inefficiency occurred due to TE under CRS function rather than SE and TE under VRS (PTE) during the period for all banks. Input cutting strategies could have helped the policy makers in banks to reduce the inputs in the following year to make banks fully efficient by scoring 1 in efficiency measures.

In general, the most inefficient banks are conventional banks followed by Islamic banks then socially responsible banks. In other words, socially responsible banks were able to be fully efficient by reducing the minimum amount of inputs compared to Islamic and conventional banks over the period (refer to Figure 5.5 below).

However, Figure 5.5 below illustrates the target for reduction as ratios (inefficiency measure) of inputs to be fully efficient.

Figure 5.5: Means of target for reduction (amount) of inputs to be fully efficient



5.1.1.1 Correlation analysis

Correlation matrix explains the relationship between two or more variables. The correlation between variables varied from -1 (perfectly negative) to +1 (perfectly positive). The value of 0 means there is no relationship between variables. In order to have an accurate model, all relationship values need to be under 0.80. If there is a correlation value over 0.80, this means that there is Multicollinearity (Studenmund, 2005). The Multicollinearity can affect the model as following:

1. The evaluations can be unbiased.
2. The variance and standard error can be increased.
3. Any changes in independent variables could lead to sensitive estimates.
4. The significance of the model can be affected by Multicollinearity.
5. The Multicollinearity reduces the reliability and stability of the model (Studenmund, 2005).

Appendices 10-12 point that there is no Multicollinearity as all correlation values between the explanatory variables are below 0.80 in Islamic, conventional and socially responsible banks over the period 2005-2012. This means that all independent variables are suitable to be examined through OLS and fixed effects models.

5.2 Second stage results: determinants of efficiency

As mentioned, two main models were examined to find the determinants of efficiency: OLS and fixed effects regressions. Appendices 5.3-5.5 show the regressions results of the determinants of efficiency measures in Islamic, conventional and socially responsible banks.

5.2.1.1 Determinants of efficiency in Islamic banks (UK and MENA), main test

Focusing on Table 5.3 which analyses Islamic banks as a main test (MT), the findings suggest that there is a positive relationship between efficiency and size, loan intensity, financial leverage, ROA, GDP and market capitalisation. On the other hand, size, capital ratio and age affect efficiency negatively. In detail, regarding bank-specific variables, larger banks tended to show increases in the TE and SE as predicted. The reason behind this finding could be due to larger banks were able to provide higher loans through less deposits which lead to reduce the

Table 5.3: Results of efficiency determinants for Islamic banks (UK and MENA), main test (MT)

Islamic Banks	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Efficiency	TE	TE	PTE	PTE	SE	SE
Bank-specific variables						
LTA	0.0205**	-0.0303	-0.000005	-0.0578**	0.0224***	0.0185
	(2.61)	(-1.16)	(-0.00)	(-2.87)	(4.63)	(1.03)
EQTA	-0.0290	-0.111	-0.0358	-0.114*	0.00333	-0.0124
	(-0.65)	(-1.83)	(-1.01)	(-2.44)	(0.12)	(-0.30)
LOANSTA	0.115**	0.158*	0.103**	0.0993	0.0237	0.0694
	(2.61)	(2.40)	(2.94)	(1.95)	(0.88)	(1.53)
LOANSDEPO	0.000537	0.000200	0.000313	-0.000001	0.000261	0.000201
	(1.29)	(0.54)	(0.95)	(-0.00)	(1.02)	(0.78)
TAEQ	-0.000434	0.0137***	-0.00196	0.00876***	0.00163	0.00642***
	(-0.23)	(5.37)	(-1.33)	(4.45)	(1.43)	(3.66)
ROA	0.115	0.158**	0.0240	0.0532	0.0967*	0.114**
	(1.70)	(2.73)	(0.44)	(1.19)	(2.32)	(2.86)
LAGE	-0.0571**		-0.0183		-0.0436***	
	(-2.72)		(-1.10)		(-3.38)	
FORE		-0.119		-0.0998		-0.0343
		(-1.27)		(-1.38)		(-0.53)
DOM	-0.00275	-0.0811	0.0113	-0.0635	-0.0171	-0.0204
	(-0.11)	(-0.94)	(0.59)	(-0.95)	(-1.15)	(-0.34)
GOV	-0.0314		-0.0236		-0.0139	
	(-0.93)		(-0.88)		(-0.67)	
Macroeconomic variables						
LGDP	-0.00526	0.0273	0.00159	-0.00778	-0.00751	0.0407
	(-0.68)	(0.57)	(0.26)	(-0.21)	(-1.59)	(1.25)
INFLATION	-0.114	0.0209	-0.0687	0.0267	-0.0514	0.00204
	(-1.06)	(0.21)	(-0.80)	(0.34)	(-0.78)	(0.03)
MCAP	0.0708***	0.00502	0.0485**	-0.0332	0.0267*	0.0306
	(3.39)	(0.14)	(2.92)	(-1.20)	(2.08)	(1.25)
GFC	-0.0222	-0.0204	-0.0206	-0.0208	-0.00183	0.000254
	(-1.14)	(-1.30)	(-1.33)	(-1.71)	(-0.15)	(0.02)
sigma	0.973***	0.342	0.914***	1.577	1.065***	-0.320
_cons	(4.75)	(0.30)	(5.61)	(1.79)	(8.47)	(-0.41)
R²	0.1465	0.1646	0.1134	0.1424	0.1479	0.1131
Number of banks	43	43	43	43	43	43
N	312	312	312	312	312	312

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

costs and maximise the profits. This result encourages banks to operate more in banking services such as opening more branches. This is consistent with the results obtained by Vu and Nahm, 2013. Many studies in the literature also support this result (see, Wanke & Barros, 2014; Tan & Floros, 2013; Sufian & Habibullah, 2009; Yildirim & Philippatos, 2007; Yudistira, 2004). In contrast, the FEM result found that smaller banks attained better PTE. This result is consistent with the results of Chortareas *et al.* (2012), Han *et al.* (2012), Satub *et al.* (2010), Ariff and Can (2008) Girardone *et al.* (2004) and Hasan and Marton (2003) who claim that smaller banks are able to achieve more efficiency. The capital ratio has a significant and negative impact on efficiency for the PTE measure in Islamic banks, which means lower capitalisation leads to achievement of less financial risk in capital and more efficiency. The most recent studies come to the same conclusion are studies of Mamatzakis *et al.* (2015), Rosman *et al.* (2014), Tabak *et al.* (2013), Noor and Ahmed (2012), Chiou (2009), Pasiouras (2008), Yildirim and Philippatos (2007), Grigorian and Manole (2006) and Hasan and Marton (2003). On the other hand, Rosman *et al.* (2014) and Pasiouras (2006) find the opposite relationship. The loan intensity (LNOANSTA) increases the TE and PTE as expected, because banks depend on loans to attain their revenues. This means that loans can increase the bank efficiency through lowering costs and serving better quality loans. This result is consistent with the findings of Johnes *et al.* (2014), Garza García (2012), Sufian and Habibullah (2009), Pasiouras (2008) and Yildirim and Philippatos (2007). In contrast, Noor and Ahmed (2012) and Sufian (2009) investigated how loans decrease efficiency. With respect to financial leverage ratio, the results show that financial leverage influences TE, PTE and SE positively at a 0.1% level following the fixed effects model. This means that increasing the capacity for owning more total assets (bought by equity) and investing them increase efficiency. The result of financial leverage is in contrast with the findings of Abu-Alkheil *et al.* (2012) which suggest a negative relationship between efficiency and financial leverage ratio. In addition, the ROA has a positive and significant relationship with TE and SE measures as predicted. This suggests that more efficient banks are able to achieve more profits in Islamic banks. As a result, customers prefer dealing with banks with higher profitability ratios who can offer better service quality. Therefore, banks with higher ROA can attract significant borrowers and depositors. This is supported by Rosman *et al.* (2014),

Tabak *et al.* (2013), Fukuyama and Matousek (2011), Sufian (2009) and Hassan (2006). On the other hand, the result of Fang *et al.* (2011) suggest that banks achieving lower ROA ratios were found to be more efficient during the period of study. According to AGE, the OLS model reveals that new banks are more efficient in terms of TE and SE. This is supported by Lee and Chich (2013) but contradicted by Satub *et al.* (2010) and Chiou (2009) who proved that older banks achieve higher efficiency measures in their study. According to macroeconomic variables, market capitalisation is only the macroeconomic determinant for efficiency in Islamic banks. In details, efficiency indicators (TE, PTE and SE) were correlated significantly and positively. In other words, development of the stock market in countries where there is Islamic banking systems leads to an increment in TE, PTE and SE. Johnes *et al.* (2014) and Vu and Nahm (2013) concern market capitalisation as a positive determinant that increase efficiency. This contrasts with the findings of Grigorian and Manole (2002) who reveal a negative relationship between security markets and efficiency in transitional European nations. In general, the ownership (similar to Hou *et al.*, 2014; Vu & Nahm, 2013; Fukuyama & Matousek, 2011), GDP (Abul Alkheil *et al.*, 2012), inflation (Tan & Floros, 2013) and global financial crisis did not impact the Islamic banks over the period 2005-2012. According to R-squared measures, the percentages of consistency for independent variables are 14.65% and 16.46% for TE-OLS and TE-FEM, respectively. Regarding PTE-OLS and PTE-FEM, R^2 equal 11.34% and 14.24%, respectively. Finally, R^2 of SE-OLS = 14.79% and R^2 of SE-FEM = 11.31%. Figure 5.6 below simplifies the relationship between the efficiency and its determinants of Islamic banking system.

The low R^2 measures could occur for many reasons, such as the following:

- Some variables are highly insignificant to efficiency, such as credit risk, ownership (foreign, domestic, and public), and GDP.
- Some banks could have their own determinants of efficiency, which can be different to those for other banks.
- Other unused determinants could strengthen the R^2 measures.
- Higher diversification in countries could lead to lower R^2 indicators.

However, Figure 5.6 below indicates only the significant variables for the main results.

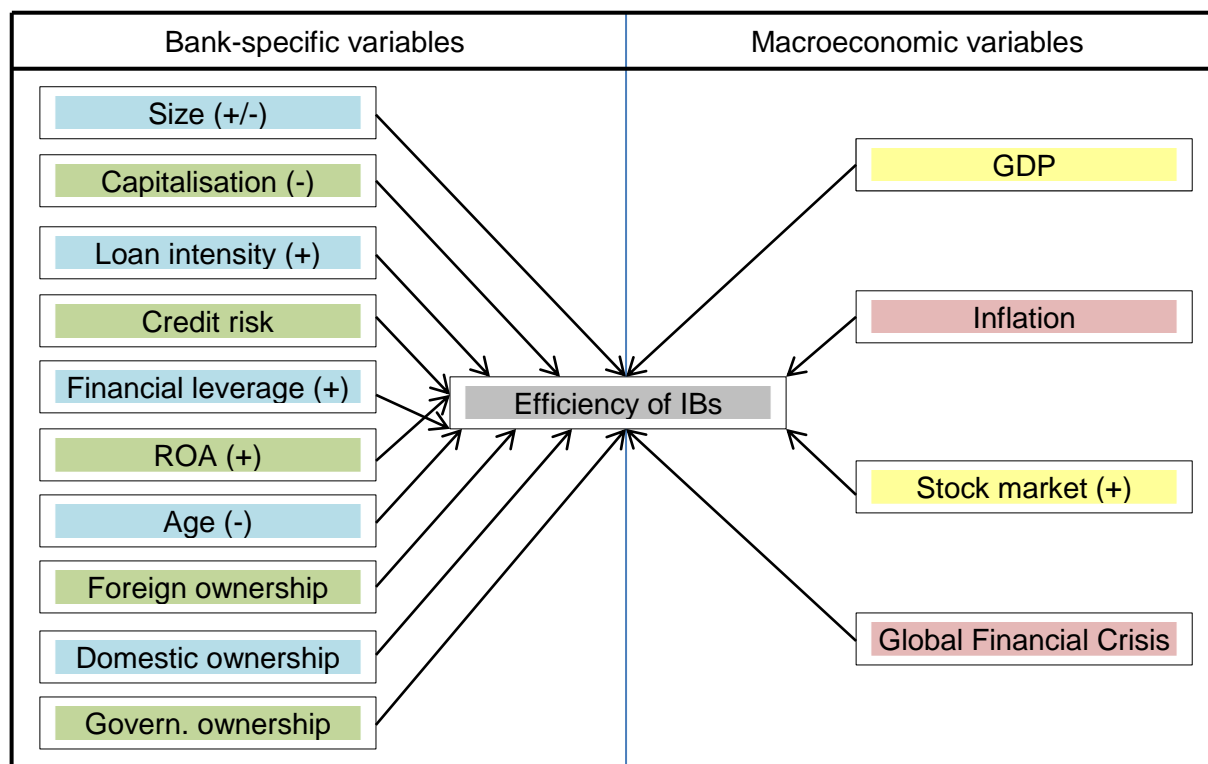


Figure 5.6: Significant variables that impact efficiency for Islamic banks, MT

5.2.1.2 Determinants of efficiency in Islamic banks (UK and MENA), additional test (AT)

The main differences between the results of the main test in Table 5.3 and the results of the additional test (including listing and corruption control as additional variables) in Table 5.4 are that the GDP and GFC became significant factors. According to the GDP, Islamic banks operated more efficiently in countries with lower economic growth (similar to Zhang *et al.*, 2012). Moreover, evidence of a significant and negative correlation was found between the global financial crisis and pure technical efficiency. Noor and Ahmed (2012) and Moradi-Motlagh and Babacan (2015) concluded the same findings. For the additional test, the Islamic listed banks were found to be more efficient than unlisted banks. The reason behind this could be because listed banks have more control from central banks, and have their own shares formally traded on the stock market. This finding is consistent with Yudistira (2004), who documents that listed Islamic banks practice more effectively than unlisted Islamic banks. Regarding the control of corruption, higher corruption control percentages strongly support (at 0.1%) the efficiency of

Table 5.4: Results of efficiency determinants for Islamic banks (UK and MENA), additional test

Islamic Banks	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Efficiency	TE	TE	PTE	PTE	SE	SE
Bank-specific variables						
LTA	0.00846	-0.0123	-0.0105	-0.0441*	0.0191***	0.0225
	(1.04)	(-0.45)	(-1.63)	(-2.09)	(3.65)	(1.19)
EQTA	-0.0164	-0.0895	-0.0243	-0.0978*	0.00560	-0.00751
	(-0.38)	(-1.46)	(-0.73)	(-2.07)	(0.21)	(-0.18)
LOANSTA	0.0974*	0.160*	0.0870**	0.100*	0.0202	0.0697
	(2.31)	(2.43)	(2.63)	(1.97)	(0.75)	(1.53)
LOANSDEPO	0.000346	0.000165	0.000143	-0.000028	0.000219	0.000193
	(0.87)	(0.44)	(0.46)	(-0.10)	(0.86)	(0.75)
TAEQ	0.00270	0.0140***	0.000865	0.00902***	0.00227	0.00650***
	(1.44)	(5.53)	(0.59)	(4.60)	(1.88)	(3.69)
ROA	0.133*	0.156**	0.0400	0.0519	0.101*	0.114**
	(2.05)	(2.72)	(0.78)	(1.17)	(2.42)	(2.85)
LAGE	-0.0430*		-0.00559		-0.0410**	
	(-2.12)		(-0.35)		(-3.15)	
FORE		-0.116		-0.0968		-0.0334
		(-1.24)		(-1.35)		(-0.52)
DOM	0.00787	-0.0709	0.0216	-0.0557	-0.0165	-0.0181
	(0.33)	(-0.82)	(1.14)	(-0.84)	(-1.07)	(-0.30)
GOV	-0.0117		-0.00606		-0.00968	
	(-0.36)		(-0.24)		(-0.47)	
LISTED*	0.0448*		0.0374*		0.0153	
	(2.03)		(2.16)		(1.08)	
Macroeconomic variables						
LGDP	-0.0187*	0.00937	-0.0105	-0.0214	-0.0103*	0.0367
	(-2.39)	(0.20)	(-1.71)	(-0.58)	(-2.05)	(1.11)
INFLATION	0.0446	0.0559	0.0725	0.0534	-0.0149	0.00993
	(0.42)	(0.55)	(0.86)	(0.68)	(-0.22)	(0.14)
MCAP	0.0119	0.00292	-0.00477	-0.0348	0.0149	0.0302
	(0.51)	(0.08)	(-0.26)	(-1.27)	(1.00)	(1.23)
GFC	-0.0283	-0.0267	-0.0261	-0.0256*	-0.00304	-0.00117
	(-1.52)	(-1.67)	(-1.79)	(-2.08)	(-0.26)	(-0.11)
CCONTROL*	0.00266***	0.00291*	0.00240***	0.00222*	0.000529	0.000656
	(4.85)	(2.06)	(5.58)	(2.03)	(1.51)	(0.67)
sigma	1.189***	0.482	1.106***	1.684	1.114***	-0.288
_cons	(5.96)	(0.42)	(7.05)	(1.92)	(8.72)	(-0.37)
R²	0.2258	0.1782	0.2167	0.1560	0.1588	0.1146
Number of banks	43	43	43	43	43	43
N	312	312	312	312	312	312

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LISTED: dummy equal 1 if listed bank and 0 unlisted bank; LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise; CCONTROL: Corruption control.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

* Additional variable

Islamic banks. In other words, clear supervision from government towards corruption allows for better efficiency. This result occurs because corruption leads to lower employee productivity, thus reducing competitiveness. Chortareas's *et al.* (2012) results show that banks in countries with more corruption control rates performed more efficiently than banks in countries with fewer corruption control rates. Overall, the R^2 measures are slightly increased compared to the main test. This means that the listing and corruption control variables are strongly linked to efficiency in Islamic banks.

5.2.2.1 Determinants of efficiency in conventional banks (UK and MENA), MT

Table 5.5 concentrates on conventional banks over the period 2005-2012. According to the internal variables, as anticipated, the results show that larger banks scored higher TE, PTE and SE than smaller banks. Capitalisation (capital ratio) impacts TE significantly and positively while, capitalisation influence SE significantly and negatively. However, loan intensity is found to be highly and positively correlated with TE, PTE and SE. In addition, there is a positive and significant relationship between financial leverage and efficiency measures. As for profitability, Table 5.5 notes a positive association between both PTE and SE, and ROA. Furthermore, new commercial banks have operated more efficiently than old banks. All the recent results are relatively consistent with Islamic banks in terms of influencing on efficiency whether positively or negatively. Regarding ownership, foreign banks scored the highest TE (FEM) but OLS shows that domestic banks were the most technical efficient banks. Furthermore, domestic banks attained the greatest PTE and state-owned banks found to be the highest scale efficient banks. However, increasing in concentration for all three types of ownership affected TE and PTE significantly and negatively (similar to Yildirim & Philippatos, 2007; Girardone *et al.*, 2004). This finding discourages foreign banks to invest and open more branches in the MENA region and the UK. Referring to the literature, many studies focused on ownership in efficiency studies, such as Gardener (2012) who classified banks as foreign, private and state banks. Gardener (2012) concludes that foreign banks are found to be more efficient than their local counterparts. Moreover, state-owned banks scored better efficiency measures than private banks. Additionally, higher levels of foreign ownership raise the TE, CE and AE of banks, while higher concentration of state ownership only increases TE.

Table 5.5: Results of efficiency determinants for conventional banks (UK and MENA), main test

CBs	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Efficiency	TE	TE	PTE	PTE	SE	SE
Bank-specific variables						
LTA	0.0147***	0.0255*	0.0137***	-0.00312	0.00352*	0.0220**
	(4.69)	(2.39)	(5.02)	(-0.36)	(1.97)	(2.62)
EQTA	0.0593	-0.0685	0.105**	-0.0200	-0.0500*	-0.0777**
	(1.44)	(-1.96)	(2.93)	(-0.70)	(-2.12)	(-2.83)
LOANSTA	0.0798***	0.0962***	0.0615***	0.0466*	0.0301**	0.0672***
	(4.20)	(4.33)	(3.71)	(2.55)	(2.77)	(3.85)
LOANSDEPO	0.000299	0.000143	0.000103	-0.0000407	0.000250	0.000160
	(0.67)	(0.51)	(0.27)	(-0.18)	(0.98)	(0.73)
TAEQ	0.000289	0.00198***	0.000161	0.00151***	0.000127	0.000684*
	(0.62)	(4.76)	(0.39)	(4.43)	(0.47)	(2.09)
ROA	-0.134	-0.00941	0.356*	-0.0995	0.239*	0.129
	(-0.67)	(-0.07)	(2.04)	(-0.86)	(2.09)	(1.17)
LAGE	-0.0232**		-0.028***		0.00185	
	(-2.78)		(-3.86)		(0.39)	
FORE	-0.428***	0.0270	-0.468***	0.0129	0.0346	0.0157
	(-5.11)	(0.70)	(-6.41)	(0.41)	(0.72)	(0.52)
DOM	-0.385***	0.0159	-0.414***	0.0163	0.0302	0.000661
	(-4.65)	(0.48)	(-5.74)	(0.60)	(0.64)	(0.03)
GOV	-0.389***		-0.445***		0.0543	
	(-4.75)		(-6.24)		(1.16)	
Macroeconomic variables						
LGDP	0.0205***	0.0351	0.0162***	0.0549***	0.00743***	0.00642
	(6.27)	(1.83)	(5.65)	(3.49)	(3.97)	(0.43)
INFLATION	-0.345***	-0.0868	-0.398***	-0.105*	0.0376	0.0187
	(-4.15)	(-1.58)	(-5.50)	(-2.33)	(0.79)	(0.43)
MCAP	0.0244***	0.0431**	0.0223***	0.0333**	0.00408	0.0175
	(6.43)	(3.02)	(6.73)	(2.84)	(1.88)	(1.56)
GFC	-0.00312	-0.0112	-0.00528	-0.0113*	0.00284	0.000382
	(-0.28)	(-1.76)	(-0.55)	(-2.18)	(0.45)	(0.08)
Sigma	0.615***	-0.407	0.863***	-0.593	0.645***	0.527
_cons	(5.06)	(-0.88)	(8.13)	(-1.55)	(9.27)	(1.44)
R²	0.1286	0.1045	0.1391	0.0797	0.0421	0.0467
Number of banks	242	242	242	242	242	242
N	1827	1827	1827	1827	1827	1827

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

On the other side, higher levels of private ownership reduce both TE and CE. Focusing on external variables, the results find that higher GDP led to increase all efficiency measures. This result is in line with the findings of Hou *et al.* (2014), Johnes *et al.* (2014), Tan and Floros (2013), Vu and Nahm (2013), Garza García (2012), Zhang *et al.* (2012), Hermes and Nhung (2010) and Chortareas *et al.* (2012). Higher GDP generated means better economy which leads to improve efficiency in banking sector. Thus, banks concentrate on countries with greater GDP to invest more. By contrast, Sufian and Habibullah (2009) claimed that GDP influenced efficiency negatively and significantly in Korean banking sector. Regarding inflation, TE and PTE have a negative and significant relationship to inflation, which corresponds by the study of Vu and Nahm (2013) and Garza García (2012) and Sufian and Habibullah (2009). In contrast, El-Moussawi and Obeid (2010) proved that inflation raises efficiency in their study. The stock market growth in conventional banks tended to be as Islamic banks, the expansion in the stock market tends to improve efficiency. Finally, the PTE in conventional banks were affected by the financial crisis significantly and negatively at 5% level. Moradi-Motlagh and Babacan (2015) and Noor and Ahmed (2012) empirically found that the global financial crisis influenced the efficiency of banks significantly and negatively. Overall, the lowest R squared was attained by SE-OLS equal to 4.21%, whereas the highest R squared was scored by PTE-OLS equal to 13.91%. Figure 5.7 explains the significant variables that affected conventional banks efficiency for the main test.

5.2.2.2 Determinants of efficiency in conventional banks (UK and MENA), AT

Table 5.6 explains that listing in financial markets is highly and strongly correlated with TE, PTE, and SE (correlated at 0.1%). This means that the conventional listed banks employed the technology professionally in order to increase efficiency. Moreover, the managerial skills in the listed banks are better than in the unlisted banks. These results are consistent with Islamic banks in the UK and MENA regions. In terms of the control of corruption, the findings in Table 5.6 reveal that the higher the level of supervision by governments, the better the efficiencies. The correlations between these factors are highly important to TE, PTE, and SE (associated at 0.1%). These results are also similar to Islamic banks. Overall, the

Table 5.6: Results of efficiency determinants for conventional banks (UK and MENA), additional test

CBs	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Efficiency	TE	TE	PTE	PTE	SE	SE
Bank-specific variables						
LTA	-0.00332 (-1.16)	0.0249* (2.31)	-0.00224 (-0.90)	-0.00342 (-0.39)	-0.000585 (-0.32)	0.0218** (2.58)
EQTA	-0.0482 (-1.32)	-0.0689* (-1.97)	0.0111 (0.35)	-0.0202 (-0.70)	-0.0746** (-3.17)	-0.0778** (-2.83)
LOANSTA	0.0211 (1.24)	0.0961*** (4.32)	0.00930 (0.63)	0.0465* (2.55)	0.0167 (1.53)	0.0671*** (3.84)
LOANSDEPO	0.000198 (0.51)	0.000145 (0.52)	0.0000151 (0.04)	-0.0000397 (-0.17)	0.000227 (0.91)	0.000160 (0.73)
TAEQ	0.00155*** (3.74)	0.00201*** (4.81)	0.00128*** (3.55)	0.00152*** (4.44)	0.000414 (1.55)	0.000691* (2.10)
ROA	0.335 (1.89)	-0.00853 (-0.06)	0.0544 (0.35)	-0.0991 (-0.86)	0.346** (3.04)	0.129 (1.17)
LAGE	-0.00682 (-0.93)		-0.0137* (-2.16)		0.00560 (1.19)	
FORE	-0.365*** (-4.96)		-0.414*** (-6.47)		0.0490 (1.03)	
DOM	-0.342*** (-4.70)	-0.0118 (-0.44)	-0.377*** (-5.97)	0.00312 (0.14)	0.0402 (0.86)	-0.0152 (-0.72)
GOV	-0.306*** (-4.25)	-0.0281 (-0.73)	-0.374*** (-5.98)	-0.0133 (-0.42)	0.0733 (1.58)	-0.0159 (-0.53)
LISTED*	0.0958*** (8.48)		0.0859*** (8.75)		0.0217** (2.99)	
Macroeconomic variables						
LGDP	-0.0174*** (-4.49)	0.0347 (1.81)	-0.0170*** (-5.06)	0.0547*** (3.47)	-0.00125 (-0.50)	0.00630 (0.42)
INFLATION	-0.0757 (-1.03)	-0.0919 (-1.66)	-0.161* (-2.52)	-0.107* (-2.35)	0.0992* (2.09)	0.0173 (0.40)
MCAP	0.00826* (2.43)	0.0428** (3.00)	0.00808** (2.73)	0.0332** (2.83)	0.000386 (0.18)	0.0174 (1.55)
GFC	-0.00660 (-0.69)	-0.0111 (-1.74)	-0.00833 (-1.00)	-0.0113* (-2.17)	0.00204 (0.33)	0.000414 (0.08)
CCONTROL*	0.00520*** (20.95)	-0.000612 (-0.72)	0.00457*** (21.21)	-0.000262 (-0.38)	0.00119*** (7.44)	-0.000167 (-0.25)
sigma	1.290***	-0.324	1.453***	-0.556	0.799***	0.558
_cons	(11.15)	(-0.69)	(14.46)	(-1.44)	(10.73)	(1.51)
R ²	0.3392	0.0724	0.3523	0.0674	0.0791	0.0984
Number of banks	242	242	242	242	242	242
N	1827	1827	1827	1827	1827	1827

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LISTED: dummy equal 1 if listed bank and 0 unlisted bank; LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise; CCONTROL: Corruption control.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

* Additional variable

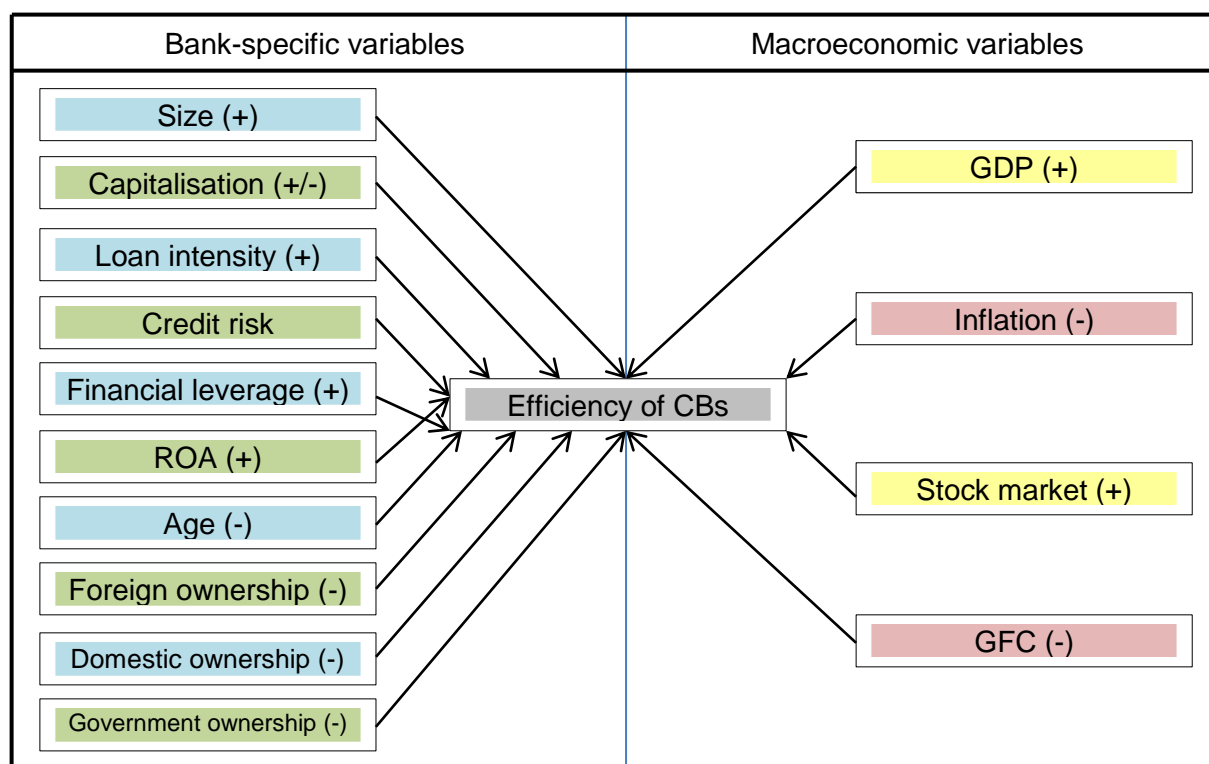


Figure 5.7: Significant variables that impact efficiency for conventional banks, MT

R^2 rates are significantly increased after using the listing dummy and corruption control factor.

5.2.3.1 Determinants of efficiency in SRBs (across the world), MT

Table 5.7 explains the determinants of socially responsible banks over the period 2005-2012. As expected, the relationship between capital ratio and efficiency found to be positive so, higher capitalisation improved TE and PTE. The credit risk ratio suggests that an increment in credit risk ratio leads to worse pure technical efficiency. Zhang *et al.* (2012) and Ariff and Can (2008) conclude the same as engaging in more lending activities lead to reduce efficiency. This goes against Hou *et al.* (2014) who argued that loans activities enhance efficiency. In addition, a positive and significant relationship was found between financial leverage and efficiency measures. Regarding ownership, the increment in concentration of government and domestic banks increased the SE over the period. Concentrating on macroeconomic variables, GDP was found to increase TE, PTE and SE. The inflation has a positive and significant correlation with TE and PTE at a 1% and 5% levels, respectively. Regarding the financial crisis, the results illustrate that the financial crisis influenced the pure technical efficiency negatively at the 5% level. Finally, R squared ranged between 6.78% (PTE-FEM) and 13.70% (TE-OLS).

However, Figure 5.8 explains the important factors to efficiency of SRBs (main test).

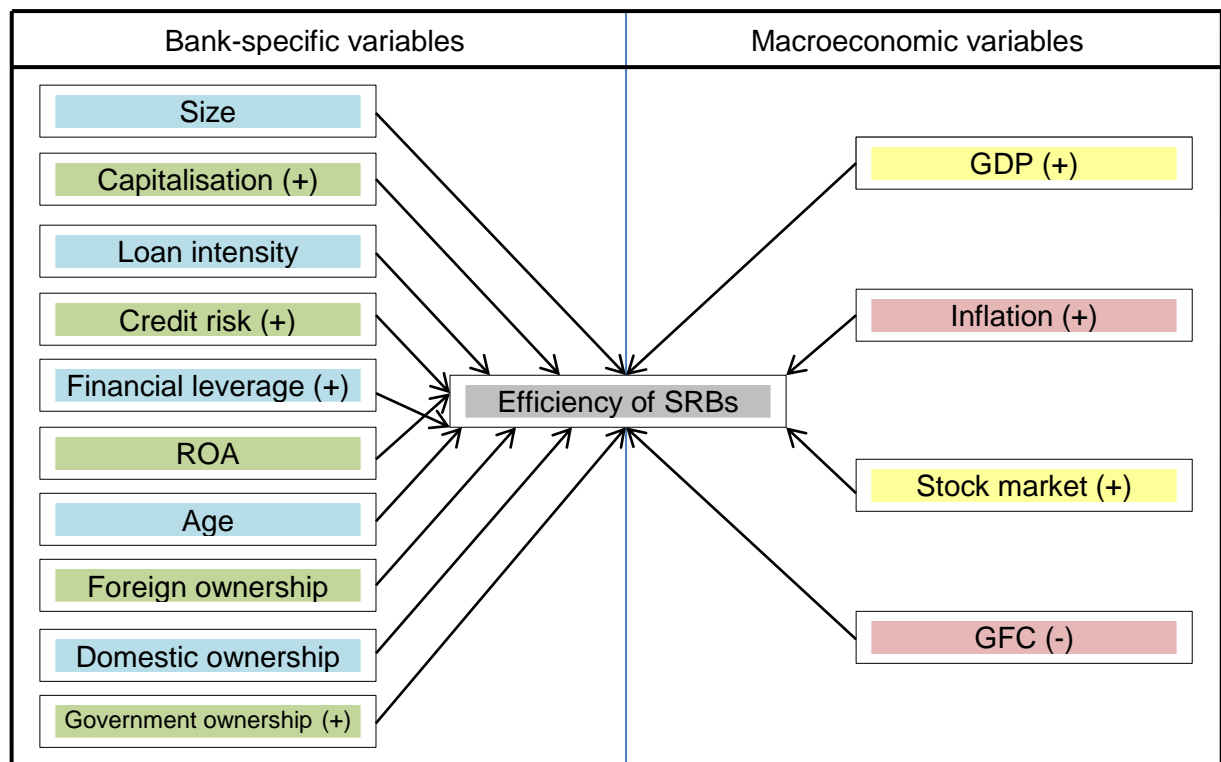


Figure 5.8: Significant variables that impact efficiency for SRBs, MT

5.2.3.2 Determinants of efficiency in SRBs (across the world), AT

The results in Table 5.8 for the additional test are consistent with the results in Table 5.7 for the main test. Regarding the additional variables (listing and control of corruption), the managerial practices (PTE) in listed banks were found to be very skilful due to a significant relationship between listing dummy and PTE. For the control of corruption factor, similar to Islamic and conventional banks, the socially responsible banks in countries with lower percentages of corruption acted more effectively. According to the R^2 scores, there is a slight increment in R^2 measures due to the high consistency found between the additional factors (listing and control of corruption) and efficiency measures (TE, PTE, and SE).

Table 5.7: Results of efficiency determinants for SRBs (across the world), MT

SRBs	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Efficiency	TE	TE	PTE	PTE	SE	SE
Bank-specific variables						
LTA	-0.00111	-0.0106	-0.00249	0.000591	0.000352	-0.00868
	(-0.25)	(-0.47)	(-0.84)	(0.04)	(0.11)	(-0.48)
EQTA	0.130*	-0.204	0.0868**	-0.0756	0.0663	-0.139
	(2.59)	(-1.26)	(2.60)	(-0.78)	(1.82)	(-1.08)
LOANSTA	0.0796	0.0665	0.0349	-0.00490	0.0530	0.0710
	(1.62)	(0.90)	(1.07)	(-0.11)	(1.48)	(1.21)
LOANSDEPO	0.0619	0.0694	0.0291	0.0697*	0.0392	0.0179
	(1.53)	(1.23)	(1.08)	(2.05)	(1.33)	(0.40)
TAEQ	0.000798	0.00194**	0.000576	0.000720*	0.000328	0.00139**
	(1.55)	(3.23)	(1.68)	(1.99)	(0.88)	(2.90)
ROA	0.801	0.502	0.624	0.221	0.310	0.325
	(0.99)	(0.62)	(1.16)	(0.46)	(0.53)	(0.51)
LAGE	-0.0109		-0.00056		-0.00905	
	(-0.86)		(-0.07)		(-0.98)	
FORE	0.0292		0.00267		0.0260	
	(0.82)		(0.11)		(1.00)	
DOM	0.0352		-0.0210		0.0502	
	(0.76)		(-0.68)		(1.50)	
GOV	0.0486		-0.00901		0.0554*	
	(1.34)		(-0.37)		(2.10)	
Macroeconomic variables						
LGDP	0.0234**	0.103	0.0103*	-0.0366	0.0156**	0.134**
	(3.18)	(1.79)	(2.10)	(-1.06)	(2.92)	(2.95)
INFLATION	0.00865**	-0.0769	0.00538*	0.0855	0.00411	-0.145
	(2.61)	(-0.37)	(2.44)	(0.69)	(1.70)	(-0.88)
MCAP	0.0463**	0.0307	0.0381**	-0.0195	0.0159	0.0469
	(2.68)	(0.81)	(3.31)	(-0.85)	(1.27)	(1.56)
GFC	0.000571	-0.00283	-0.0142	-0.0187*	0.0117	0.0117
	(0.04)	(-0.21)	(-1.39)	(-2.29)	(1.05)	(1.08)
Sigma	0.161	-1.673	0.642***	1.818*	0.434**	-2.407*
_cons	(0.76)	(-1.23)	(4.57)	(2.22)	(2.83)	(-2.22)
R²	0.1370	0.0782	0.1208	0.0678	0.1074	0.0967
Number of banks	38	38	38	38	38	38
N	284	284	284	284	284	284

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

Table 5.8: Results of efficiency determinants for SRBs (across the world), additional test

SRBs	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Efficiency	TE	TE	PTE	PTE	SE	SE
Bank-specific variables						
LTA	-0.000026 (-0.01)	-0.00770 (-0.34)	-0.00151 (-0.54)	0.00351 (0.26)	0.000632 (0.19)	-0.00830 (-0.46)
EQTA	0.197*** (3.79)	-0.177 (-1.09)	0.150*** (4.49)	-0.0493 (-0.51)	0.0823* (2.12)	-0.136 (-1.05)
LOANSTA	0.0510 (1.04)	0.0677 (0.92)	0.00677 (0.22)	-0.00365 (-0.08)	0.0466 (1.27)	0.0712 (1.21)
LOANSDEPO	0.0651 (1.65)	0.0694 (1.23)	0.0322 (1.27)	0.0696* (2.08)	0.0400 (1.35)	0.0179 (0.40)
TAEQ	0.00100* (1.98)	0.00199** (3.30)	0.000768* (2.36)	0.000762* (2.13)	0.000378 (1.00)	0.00139** (2.91)
ROA	0.862 (1.09)	0.552 (0.69)	0.675 (1.32)	0.272 (0.57)	0.328 (0.55)	0.331 (0.52)
LAGE	-0.0170 (-1.35)		-0.00626 (-0.78)		-0.0105 (-1.12)	
FORE	0.0116 (0.30)		-0.0125 (-0.50)		0.0212 (0.73)	
DOM	0.0337 (0.70)		-0.0205 (-0.66)		0.0491 (1.36)	
GOV	0.0201 (0.53)		-0.0351 (-1.45)		0.0482 (1.71)	
LISTED*	0.0419 (1.86)		0.0421** (2.90)		0.00893 (0.53)	
Macroeconomic variables						
LGDP	0.0187* (2.46)	0.0994 (1.74)	0.00605 (1.23)	-0.0401 (-1.18)	0.0145* (2.54)	0.134** (2.93)
INFLATION	0.00647 (1.83)	-0.0986 (-0.48)	0.00343 (1.51)	0.0637 (0.52)	0.00355 (1.34)	-0.147 (-0.89)
MCAP	0.0264 (1.46)	0.0277 (0.73)	0.0195 (1.68)	-0.0224 (-0.99)	0.0111 (0.82)	0.0465 (1.54)
GFC	-0.000867 (-0.06)	-0.00181 (-0.13)	-0.0156 (-1.62)	-0.0177* (-2.19)	0.0113 (1.01)	0.0118 (1.09)
CCONTROL*	0.00187*** (3.74)	0.00391 (1.63)	0.00177*** (5.50)	0.00394** (2.76)	0.000445 (1.19)	0.000507 (0.27)
sigma	0.161	-1.882	0.636***	1.607*	0.437**	-2.434*
_cons	(0.75)	(-1.38)	(4.58)	(1.98)	(2.71)	(-2.23)
R ²	0.1879	0.0885	0.2281	0.0971	0.1128	0.0970
Number of banks	38	38	38	38	38	38
N	284	284	284	284	284	284

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LISTED: dummy equal 1 if listed bank and 0 unlisted bank; LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise; CCONTROL: Corruption control.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

* Additional variable

5.3 Efficiency of MENA countries (including GCC)

5.3.1 Efficiency measures description for MENA countries (including GCC)

Table 5.9 reveals that Islamic banks in MENA countries operated more efficiently than conventional banks during the period 2005-2012, scoring DEA measures as 0.882, 0.935 and 0.940 for TE, PTE and SE, respectively. An explanation for this could be that most MENA countries employ Sharia law and primarily consist of Muslim communities. For this reason, Islamic banks are viewed as more trustworthy and reliable by clients in terms of the share of deposits and borrowing activities. The DEA results in this study contradicted Johnes *et al.* (2014) who assert that conventional banks act more effectively than Islamic banks. However, the next section explores the reasons behind inefficiencies in MENA countries.

Table 5.9: Efficiency measures description for MENA countries (including GCC)

Islamic Banks					Conventional Banks				
DEA	Mean	Std. Dev.	Min	Max	DEA	Mean	Std. Dev.	Min	Max
TE	0.882	0.177	0.24	1	TE	0.778	0.264	0.06	1
PTE	0.935	0.140	0.25	1	PTE	0.840	0.240	0.14	1
SE	0.940	0.107	0.49	1	SE	0.918	0.138	0.08	1

5.3.2 Determinants of efficiency for MENA countries (including GCC)

Table 5.10 displays the results of OLS and FEM for Islamic and conventional banks in MENA (including GCC) countries. The results suggest that the total assets are highly important in improving efficiency in Islamic and conventional banks (with the exception of PTE in Islamic banking). More expansion in banking operations could effectively allow banks to convert their inputs to outputs (Stewart *et al.*, 2016; Chen & Wang, 2015; Pessarossi & Weill, 2015; Xiang *et al.*, 2015). Based on the capitalisation coefficient, more equity led to enlarged PTE for Islamic and conventional systems. In other words, banks' capital supported a raise in managerial skills (Pessarossi & Weill, 2015). On the other hand, capital ratio proposed a decrease in the scale (volume) of management members in order to increase financial capitals in conventional banks, as the correlation between scale efficiency and capital intensity is negative (Wijesiri *et al.*, 2015). Lending services (LOANSTA) encourage managers of Islamic and conventional banks to perform efficiently, resulting in managers choosing to provide more loans. With this in mind, the best strategy to attract more clients is to supply loans with fewer lending

Table 5.10: Determinants of efficiency for MENA countries (including GCC)

Banks	Islamic Banks						Conventional Banks					
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
DEA	TE	TE	PTE	PTE	SE	SE	TE	TE	PTE	PTE	SE	SE
Bank-specific variables												
LNTA	0.0248 [*]	-0.0357	0.0002	-0.0470 [*]	0.0273 ^{***}	0.00411	0.0315 ^{***}	0.0207	0.0334 ^{***}	0.00557	0.0037	0.0059
	(2.40)	(-1.36)	(0.03)	(-2.23)	(4.42)	(0.23)	(6.79)	(1.55)	(7.92)	(0.46)	(1.44)	(0.58)
EQTA	0.124	0.0976	0.129 [*]	0.0929	0.0123	0.0233	0.0594	-0.0446	0.103 [*]	-0.017	-0.0509	-0.0598 [*]
	(1.64)	(0.71)	(2.12)	(0.83)	(0.27)	(0.25)	(1.22)	(-1.18)	(2.32)	(-0.49)	(-1.84)	(-2.06)
LOANSTA	0.236 ^{***}	0.235 ^{***}	0.211 ^{***}	0.160 ^{***}	0.0482	0.096	0.115 ^{***}	0.0927 ^{***}	0.0966 ^{***}	0.0534 [*]	0.0339 ^{**}	0.0569 ^{**}
	(3.79)	(3.09)	(4.22)	(2.61)	(1.30)	(1.89)	(5.22)	(3.86)	(4.83)	(2.42)	(2.71)	(3.08)
LOANSDEPO	0.000403	0.000175	0.0001	-0.00007	0.0002	0.00024	0.0003	0.00013	0.0001	-0.00005	0.0002	0.0001
	(0.97)	(0.48)	(0.36)	(-0.27)	(1.21)	(1.00)	(0.70)	(0.50)	(0.42)	(-0.21)	(0.85)	(0.79)
TAEQ	0.00144	0.0144 ^{***}	0.0004	0.009 ^{***}	0.0013	0.006 ^{***}	0.0009	0.002 ^{***}	0.0008	0.002 ^{***}	0.0002	0.0007
	(0.71)	(5.74)	(0.28)	(4.74)	(1.09)	(3.84)	(1.39)	(4.96)	(1.34)	(4.55)	(0.73)	(1.82)
ROA	0.301	0.478 ^{***}	-0.052	0.0368	0.355 ^{***}	0.465 ^{***}	-0.196	-0.11	-0.375	-0.136	0.212	0.0737
	(1.92)	(3.41)	(-0.42)	(0.33)	(3.80)	(4.96)	(-0.83)	(-0.73)	(-1.75)	(-0.98)	(1.59)	(0.63)
LAGE	-0.0596 ^{**}		-0.018		-0.0457 ^{***}		-0.0515 ^{***}		-0.0534 ^{***}		-0.00352	
	(-2.85)		(-1.11)		(-3.66)		(-4.24)		(-4.85)		(-0.51)	
FORE		-0.0514		-0.0602		0.00591	-0.443 ^{***}	0.044	-0.481 ^{***}	0.0201	0.0314	0.0274
		(-0.55)		(-0.80)		(0.09)	(-5.12)	(0.96)	(-6.13)	(0.48)	(0.64)	(0.78)
DOM	-0.00622	-0.093	0.0131	-0.0651	-0.022	-0.0328	-0.375 ^{***}	0.0227	-0.396 ^{***}	0.0173	0.0239	0.0068
	(-0.24)	(-1.11)	(0.64)	(-0.97)	(-1.47)	(-0.59)	(-4.40)	(0.66)	(-5.12)	(0.55)	(0.50)	(0.26)
GOV	-0.0431		-0.035		-0.015		-0.340 ^{***}		-0.400 ^{***}		0.0619	
	(-1.28)		(-1.30)		(-0.79)		(-4.03)		(-5.23)		(1.29)	(-1.39)
Macroeconomic variables												
LGDP	-0.0196	0.0756	-0.001	0.00249	-0.020 [*]	0.0821 [*]	-0.0372 ^{***}	0.0508 [*]	-0.0413 ^{***}	0.0553 ^{**}	0.000858	0.0276
	(-1.39)	(1.58)	(-0.14)	(0.06)	(-2.37)	(2.57)	(-5.31)	(2.32)	(-6.50)	(2.75)	(0.22)	(1.65)
INFLATION	-0.0809	0.109	-0.099	0.0352	0.0088	0.0875	-0.065	-0.0937	-0.157	-0.112 [*]	0.119 [*]	0.0193
	(-0.72)	(1.09)	(-1.10)	(0.43)	(0.13)	(1.30)	(-0.70)	(-1.59)	(-1.83)	(-2.06)	(2.22)	(0.42)
MCAP	0.0533 [*]	0.0276	0.0439 [*]	-0.0137	0.0122	0.0384	0.137 ^{***}	0.0622 ^{***}	0.102 ^{***}	0.0531 ^{***}	0.0512 ^{***}	0.0217
	(2.22)	(0.76)	(2.28)	(-0.47)	(0.86)	(1.58)	(9.53)	(3.60)	(7.83)	(3.35)	(6.28)	(1.63)
GFC	-0.0305	-0.029	-0.026	-0.0278 [*]	-0.005	-0.00269	-0.016	-0.0131	-0.020	-0.0183 ^{**}	0.00243	0.0045
	(-1.54)	(-1.84)	(-1.68)	(-2.19)	(-0.44)	(-0.26)	(-1.19)	(-1.73)	(-1.64)	(-2.63)	(0.31)	(0.79)
Sig	1.212 ^{***}	-0.961	0.896 ^{***}	1.126	1.338 ^{***}	-1.288	1.906 ^{***}	-0.777	2.112 ^{***}	-0.666	0.792 ^{***}	0.120
cons	(3.84)	(-0.83)	(3.53)	(1.21)	(7.10)	(-1.67)	(9.87)	(-1.58)	(12.17)	(-1.47)	(7.23)	(0.32)
R ²	0.1805	0.2048	0.1556	0.1537	0.1999	0.1807	0.2152	0.0614	0.2188	0.0489	0.0717	0.0286

# of banks	40	40	40	40	40	40	168	168	168	168	168	168
<i>N</i>	291	291	291	291	291	291	1277	1277	1277	1277	1277	1277

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

interests in terms of conventional banks, and lower administrative fees for Islamic banks (Johnes *et al.*, 2014). The findings show that the financial leverage positively and significantly led to higher efficiency for both Islamic and conventional banking systems. As a result, investing more in assets enhanced the efficiency measures (Abu-Alkheil *et al.*, 2012). However, the profits in Islamic banking are highly remarkable as the more profitable Islamic banks are found to be more efficient (similar to Stewart *et al.*, 2016; Rosman *et al.*, 2014). According to date of establishment, the more recent Islamic and conventional banks were more productive than older banks. This result supports Wijesiri's *et al.* (2015) conclusion who confirmed that new banks attained better technical efficiency scores (based on the social model). In conventional banks, foreign, domestic, and public involvements worsen the technical and pure technical efficiencies significantly. This acts as a warning to shareholders to decrease investment in the banking sector. Yildirim and Philippatos (2007) point out that foreign ownership levels reduce efficiency in the European banking sector. Furthermore, Assaf *et al.* (2011) analyse that private (domestic) banks concentration leads to lower pure technical efficiency. Finally, Chen and Wang (2015) prove that a higher number of state-owned banks in China raises inefficiency. Focusing on industry-specific factors, the fixed effects model underlines that Islamic and conventional banks in a developed economy had better efficiency measures (Hou *et al.*, 2014). Based on OLS coefficients, the GDP growth affected the efficiency of Islamic and conventional banks negatively and significantly (consistent with Sufian, 2009). Regarding the significant coefficients of inflation in conventional banks, inflation reduces the pure technical efficiency but enlarges the scale efficiency over the period. However, the roles of booming of financial markets in MENA countries are found to be very significant to the efficiency in the banking sector; especially in conventional banks, as MCAP coefficients are strongly and highly correlated with TE, PTE and SE at 0.1% levels. This outcome encourages the owners of banks to invest more in countries with larger indices of financial markets. The reason behind this result could be that banks can issue more securities (shares or bonds) in countries with developed stock markets (Tan & Floros, 2013). The financial crisis impacted the efficiency of Islamic and conventional banks badly, especially with regard to pure technical efficiency, which was found to be a significant coefficient. The global financial crisis intensively influenced the efficiency of

Islamic banks compared to conventional banks. The coefficients of Islamic banks were less than the coefficients of conventional banks. The R^2 in Islamic banks varied from 15.37% to 20.48%, whereas the R^2 in conventional banks ranged between 2.59% and 21.88%.

5.4 Efficiency of MENA countries (excluding GCC)

5.4.1 Efficiency measures description for MENA countries (excluding GCC)

In MENA countries (excluding GCC), the best practice of banking services was demonstrated by socially responsible banks (TE= 88%, PTE= 93.5% and SE= 93.4%), followed by Islamic banks (81.4%, 87.9% and 92.1%, respectively). The poorest efficiency measures were attained by conventional banks, which experienced difficulties in transferring their inputs to outputs efficiently, which could easily maximise the cost of operations (see Table 5.11). The conventional banks scored 67.1%, 75.5% and 88.4% for TE, PTE and SE, respectively.

Table 5.11: Efficiency measures description for MENA countries (excluding GCC)

Banks	Islamic				Conventional Banks				Socially Responsible Banks			
DEA	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
TE	0.814	0.2013	0.26	1	0.671	0.272	0.06	1	0.880	0.1885	0.21	1
PTE	0.879	0.1746	0.34	1	0.755	0.264	0.14	1	0.935	0.1644	0.28	1
SE	0.921	0.1147	0.49	1	0.884	0.156	0.08	1	0.934	0.0902	0.67	1

5.4.2 Determinants of efficiency for MENA countries (excluding GCC)

Table 5.12 exhibits the results of OLS and FEM indicating the determinants of efficiency in MENA region (excluding GCC) for Islamic, conventional and socially responsible banks. In Islamic banks, the size of the bank supported the scale efficiency positively and significantly while, in conventional banks, total assets significantly increased the technical and pure technical efficiencies. The capitalisation of the Islamic banking system affected the SE badly but based on the relationship between PTE and capital ratio (EQTA), conventional banks took advantage of investing their capitals to maximise outputs effectively. The loan intensity coefficients indicate that there are insignificant signs for the Islamic banks, as found by Xiang *et al.* (2015). The lending services confirmed that the management generated the loans outstandingly in conventional and socially responsible banks (based on the correlation between loan intensity and SE). In conventional banks, the managers applied their skills and the technology to

Table 5.12: Determinants of efficiency for MENA countries (excluding GCC)

Banks	Islamic Banks						Conventional Banks						Socially Responsible Banks					
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
DEA	TE	TE	PTE	PTE	SE	SE	TE	TE	PTE	PTE	SE	SE	TE	TE	PTE	PTE	SE	SE
Bank-specific variables																		
LNTA	-0.00498	-0.0850	-0.028	-0.0581	0.0281*	-0.0351	0.0188**	0.0180	0.026***	0.00491	-0.00233	-0.007	0.0563	-0.0955	0.0725	-0.135	-0.00112	0.034
	(-0.23)	(-1.94)	(-1.49)	(-1.40)	(2.33)	(-1.29)	(3.29)	(0.91)	(4.88)	(0.25)	(-0.62)	(-0.51)	(1.18)	(-1.02)	(1.66)	(-1.62)	(-0.04)	(0.68)
EQTA	-0.262	-0.643	-0.075	-0.119	-0.192	-0.525*	0.165	0.0293	0.257*	0.0355	-0.117	-0.118	0.248	0.608	-0.032	0.401	0.302	0.319
	(-0.80)	(-1.90)	(-0.26)	(-0.37)	(-1.06)	(-2.50)	(1.49)	(0.26)	(2.40)	(0.32)	(-1.61)	(-1.34)	(0.67)	(1.43)	(-0.09)	(1.07)	(1.40)	(1.37)
LOANS TA	-0.0314	0.118	0.137	0.160	-0.151	-0.0102	0.232**	0.164**	0.102	0.0638	0.177***	0.136**	0.0192	-0.0967	-0.103	-0.46	0.137	0.357
	(-0.21)	(0.84)	(1.04)	(1.21)	(-1.82)	(-0.12)	(3.14)	(2.59)	(1.43)	(1.04)	(3.66)	(2.78)	(0.07)	(-0.31)	(-0.40)	(-1.64)	(0.84)	(2.06)
LOANS DEPO	0.198**	0.140*	0.110	0.0915	0.100*	0.0484	0.0882	0.224	0.172**	0.177	-0.0787*	0.0951	0.425	0.550	0.243	0.429**	0.257**	0.228
	(2.77)	(2.00)	(1.75)	(1.39)	(2.55)	(1.12)	(1.55)	(3.65)	(3.12)	(2.95)	(-2.11)	(2.00)	(3.02)	(3.48)	(1.88)	(3.06)	(3.15)	(2.63)
TAEQ	0.00634	0.01***	0.00492	0.0089**	0.00223	0.0050	0.006**	0.004	0.005	0.003	0.0017**	0.00137*	0.007***	0.009	0.0060**	0.007***	0.00299*	0.0041
	(1.78)	(4.35)	(1.58)	(3.31)	(1.14)	(2.85)	(8.02)	(5.42)	(7.20)	(4.46)	(3.01)	(2.31)	(3.69)	(4.39)	(3.15)	(3.65)	(2.48)	(3.41)
ROA	5.482***	7.10***	3.442*	4.397**	2.599**	3.327**	1.716	-0.171	1.185	-0.279	0.957	0.143	8.515	11.41***	5.869	9.181	4.107	4.236
	(3.57)	(4.21)	(2.56)	(2.76)	(3.07)	(3.18)	(3.66)	(-0.47)	(2.61)	(-0.78)	(3.11)	(0.51)	(2.98)	(3.69)	(2.23)	(3.35)	(2.47)	(2.50)
LAGE	-0.0114		0.0420		-0.066*		0.00822		-0.00868		0.0158		0.0112		-0.014		0.0243	
	(-0.19)		(0.79)		(-1.98)		(0.54)		(-0.59)		(1.59)		(0.22)		(-0.31)		(0.83)	
FORE	0.0158		-0.0477		0.0760*		-0.208*		-0.289***		0.0978		0.0063		-0.015		0.0331	
	(0.30)		(-1.03)		(2.61)		(-2.35)		(-3.38)		(1.69)		(0.07)		(-0.17)		(0.58)	
DOM							-0.159		-0.205*		0.0726		-0.175		-0.336		0.104	
							(-1.84)		(-2.46)		(1.28)		(-0.54)		(-1.13)		(0.55)	
GOV	0.00937		-0.0648		0.0759		-0.129		-0.224**		0.116*		-0.2		-0.168		-0.0594	
	(0.12)		(-0.94)		(1.74)		(-1.54)		(-2.77)		(2.12)			(-1.27)		(-0.71)		
Macroeconomic variables																		
LGDP	-0.0343	0.161	-0.00194	-0.0211	-0.040*	0.190***	-0.117***	0.0581	-0.112***	0.0677*	-0.0168**	0.0381	-0.111*	0.0736	-0.102*	-0.018	-0.0319	0.0674
	(-1.13)	(1.88)	(-0.07)	(-0.26)	(-2.42)	(3.58)	(-12.25)	(1.91)	(-12.14)	(2.29)	(-2.67)	(1.62)	(-2.42)	(0.54)	(-2.41)	(-0.15)	(-1.19)	(0.91)
INFLATION	-0.267	-0.126	-0.220	-0.0677	-0.0631	-0.0566	0.118	-0.216	-0.0776	-0.295**	0.290**	0.0819	0.756	0.118	0.179	0.373	0.709**	-0.204
	(-0.85)	(-0.47)	(-0.80)	(-0.27)	(-0.37)	(-0.34)	(0.73)	(-1.89)	(-0.50)	(-2.64)	(2.77)	(0.92)	(1.69)	(0.17)	(0.44)	(0.61)	(2.73)	(-0.54)
MCAP	0.0251	0.0514	0.0251	-0.0138	-0.0003	0.0588	0.073***	0.0505*	0.0480	0.0563*	0.0368**	0.00934	0.037	0.144	-0.007	0.0336	0.0155	0.0807
	(0.60)	(0.68)	(0.68)	(-0.19)	(-0.01)	(1.25)	(4.07)	(2.02)	(2.74)	(2.32)	(3.09)	(0.48)	(0.19)	(0.71)	(-0.04)	(0.19)	(0.14)	(0.73)
GFC	0.00930	0.00074	-0.0293	-0.0303	0.0409*	0.0322*	-0.0129	-0.00213	-0.0235	-0.0187	0.00852	0.0151	-0.055	-0.0505	-0.0703*	-0.0633*	-0.00055	-0.0007
	(0.27)	(0.03)	(-0.99)	(-1.23)	(2.19)	(1.99)	(-0.77)	(-0.19)	(-1.46)	(-1.75)	(0.78)	(1.79)	(-1.69)	(-1.56)	(-2.31)	(-2.21)	(-0.03)	(-0.04)
Sig	1.541*	-2.874	0.845	1.602	1.86***	-3.655***	3.298***	-1.150	3.371***	-1.121	1.084	-0.122	2.573	-1.259	2.809**	1.784	1.112	-1.598
cons	(2.39)	(-1.38)	(1.50)	(0.82)	(5.24)	(-2.83)	(13.12)	(-1.72)	(13.89)	(-1.72)	(6.58)	(-0.24)	(2.75)	(-0.43)	(3.27)	(0.69)	(2.05)	(-0.99)
R ²	0.2652	0.3854	0.2520	0.2902	0.3144	0.3160	0.3020	0.1230	0.3079	0.0864	0.0855	0.0588	0.6719	0.7519	0.6353	0.5555	0.5169	0.4081

# banks	17	17	17	17	17	17	108	108	108	108	108	108	9	9	9	9	9	9
<i>N</i>	129	129	129	129	129	129	813	813	813	813	813	813	64	64	64	64	64	64

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

provide the loans very professionally (referring to OLS and FE models). However, by comparing loans with deposits, the credit risk was significantly raised in all types of banking (Islamic, conventional and socially responsible banks). This problem could be solved by managers through increasing the shares of deposits due to supporting banks' efficiencies (e.g. through providing more deposit interests). Hou *et al.* (2014) claim the opposite opinion, stating the relationship between efficiency and credit risk was negative. The results of the financial leverage and ROA underline that the more banks invest their total assets, the more the efficiency could improve for all banks. Regarding the age of banks, new Islamic banks practiced their work effectively and applied economies of scale strategies properly by providing more banking products and services. In terms of ownership, foreign banks increased the scale efficiency significantly in Islamic banks but decreased significantly the TE and PTE in conventional banks. In addition, the domestic and public conventional banks suffered from the pure technical inefficiency, whereas the scale efficiency scores were good. Concentrating on macroeconomic determinations, based on FEM's findings, we can conclude that the economic growth (GDP) was highly important to the scale efficiency in Islamic banks and the pure technical efficiency of conventional banks. However, OLS's coefficients proposed that scale inefficiency occurred in Islamic and conventional banks in developed economies. Moreover, the GDP development caused technical and pure technical inefficiencies in conventional and socially responsible banks. The managers of these banks could not exploit the economic growth optimally. The inflation worsened the pure technical efficiency of conventional banks, which reduced the skills of management, but increased the scale efficiency of conventional and socially responsible banks. The market capitalisation coefficients of conventional banking systems could support that the growth of the stock market was very important for the generation of more banking services. Finally, Table 5.12 illustrates that the global financial crisis (GFC) impacted remarkably on the efficiency of socially responsible banks especially the PTE (has a negative and significant sign); this is consistent with Moradi-Motlagh and Babacan's (2015) study. The results also show that the SE increased significantly in Islamic banks during the GFC. However, there is no evidence of the correlation between GFC and DEA indicators for the conventional banking sector (similar to Chortareas *et al.*, 2012). The minimum R^2 for Islamic banks is 25.20%,

while the maximum R^2 is 38.54%. The lowest and highest R^2 for conventional banks are 5.88% and 30.79%, respectively, and the R^2 for socially responsible banks are 40.81% and 75.19%, respectively.

5.5 Efficiency of GCC countries

5.5.1 Efficiency measures description for GCC countries

The conventional banks in GCC region performed more efficiently than Islamic banks over the period 2005-2012 (as in Table 5.13). The efficiency measures for conventional banks are 96.5%, 98.8%, and 97.6% for TE, PTE and SE respectively, whereas Islamic banks achieved efficiencies as 93.7%, 97.9% and 95.5% for TE, PTE and SE respectively. However, the determinants of efficiency in the next section could indicate the reasons behind the privilege of conventional banks.

Table 5.13: Efficiency measures description for GCC countries

Islamic Banks					Conventional Banks				
DEA	Mean	Std. Dev.	Min	Max	DEA	Mean	Std. Dev.	Min	Max
TE	0.937	0.131	0.24	1	TE	0.965	0.084	0.36	1
PTE	0.979	0.081	0.25	1	PTE	0.988	0.044	0.67	1
SE	0.955	0.098	0.49	1	SE	0.976	0.066	0.41	1

5.5.2 Determinants of efficiency for GCC countries

The efficiency of Islamic banks in GCC region were affected positively and significantly by size, capitalisation, loans, financial leverage, and profitability (ROA), and these factors could impact the efficiency of conventional banks (based on the findings in Table 5.14). Comparing the age variable between Islamic and conventional banking, the results conclude that the modern Islamic banks could practically convert their inputs better than older banks. On the other hand, age increased efficiency in conventional banks significantly. Foreign ownership supported the technical efficiency actively in conventional banking. Based on the external factors, the Islamic banks in countries with higher GDP operated inefficiently. Moreover, inflation indicates positive and significant signs for TE and SE in Islamic banks. On the contrary, inflation decreased the TE in conventional banks significantly at a level of 5%. Furthermore, the market capitalisation was found to be very important in strengthening the TE and PTE of conventional banks.

Table 5.14: Determinants of efficiency for GCC countries

Banks	Islamic Banks						Conventional Banks					
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
DEA	TE	TE	PTE	PTE	SE	SE	TE	TE	PTE	PTE	SE	SE
Bank-specific variables												
LNTA	0.0350**	0.0551	0.00564	-0.00895	0.0303**	0.0620**	-0.00266	0.0168	-0.00321	-0.00432	0.0000210	0.0196
	(2.72)	(1.82)	(0.65)	(-0.43)	(3.30)	(2.88)	(-0.82)	(1.15)	(-1.89)	(-0.56)	(0.01)	(1.65)
EQTA	0.161	0.491**	0.0700	0.168	0.102	0.357**	-0.0239	-0.00955	-0.00864	-0.00979	-0.0167	-0.000678
	(1.70)	(3.26)	(1.09)	(1.61)	(1.50)	(3.33)	(-1.10)	(-0.35)	(-0.76)	(-0.67)	(-0.97)	(-0.03)
LOANSTA	0.140	0.266*	0.0543	0.0610	0.0966*	0.220**	-0.00143	0.0148	-0.00172	0.00318	0.0000980	0.0115
	(2.06)	(2.79)	(1.18)	(0.93)	(2.00)	(3.25)	(-0.15)	(0.82)	(-0.34)	(0.33)	(0.01)	(0.78)
LOANSDEPO	0.000161	-0.0000641	0.00000739	-0.000134	0.000154	0.0000476	0.000120	0.000231	0.0000207	0.0000326	0.000103	0.000199
	(0.52)	(-0.21)	(0.04)	(-0.64)	(0.69)	(0.22)	(0.74)	(1.41)	(0.24)	(0.38)	(0.80)	(1.49)
TAEQ	0.00623	0.0234**	0.00365	0.00654	0.00298	0.0181**	0.000574	0.000499	0.000343	0.000344	0.000285	0.000209
	(1.19)	(3.02)	(1.03)	(1.22)	(0.80)	(3.27)	(0.88)	(0.74)	(1.00)	(0.96)	(0.55)	(0.38)
ROA	0.338**	0.336**	-0.0202	-0.00178	0.367***	0.353***	0.126	0.0235	0.0497	0.0308	0.0844	-0.00475
	(2.76)	(2.76)	(-0.24)	(-0.02)	(4.21)	(4.09)	(1.17)	(0.20)	(0.88)	(0.50)	(0.99)	(-0.05)
LAGE	-0.0476*		-0.00798		-0.0395**		0.0376***		0.0120*		0.0276***	
	(-2.58)		(-0.64)		(-3.01)		(4.10)		(2.49)		(3.80)	
FORE		-0.0134		-0.00789		-0.00327		0.0555*		0.0246		0.0339
		(-0.17)		(-0.14)		(-0.06)		(2.02)		(1.69)		(1.51)
DOM	0.0456	-0.0685	0.0286	-0.0133	0.0199	-0.0553	-0.00873	0.0239	-0.00362	0.0174	-0.00718	0.00751
	(1.60)	(-0.96)	(1.48)	(-0.27)	(0.97)	(-1.09)	(-0.92)	(1.16)	(-0.73)	(1.60)	(-0.96)	(0.45)
GOV	0.0728		0.0385		0.0378		0.00929		0.00572		0.00370	
	(1.80)		(1.40)		(1.30)		(0.93)		(1.09)		(0.47)	
Macroeconomic variables												
LGDP	-0.0398*	0.0119	-0.0131	0.0392	-0.0286*	-0.0177	-0.00815	-0.00599	-0.00122	0.0115	-0.00692	-0.0156
	(-2.53)	(0.22)	(-1.24)	(1.06)	(-2.55)	(-0.46)	(-1.82)	(-0.24)	(-0.52)	(0.88)	(-1.96)	(-0.78)
INFLATION	0.140	0.185*	0.0438	0.0577	0.108	0.143*	-0.0893*	-0.0402	-0.0435	-0.0361	-0.0473	-0.00311
	(1.39)	(1.99)	(0.64)	(0.90)	(1.50)	(2.16)	(-2.03)	(-0.90)	(-1.88)	(-1.52)	(-1.36)	(-0.09)
MCAP	-0.00575	0.0650	-0.0175	0.0163	0.00763	0.0497	0.00380	0.0361*	0.0108*	0.0207*	-0.00654	0.0175
	(-0.19)	(1.79)	(-0.87)	(0.65)	(0.36)	(1.94)	(0.38)	(2.02)	(2.08)	(2.18)	(-0.84)	(1.20)
GFC	-0.0695***	-0.0660***	-0.0329*	-0.0308*	-0.0408**	-0.0388**	-0.0171*	-0.0222**	-0.00946*	-0.0100*	-0.00882	-0.0134*
	(-3.58)	(-3.63)	(-2.50)	(-2.46)	(-2.95)	(-3.01)	(-2.14)	(-2.85)	(-2.25)	(-2.42)	(-1.40)	(-2.11)
Sig	1.631***	-0.210	1.224***	-0.0500	1.436***	0.585	1.073***	0.919	1.002***	0.707*	1.068***	1.173*
cons	(4.67)	(-0.16)	(5.17)	(-0.06)	(5.76)	(0.63)	(10.12)	(1.64)	(17.99)	(2.37)	(12.74)	(2.56)
R ²	0.2419	0.2914	0.0908	0.0979	0.2997	0.3628	0.0695	0.0589	0.0589	0.0565	0.0492	0.0342
# of banks	23	23	23	23	23	23	60	60	60	60	60	60

<i>N</i>	162	162	162	162	162	162	464	464	464	464	464	464
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Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

Finally, the GFC worsened the TE, PTE and SE in Islamic and conventional banks in GCC region. In comparison, the coefficients clarify that Islamic banks suffered more from effects the financial crisis, which could be one of the main reasons that conventional banks were more efficient than Islamic banks. Overall, the R^2 in Islamic banks ranged from 9.08% to 36.28%, while in conventional banks, the R^2 varied between 3.42% and 6.95%.

5.6 Efficiency of UK (as a benchmark)

5.6.1 Efficiency measures description for UK

Table 5.15 indicates that SRBs are the most efficient banks compared to conventional and Islamic banks. However, we can use the efficiency of the UK as a benchmark for Islamic, conventional and socially responsible banks across the world and MENA (including and excluding GCC, and GCC itself) region. Depending on Islamic banking efficiency measures, the Islamic GCC banks (TE = 93.7%, PTE = 97.7% and SE = 95.5%) only performed more efficiently than Islamic banks in the UK (90.3%, 95.5% and 94%, respectively). This could be due to the fact that managers in GCC region have better ability to deal with Islamic communities. Conversely, Islamic banks in MENA (excluding GCC) region encountered hurdles when attempting to transform their resources into services and profits. The global financial crisis could be one of the main reasons for their inefficiency. The same was seen in conventional banks; the highest efficiency measures were attained by conventional banks in GCC (96.5%, 98.8% and 97.6%, respectively), which are more efficient than conventional banks in the UK (93.1%, 97.8% and 95%, respectively). In addition, the worst DEA indicators were achieved by banks in MENA (excluding GCC) region. Focusing on socially responsible banks, managers of banks in the UK have the best managerial skills, as they maximise outputs more efficiently compared to banks in MENA (excluding GCC) region and SRBs around the world.

Table 5.15: Efficiency measures description for UK

Banks	Islamic				Conventional Banks				Socially Responsible Banks			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
TE	0.903	0.170	0.39	1	0.931	0.144	0.04	1	0.969	0.089	0.53	1
PTE	0.955	0.099	0.57	1	0.978	0.077	0.33	1	0.988	0.038	0.83	1
SE	0.940	0.129	0.51	1	0.950	0.120	0.04	1	0.980	0.079	0.53	1

5.6.2 Determinants of efficiency for UK

Table 5.16 explains that the size of banks supported Islamic and conventional scale efficiency, but weakened the scale efficiency of SRBs. The managerial skills (PTE) of conventional banks were affected badly by size. Regarding the relationship between TE and size, SRBs only have significant signs, as OLS's coefficient demonstrates a positive and significant association, while FE generated a negative and significant sign between TE and size. Against prediction, Islamic, conventional and socially responsible banks with higher capitalisation were found to be inefficient. In Islamic banks, the loans increased the efficiency significantly. This result is consistent with Islamic banks across the world, Islamic banks in MENA (including GCC) region, and Islamic banks in GCC region. According to financial leverage, the financial investments in SRBs were found to be very important in enhancing TE and SE. The SRBs around the world and SRBs in MENA (excluding GCC) region have the same finding. In Islamic banks, more experience in the banking sector (AGE) led to better efficiency (similar to Islamic banks across countries) while regarding SRBs, newer banks tended to be more efficient than older banks (inconsistent with SRBs in MENA countries). Regarding the country-specific factors, SRBs acted more efficiently in countries with higher inflation rates. This complies with SRBs around the world and MENA region. Finally, over the period of the global crisis (2007-2009), SRBs took advantage to raise their efficiency, this could be because clients wanted to support more social activities during the crisis period. As a result, banks received more deposits in this period. The GFC affected the efficiency of SRBs negatively and significantly across the world, and also SRBs in MENA region. In Islamic banks, R^2 ranged between 59.19% and 79.30%, and R^2 in conventional banks varied between 3.92% and 8.76%, and R^2 in SRBs ranged from 23.31% to 72.38%.

5.7 Determinants of efficiency for the whole sample

Finally, we can consider the whole sample of banks to find the average determinations for all countries and banking types (see Table 5.17). The results illustrate that the factors improved the efficiency were sizes of banks, capital ratio (TE-OLS and PTE-OLS), loan intensity, financial leverage, ROA, ownership (government, foreign and domestic only enhanced SE significantly), inflation and market capitalisation. On the contrary, capital ratio (SE), age of banks and the

Table 5.16: Determinants of efficiency for UK

Banks	Islamic Banks						Conventional Banks						Socially Responsible Banks					
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
DEA	TE	TE	PTE	PTE	SE	SE	TE	TE	PTE	PTE	SE	SE	TE	TE	PTE	PTE	SE	SE
Bank-specific variables																		
LNTA	0.594	-0.0221	0.0896	-0.288	0.520 [*]	0.167	-0.00606	0.0166	-0.0050 ^{**}	-0.0206	-0.00172	0.0355 [*]	0.0403 [*]	-0.220 ^{**}	-0.00581	-0.00942	0.0456 ^{**}	-0.212 ^{***}
	(2.23)	(-0.03)	(0.51)	(-0.65)	(3.01)	(0.38)	(-1.85)	(0.75)	(-2.91)	(-1.72)	(-0.63)	(1.97)	(2.18)	(-3.00)	(-0.64)	(-0.22)	(3.02)	(-3.91)
EQTA	-0.587	-1.428	-0.168	-0.684	-0.489 [*]	-0.971	-0.270 ^{***}	-0.230	-0.0635	-0.0575	-0.217 ^{**}	-0.180	1.273	-5.037 [*]	-0.487	-2.414	1.681	-2.777
	(-2.04)	(-1.61)	(-0.89)	(-1.17)	(-2.62)	(-1.67)	(-3.32)	(-1.69)	(-1.48)	(-0.77)	(-3.20)	(-1.61)	(0.76)	(-2.10)	(-0.59)	(-1.73)	(1.23)	(-1.57)
LOANS TA	1.883 [*]	2.167 [*]	0.393	0.567	1.615 [*]	1.778 [*]	0.00131	0.0247	-0.0105	-0.00917	0.0115	0.0425	0.628	-1.223	-0.0242	-0.490	0.631	-0.764
	(2.51)	(2.71)	(0.80)	(1.07)	(3.33)	(3.37)	(0.03)	(0.35)	(-0.47)	(-0.24)	(0.33)	(0.73)	(0.78)	(-1.52)	(-0.06)	(-1.05)	(0.96)	(-1.28)
LOANS DEPO	1.101	0.454	0.317	-0.0803	0.892	0.521	0.0376	0.0273	0.0247	0.0206	0.0166	0.00944	-0.431	1.444	0.0106	0.770	-0.424	0.707
	(1.66)	(0.49)	(0.73)	(-0.13)	(2.07)	(0.86)	(1.58)	(1.03)	(1.95)	(1.42)	(0.84)	(0.43)	(-0.63)	(1.71)	(0.03)	(1.57)	(-0.76)	(1.13)
TAEQ	-0.0218	0.00326	-0.00343	0.0119	-0.0181	-0.00372	-0.00022	0.000852	-0.00017	0.000403	-0.00003	0.000526	0.0109	0.0135 [*]	-0.00437	-0.00376	0.0149 ^{**}	0.016 ^{***}
	(-0.94)	(0.10)	(-0.23)	(0.53)	(-1.20)	(-0.17)	(-0.46)	(1.31)	(-0.67)	(1.13)	(-0.09)	(0.98)	(1.87)	(2.51)	(-1.52)	(-1.20)	(3.13)	(4.24)
ROA	0.218	0.229	0.100	0.107	0.137	0.144	0.530	0.567	0.294	0.238	0.262	0.368	2.582	-1.819	-0.375	-1.800	2.906	-0.124
	(1.63)	(1.71)	(1.14)	(1.21)	(1.58)	(1.63)	(1.58)	(1.31)	(1.66)	(1.00)	(0.94)	(1.03)	(0.89)	(-0.69)	(-0.27)	(-1.18)	(1.23)	(-0.06)
LAGE	1.980		0.482		1.705 [*]		-0.00536		-0.00572		0.000331		-0.134 ^{**}		0.0194		-0.153 ^{***}	
	(1.99)		(0.74)		(2.64)		(-0.68)		(-1.37)		(0.05)		(-2.85)		(0.84)		(-3.97)	
FORE	0.0996		0.00179		0.0819		-0.0926	0.00221	-0.0449	-0.00256	-0.0528	0.00602						
	(0.42)		(0.01)		(0.53)		(-1.08)	(0.05)	(-0.99)	(-0.11)	(-0.74)	(0.16)						
DOM		0.0444		0.0866		0.000687	-0.0878		-0.0495		-0.0453							
		(0.16)		(0.47)		(0.00)	(-1.03)		(-1.10)		(-0.64)							
GOV									0.0725		0.0359		0.0432					
									(0.66)		(0.60)		(0.48)					
Macroeconomic variables																		
LGDP	-0.793	-0.280	-0.168	0.148	-0.578	-0.284	0.0361	0.0251	0.0777	0.0791	-0.0428	-0.0561	-0.116	-0.0638	-0.0623	0.0846	-0.0561	-0.148
	(-0.96)	(-0.29)	(-0.31)	(0.23)	(-1.08)	(-0.44)	(0.45)	(0.32)	(1.82)	(1.86)	(-0.64)	(-0.88)	(-0.57)	(-0.32)	(-0.62)	(0.74)	(-0.34)	(-1.02)
INFLA TION	10.05	6.177	10.35	7.967	0.887	-1.334	-0.0346	-0.0425	-0.0196	-0.00879	-0.0148	-0.0366	2.061	4.198	0.544	-2.279	1.535	6.431 [*]
	(0.62)	(0.37)	(0.98)	(0.73)	(0.08)	(-0.12)	(-0.24)	(-0.30)	(-0.25)	(-0.11)	(-0.12)	(-0.31)	(0.57)	(1.12)	(0.31)	(-1.04)	(0.52)	(2.32)
MCAP	-0.00385	0.249	0.158	0.313	-0.147	-0.00188	0.00238	0.00611	0.000776	0.00459	0.00162	-0.00005	0.0630	0.0993	0.0123	-0.0772	0.0497	0.173
	(-0.01)	(0.41)	(0.43)	(0.77)	(-0.40)	(-0.00)	(0.49)	(0.22)	(0.30)	(0.30)	(0.40)	(-0.00)	(0.45)	(0.75)	(0.18)	(-1.01)	(0.44)	(1.78)
GFC	0.0435	0.0311	0.104	0.0960	-0.0497	-0.0568	-0.00961	-0.0141	-0.00346	-0.00284	-0.00419	-0.00961	0.0594	0.107 [*]	0.0286	0.0167	0.0318	0.0912 [*]
	(0.20)	(0.15)	(0.74)	(0.68)	(-0.36)	(-0.40)	(-0.71)	(-1.01)	(-0.48)	(-0.37)	(-0.37)	(-0.84)	(1.21)	(2.33)	(1.19)	(0.63)	(0.79)	(2.69)
Sig	15.17	8.621	3.558	-2.195	10.63	8.199	0.0766	0.0601	-1.127	-1.119	2.246	2.243	4.015	3.836	2.809	-1.159	2.294	6.008
cons	(0.65)	(0.34)	(0.23)	(-0.13)	(0.71)	(0.48)	(0.03)	(0.03)	(-0.92)	(-0.92)	(1.17)	(1.23)	(0.70)	(0.67)	(1.00)	(-0.35)	(0.49)	(1.42)
R ²	0.5919	0.6749	0.4835	0.7930	0.7028	0.7433	0.0392	0.0406	0.0522	0.0876	0.0428	0.0585	0.4033	0.5896	0.2331	0.3859	0.4954	0.7238
# banks	3	3	3	3	3	3	74	74	74	74	74	74	5	5	5	5	5	5
N	21	21	21	21	21	21	550	550	550	550	550	550	37	37	37	37	37	37

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

Table 5.17: Results of efficiency determinants for all banks

All Banks	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Efficiency	TE	TE	PTE	PTE	SE	SE
Bank-specific variables						
LTA	0.0154***	0.0154	0.0131***	-0.00946	0.00477***	0.0193**
	(6.18)	(1.75)	(6.11)	(-1.34)	(3.35)	(2.85)
EQTA	0.106***	-0.0913***	0.123***	-0.0535**	-0.00769	-0.0613**
	(4.90)	(-3.59)	(6.58)	(-2.63)	(-0.62)	(-3.13)
LOANSTA	0.0639***	0.105***	0.0443***	0.0542***	0.0282***	0.0685***
	(4.48)	(5.36)	(3.60)	(3.47)	(3.46)	(4.55)
LOANSDEPO	0.000372	0.000194	0.000173	0.0000250	0.000240	0.000158
	(1.14)	(0.90)	(0.61)	(0.14)	(1.28)	(0.95)
TAEQ	0.000723	0.00218***	0.000568	0.00141***	0.000215	0.000976***
	(1.92)	(6.34)	(1.75)	(5.12)	(1.00)	(3.69)
ROA	0.0979	0.0941*	-0.00873	0.0193	0.112**	0.0858*
	(1.34)	(1.97)	(-0.14)	(0.50)	(2.68)	(2.33)
LAGE	-0.0310***		-0.028***		-0.00602	
	(-4.67)		(-5.03)		(-1.58)	
FORE	-0.0272		-0.0683		0.0495*	
	(-0.65)		(-1.90)		(2.07)	
DOM	0.0226	-0.00165	-0.0168	0.00952	0.0538*	-0.00933
	(0.54)	(-0.07)	(-0.46)	(0.51)	(2.23)	(-0.52)
GOV	-0.00882	-0.00922	-0.0647	-0.00374	0.0658**	-0.00580
	(-0.22)	(-0.26)	(-1.85)	(-0.13)	(2.84)	(-0.22)
Macroeconomic variables						
LGDP	0.0222***	0.0391*	0.0182***	0.0404**	0.00667***	0.0195
	(8.55)	(2.34)	(8.11)	(3.02)	(4.49)	(1.52)
INFLATION	0.0159***	-0.0588	0.0126***	-0.0696	0.00505*	0.0132
	(4.34)	(-1.28)	(4.00)	(-1.90)	(2.41)	(0.37)
MCAP	0.0146***	0.0383**	0.0110***	0.0198*	0.00520***	0.0236*
	(5.38)	(3.09)	(4.67)	(2.00)	(3.35)	(2.48)
GFC	-0.00778	-0.0114*	-0.0114	-0.0135**	0.00350	0.00177
	(-0.86)	(-2.09)	(-1.45)	(-3.10)	(0.67)	(0.42)
Sigma	0.190*	-0.367	0.416***	-0.109	0.667***	0.218
_cons	(2.34)	(-0.91)	(5.96)	(-0.34)	(14.40)	(0.70)
R ²	0.1105	0.0497	0.1061	0.0488	0.0443	0.0528
Number of banks	323	323	323	323	323	323
N	2423	2423	2423	2423	2423	2423

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, ROA: returns on assets, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

global financial crisis affected the efficiency significantly and negatively in whole banks.

5.7 Conclusion of efficiency and its determinants

According to banks across the world, the socially responsible banks scored the highest averages of efficiency's measures during the period 2005-2012. In contrast, the least scores were achieved by conventional banks. Regarding the determinants, the variables that increase the efficiency of Islamic banks are size (TE and SE), loan intensity, financial leverage, ROA and market capitalisation. In contrary, the threats against Islamic banks attained from size (PTE), capital ratio and age. According to conventional banks, the results reveal that size, capital ratio (PTE), loan intensity, financial leverage, ROA, GDP and market capitalisation increase the efficiency. On the other hand, capital ratio (SE), ownership, inflation and the global financial crisis reduce the efficiency. In accordance to socially responsible banks, there is a positive and significant relationship between efficiency and capital ratio, credit risk, financial leverage, ownership (government banks), GDP, market capitalisation. However, the global financial crisis influenced the efficiency negatively.

However, Appendix 15 concludes the efficiency averages for Islamic, conventional and socially responsible banks. In addition, Appendix 15 states the highest and lowest measures over the period 2005-2012.

Appendix 16 presents the significant variables that affected efficiency in Islamic, conventional and socially responsible banks through the 2005-2012 periods. Appendix 16 shows that ROA is the most important internal variable and increases the efficiency of the Islamic and conventional banks significantly. This is the reason behind striving to maximise profits, which improves efficiency in the banking sector. Regarding the external variables, market capitalisation was found to be the main factor for efficiency (excluding Islamic banks). Thus, governments need to be concerned about improving the stock market. Additionally, banks can grow their efficiency through investing more in countries with higher market capitalisation. However, inflation was found to be affecting negatively the efficiency (excluding SRB over the period 2005-2012. This result is a warning to banks against operating in countries with higher inflation rates. Regarding the GFC, the

efficiency of conventional and socially responsible banks was influenced by the GFC significantly and negatively.

Based on the results of the additional test, the listed banks found to be more effective and operated efficiently. This allowed providing better quality of banking services. Additionally, higher control of corruption from the governments results to have better DEA's scores over the period 2005-2012.

In MENA region including GCC countries, the managers of Islamic banks performed more effectively than conventional banks. In MENA region excluding GCC countries, we can conclude that the socially responsible banks were found to be more efficient by a wide margin compared to Islamic (average efficiency) and conventional banks (the worst performance). Finally, in GCC region, conventional banks attained better efficiency measures over the period 2005-2012. According to the determinants of efficiency, the profitability in banking (ROA) is remarkably supported to enhance the efficiency of Islamic, conventional and socially responsible banks in terms of bank-specific factors. Regarding the macroeconomic variables, efficiency is significantly improved by stock market growth in the MENA region banking sector.

In the UK, SRBs operated efficiently compared to conventional and Islamic banks. With regards to determinants, size, loans and age were very important to support efficiency, whereas capitalisation went against expectations as it influenced efficiency inversely. In conventional banks, size and capital ratios have negative and significant correlations with efficiency. According to SRBs, financial leverage and inflation increased the efficiency significantly. New SRBs were more efficient than banks with greater experience (time). Finally, it is very remarkable for SRBs to have positive and significant signs for technical and scale efficiencies over the crisis period (2007-2009).

Overall, the highest estimator for all banks is the average SE scoring then the average PTE achieving and the minimum indicator was the TE means.

Chapter Six: Results and Discussion of Profitability

6.1 Results of profitability

Many studies used ROA and ROE ratios as explained variables such as Chronopoulos *et al.* (2015), Căpraru and Ihnatov (2014), Al-Musali and Ismail (2014), Rumler and Waschiczek (2014), Lee and Kim (2013), Dedu and Chitan (2013), Kanas *et al.* (2012), Haan and Poghosyan (2012), Barry *et al.* (2011) and Mirzaei *et al.* (2013). Fewer studies concentrated on NIM, for example, Horváth's *et al.* (2014) study. By following the recent studies, this study employs ROA, ROE and NIM as dependant variables through the period 2005-2012. Before analysing, we can conclude the data description of each profitability ratio to know which type of banks have the highest average profitability ratios as in Table 6.1 below.

Table 6.1: Data description of profitability ratios

Type	Ratio	Obs	Mean	Std. Dev.	Min	Max
Islamic Banks	ROA	312	0.009	0.150	-0.870	2.200
	ROE	312	0.058	0.172	-1.130	0.530
	NIM	255	3.862	6.511	-26.270	64
Conventional Banks	ROA	1827	0.103	0.035	-0.440	0.860
	ROE	1827	0.070	0.309	-9.980	1.180
	NIM	1700	2.789	1.845	-4.570	18
Socially Responsible Banks	ROA	284	0.005	0.011	-0.080	0.039
	ROE	284	0.025	0.682	-11.070	0.900
	NIM	260	3.484	3.063	-5.560	14
All Banks	ROA	2423	0.008	0.062	-0.873	2.200
	ROE	2423	0.051	0.361	-11.066	1.180
	NIM	2215	2.994	2.953	-26	63.996

Appendix 13 includes the measures of profitability ratios (ROA, ROA and NIM) for all banks (Islamic, conventional and socially responsible banks). The conventional banks were found to be the most profitable banks (we accept *H2*). This could be due to charging more interest than Islamic and socially responsible banks. The calculation of ROA is net income over total assets and ROA represents a dependant variable following Apergis' (2014) approach. According to ROE, return on equity ratio is calculated as net income to total shareholders' equity. The ROE is also dealt with as a dependent variable in different equations (Lee and Kim, 2013). The mean ROA for conventional banks is equal to 1%, whereas the

average ROE is 7%. However, Islamic banks achieved moderate profitability ratios (mean ROA = 0.90% and mean ROE = 5.80%). Furthermore, socially responsible banks scored the lowest average ROA (0.50%) and ROE (2.50%) over the period 2005-2012 as Flammer (2005) states that socially responsible corporations seek to support social issues more than profitability. According to NIM ratios in Table 6.1 above, Islamic banks attained the highest NIM (3.862) due to generating their income by not pay interest expenses and through interest-free investment (H_2 is rejected). Following by socially responsible banks which they scored mean NIM equal to 3.484. After that, conventional banks found to be the least profitable in terms of NIM (2.789), which can be explained as conventional banks anticipated to pay the greatest interest expenses compared to Islamic and socially responsible banks or conventional banks could gain less interest income than Islamic and socially responsible banks. Appendix 13 illustrates the averages for profitability ratios for Islamic, conventional, socially responsible and all banks from 2005-2012. Focusing on the profitability of Islamic banks, Figure 6.1 below explains that the highest mean ROA attained in 2005 scored 11.07% followed by the average ROA in 2006 (2.15%), then the ROA dropped in 2007 (0.16%). However, the lowest mean ROA occurred in 2010 (-2.88%) which is the post-crisis period, then the profitability improved in 2011 (-2.40) and 2012 (0.70%) compared to recent years. Regarding ROE, the mean ratio of ROE ranged between 1.87% in 2012 (the minimum) to 3.01% in 2007 (the maximum). Over the period 2008-2011, ROE did not change significantly, but it dropped in 2012. Overall, the mean ROE (5.80%) was found to be higher than ROA (0.9%) over the period 2005-2012. This means that investing in shareholder's equity generated more profits than investing in banks' assets.

Based on the NIM measure, Islamic banks achieved the greatest earnings in (7.3536) then drop slightly in 2006 (4.3743). In 2007, the NIM grown to 5.5172, after that the profits kept decreasing until 2011 which considered to be the worst measure (2.4285). However, the NIM ratios are explained in different figure due to high differences between NIM and other profitability ratios (ROA and ROE). Figure 6.2 below illustrates the means NIM over the period 2005-2012 for the Islamic banks.

Figure 6.1: Bar chart of average ROA and ROE ratios for Islamic banks

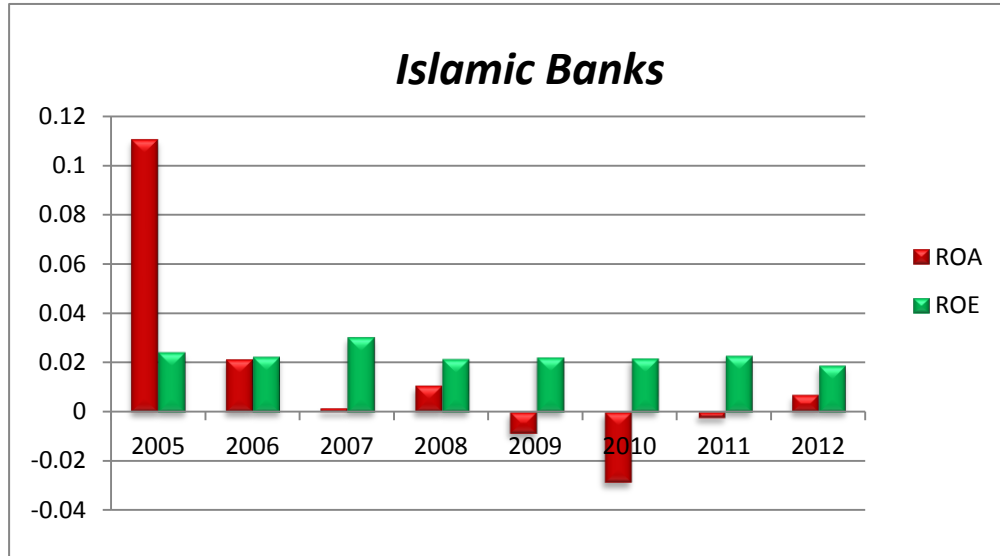
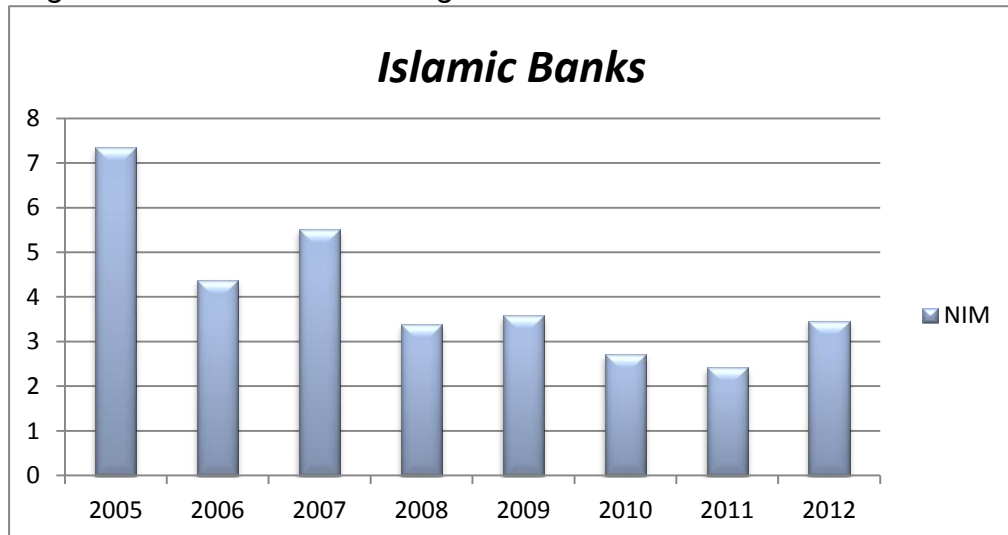
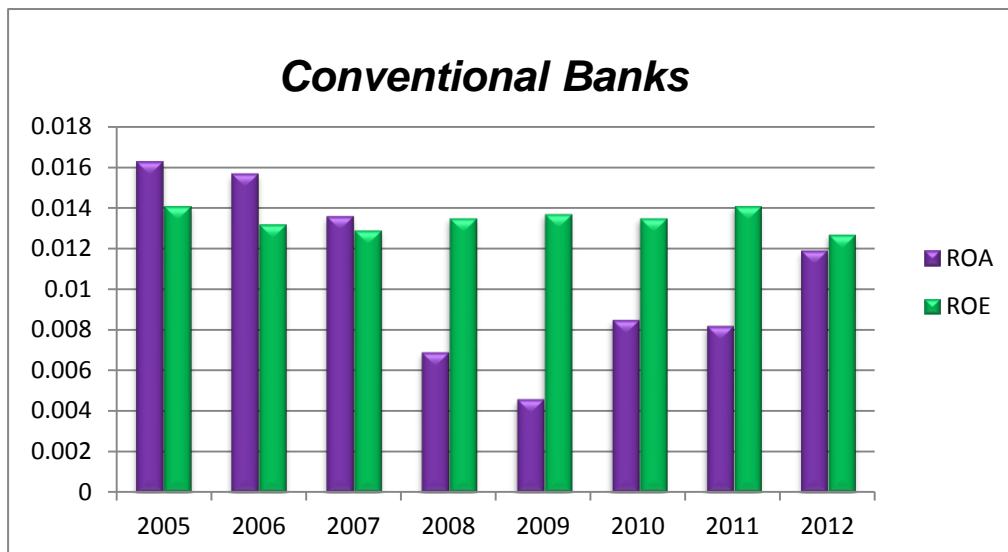


Figure 6.2: Bar chart of average NIM ratios for Islamic banks



With regard to conventional banks' profitability ratios, Figure 6.3 below shows that ROA declined slightly in 2006 (1.57%) and 2007 (1.36%) but collapsed in 2008 (0.69%) and 2009 (0.49%). This could be due to the impact of the global financial crisis. After that, ROA improved during the period 2010-2012 (post-crisis) with mean scores for ROA equal to 0.85% in 2010 and 1.19% in 2012. However, the conventional banks achieved the maximum ROA in 2005 (1.63%) as shown in Figure 6.3 below. Regarding ROE measures, the mean ROE ranged between 1.27% (in 2012) and 1.41% (in 2005 and 2011). In detail, the mean ROE declined in 2006 (1.32%) and 2007 (1.29%), then increased in 2008 (1.35%) and 2009 (1.37%).

Figure 6.3: Bar chart of average ROA and ROE ratios for conventional banks



The NIM in conventional banks started in 2005 from 2.7421 then decreased to 2.7259 in 2006. Then the period between 2007 (2.8255) to 2009 (2.8881), the interest revenues boomed clearly as in Figure 6.4 below. After that NIM collapsed again in 2010 and 2011 scoring average NIM ratios as 2.7464 and 2.7193 (the minimum), respectively. Finally, the profits enhanced again in 2012 (2.7621).

In socially responsible banks, ROA rose in 2006 scoring a mean ROA equal to 0.69%, which was the highest percentage, then the profitability declined in 2007 (0.60%) and 2008 (0.15%). In 2009 and 2010, the ROA improved, achieving average ROA of 0.48% and 0.60%, respectively. After that, the profitability kept decreasing in 2011 (0.52%) and 2012 (0.47%). Focusing on the ROE indicator, but

Figure 6.4: Bar chart of average NIM ratios for conventional banks

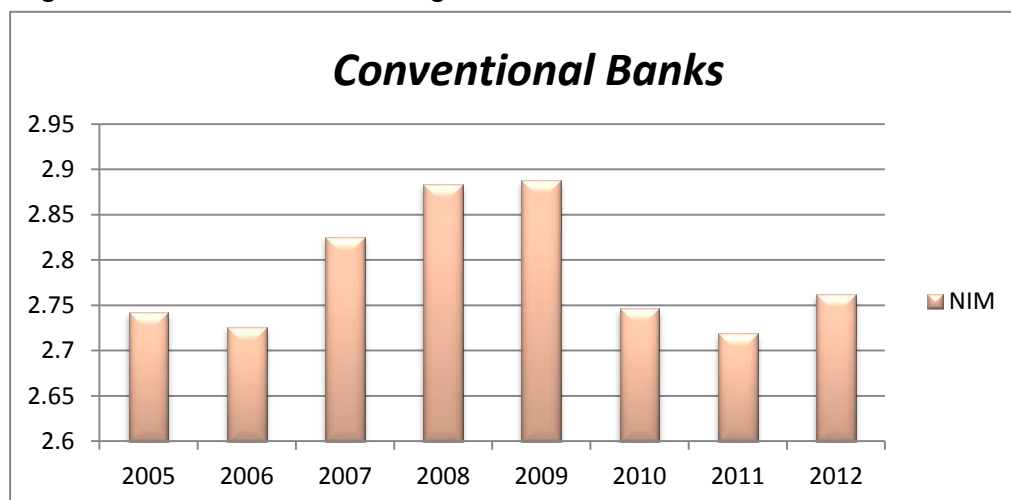
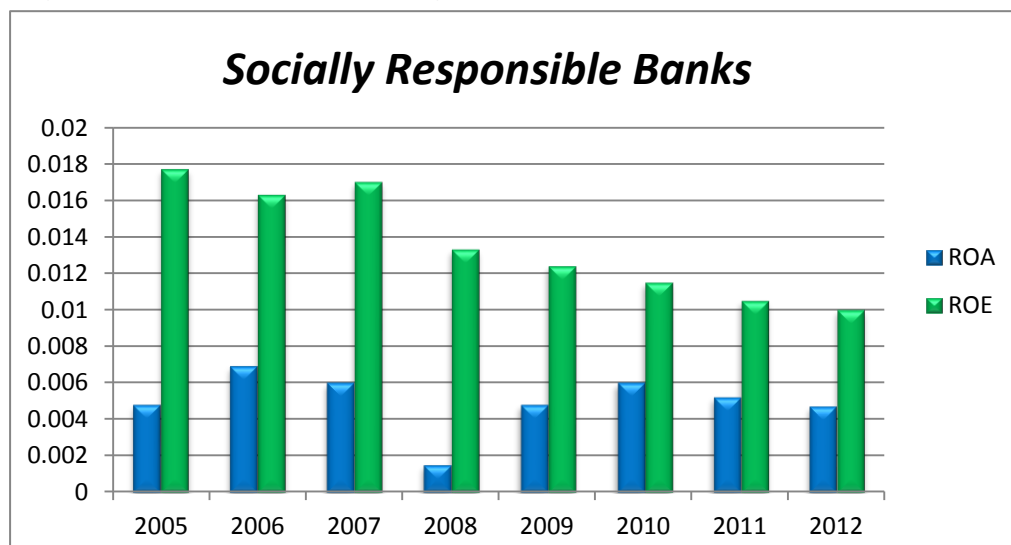


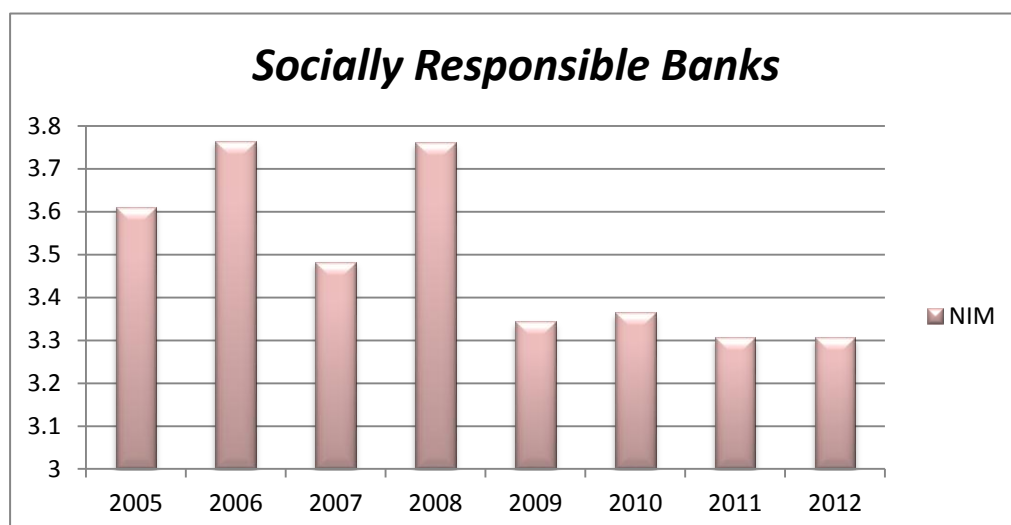
Figure 6.5 below illustrates that the highest ROE was attained in 2005 (1.77%). It then dropped slightly in 2006 (1.63%). In 2007, the ROE increased to 1.70%, after that the returns on equity decreased continuously from 2008 (1.33%) to 2012 (1%) which is considered to be the least profitable year in terms of ROE. Overall, ROE was found to be higher than ROA over the period 2005-2012, achieving means equal to 0.5% and 2.5% for ROA and ROE, respectively.

Figure 6.5: Bar chart of average ROA and ROE ratios for SRBs



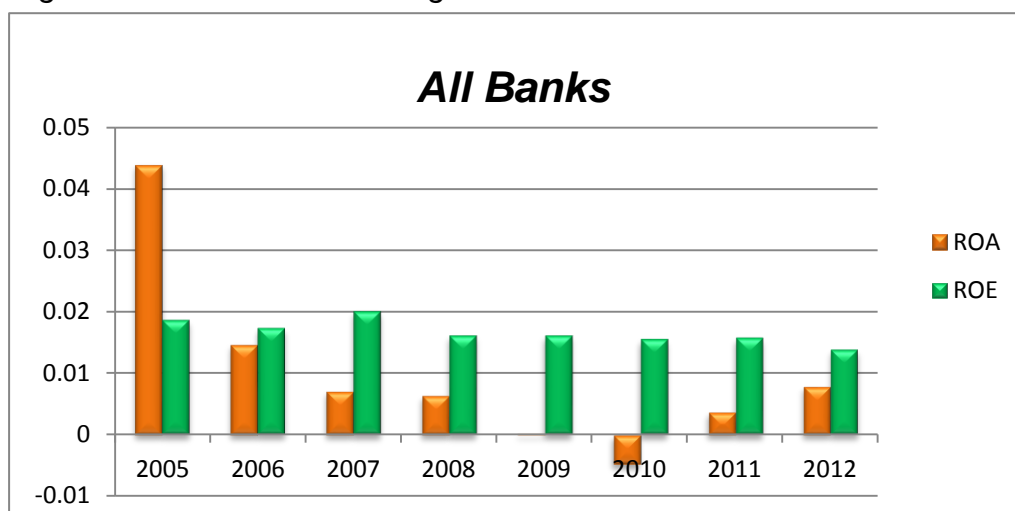
Concentrating on NIM averages in socially responsible banks, Figure 6.6 below concludes that NIM indicator varied between 3.3062 in 2012 to 3.7643 in 2006. In 2007 the earnings collapsed badly and the recovery attained in 2008 (3.7603). After 2008, the NIM could not improve until 2012 as in Figure 6.6 below.

Figure 6.6: Bar chart of average NIM ratios for SRBs



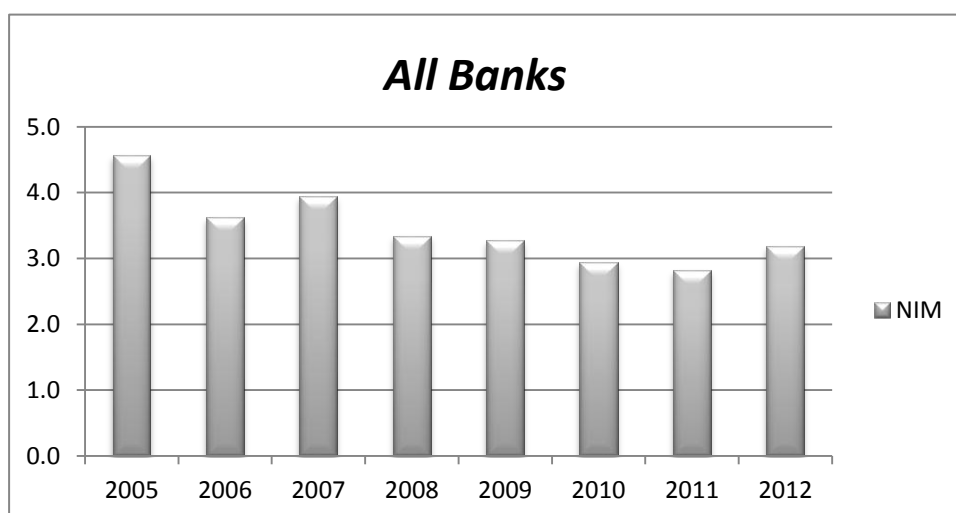
In general, the highest overall ROA for all banks was attained in 2005, scoring 4.39%. After 2005, ROA carried on reducing from 2006 (1.47%) to 2010 (-0.48%), but in 2011 and 2012 the ROA index improved by 0.37% and 0.79%, respectively. However, the maximum average ROE was found in 2007 (2%) and the minimum ROE was attained in 2012 (1.38%). In 2006, the ROE declined to 1.73%, then rose in 2007 (2%). After that, the ROE indicator kept decreasing over the period 2008-2012 from 1.61% to 1.38%. Overall, ROE (5.10%) was found to be higher than ROA (0.8%) during the period 2005-2012 as shown in figure 6.7 below.

Figure 6.7: Bar chart of average ROA and ROE ratios for all banks



The average NIM for all banks started strongly in 2005 scoring 4.5688. In 2006, a slight difference is observed as NIM dropped to 3.6215. Then, profits recovered in 2007 (3.9416) but the period of 2008-2011, interest earnings continuously reducing from 3.3427 to 2.8183 (the lowest), respectively. In 2012, banks found to be achieving better net interest margins (see Figure 6.8).

Figure 6.8: Bar chart of average NIM ratios for all banks



However, Table 6.2 below indicates the averages ROA and ROE ratios for each country in the study to find out which country needs to improve its profitability in the banking sector.

Table 6.2 shows that mean ROE was more than mean ROA over the period 2005-2012, scoring 2.28% and 1.72% for ROE and ROA, respectively. Iranian banks achieved the maximum overall ROA equal to 9.87%, whereas banks in the UK needed to improve their returns as mean ROA was the minimum, equal to -0.49% compared to the rest of the countries. However, Bolivian socially responsible banks attained the highest average ROE (21.38%), while the least profitable banks were in Morocco (-15.57%).

According to NIM measure, Table 6.3 below concludes the NIM ratios by country. It can be observed that Bolivia invested in interests efficiently (12.660) while, the least profitable banks found to be in Austria (1.188). As a result, comparing the profitability ratios between countries could encourage banks to operate and invest effectively due to increasing in competitiveness in banking sector.

6.2 Determinants of profitability

The profitability analysis shows the variables (bank-specific and macrocosmic) that can improve profitability and the variables that could increase/reduce profitability over the period 2005-2012 for Islamic, conventional and socially responsible banks through the use of OLS and fixed effects models. The following sections conclude the relationships between the profitability ratios (ROA, ROE and NIM) and the explanatory variables.

6.2.1 Determinants of profitability in Islamic banks (UK and MENA), MT

6.2.1.1 Determinants of ROA and ROE in Islamic banks (UK and MENA), MT

The empirical results of the OLS and fixed effects models are presented in Table 6.4. After considering the ROA and ROE indicators, the internal determinants are size, capital ratio, loan intensity, deposit ratio and z-score, whereas the external determinants were found to be GDP and inflation. In detail, the larger sized banks are more profitable than smaller sized banks over the period. The reason of this result could be due to larger banks are more likely to gain profits from economies

Table 6.2: Averages ROA and ROA ratios by country

N	Country	Mean ROA	Mean ROE	Banks in the sample	Number of Banks
1	USA	0.0078	0.0005	Socially Responsible Banks	1 SRB
2	Germany	0.0027	0.0111	Socially Responsible Banks	3 SRB
3	France	0.0027	0.0022	Socially Responsible Banks	1 SRB
4	UK	-0.0049	0.0049	Islamic, Conventional and Socially Responsible Banks	3 IB, 74 CB and 6 SRB
5	Canada	0.0071	0.0011	Socially Responsible Banks	1 SRB
6	Australia	0.0054	0.0021	Socially Responsible Banks	1 SRB
7	Spain	0.0081	0.0159	Socially Responsible Banks	1 SRB
8	Netherlands	0.0039	0.0053	Socially Responsible Banks	2 SRB
9	Saudi Arabia	0.0620	0.0414	Islamic and Conventional Banks	3 IB and 9 CB
10	Switzerland	0.0008	0.0164	Socially Responsible Banks	1 SRB
11	Norway	0.0026	0.0169	Socially Responsible Banks	1 SRB
12	Austria	-0.0026	0.0107	Socially Responsible Banks	1 SRB
13	UAE	0.0357	0.0262	Islamic and Conventional Banks	6 IB and 17 CB
14	Iran	0.0987	0.1007	Islamic and Socially Responsible Banks	7 IB and 1 SRB
15	Denmark	0.0036	0.0114	Socially Responsible Banks	5 SRB
16	Israel	0.0060	0.0111	Conventional Banks	8 CB
17	Egypt	0.0150	0.0197	Islamic and Conventional Banks	2 IB and 21 CB
18	Iraq	0.0361	0.0302	Conventional Banks	2CB
19	Algeria	0.0316	0.0546	Islamic, Conventional and Socially Responsible Banks	1 IB, 9 CB and 3 SRB
20	Qatar	0.0892	0.0696	Islamic and Conventional Banks	3 IB and 6 CB
21	New Zealand	0.0019	0.0060	Socially Responsible Banks	1 SRB
22	Kuwait	0.0165	0.0125	Islamic and Conventional Banks	2 IB and 6 CB
23	Bangladesh	0.0119	0.0158	Socially Responsible Banks	1 SRB
24	Morocco	0.0095	-0.1557	Conventional and Socially Responsible Banks	8 CB and 1 SRB
25	Oman	0.0187	0.0105	Conventional Banks	7 CB
26	Syria	0.0036	0.0371	Conventional Banks	5 CB
27	Libya	0.0061	0.0128	Conventional Banks	5 CB
28	Tunisia	0.0149	0.0324	Islamic, Conventional and Socially Responsible Banks	1 IB, 8 CB and 2 SRB
29	Lebanon	0.0078	0.0185	Conventional Banks	28 CB
30	Yemen	0.0272	0.0281	Islamic and Conventional Banks	4 IB and 1 CB
31	Jordan	0.0249	0.0254	Islamic and Conventional Banks	1 IB and 7 CB
32	Bahrain	0.0008	0.0071	Islamic and Conventional Banks	9 IB and 15 CB
33	Bolivia	0.0185	0.2138	Socially Responsible Banks	2 SRB
34	Nepal	0.0054	0.0182	Socially Responsible Banks	1 SRB
35	Mongolia	0.0164	0.0554	Socially Responsible Banks	1 SRB
36	Malta	0.0099	0.0172	Conventional and Socially Responsible Banks	4 CB and 1 SRB
37	Palestine	0.0314	0.0358	Islamic and Conventional Banks	1 IB and 2 CB
	All Banks	0.0172	0.0228	Islamic, Conventional and Socially Responsible Banks	323 banks (43 IB, 242 CB and 38 SRB)

of scale than smaller banks, which it may have a higher degree of production differentiation and loan diversification. Many studies proposed that size of banks influence the profitability significantly and positively (e.g., Houston *et al.*, 2010; Chronopoulos *et al.*, 2015; Guillén *et al.*, 2014; Bertay *et al.*, 2013; Lee & Kim, 2013; Mirzaei *et al.*, 2013; Shehzad *et al.*, 2013; Haan & Poghosyan, 2012;

Table 6.3: Averages NIM ratios by country

N	Country	Mean NIM	Banks in the sample	Number of Banks
1	USA	2.8280	Socially Responsible Banks	1 SRB
2	Germany	2.2417	Socially Responsible Banks	3 SRB
3	France	1.9759	Socially Responsible Banks	1 SRB
4	UK	1.9921	Islamic, Conventional and Socially Responsible Banks	2 IB, 72 CB and 5 SRB
5	Canada	1.8757	Socially Responsible Banks	1 SRB
6	Australia	1.9216	Socially Responsible Banks	1 SRB
7	Spain	1.6662	Socially Responsible Banks	1 SRB
8	Netherlands	2.2603	Socially Responsible Banks	1 SRB
9	Saudi Arabia	3.4284	Islamic and Conventional Banks	2 IB and 9 CB
10	Switzerland	1.9008	Socially Responsible Banks	1 SRB
11	Norway	4.8715	Socially Responsible Banks	1 SRB
12	Austria	1.1888	Socially Responsible Banks	1 SRB
13	UAE	3.5089	Islamic and Conventional Banks	5 IB and 15 CB
14	Iran	3.2033	Islamic and Socially Responsible Banks	6 IB and 1 SRB
15	Denmark	3.5330	Socially Responsible Banks	5 SRB
16	Israel	2.5350	Conventional Banks	8 CB
17	Egypt	2.7620	Islamic and Conventional Banks	2 IB and 20 CB
18	Iraq	8.4910	Conventional Banks	2 CB
19	Algeria	5.2607	Islamic, Conventional and Socially Responsible Banks	1 IB, 9 CB and 3 SRB
20	Qatar	3.4685	Islamic and Conventional Banks	3 IB and 6 CB
21	New Zealand	3.2330	Socially Responsible Banks	1 SRB
22	Kuwait	3.2217	Islamic and Conventional Banks	1 IB and 6 CB
23	Bangladesh	6.2255	Socially Responsible Banks	1 SRB
24	Morocco	3.4299	Conventional Banks	8 CB
25	Oman	3.6370	Conventional Banks	7 CB
26	Syria	2.7824	Conventional Banks	5 CB
27	Libya	2.8006	Conventional Banks	5 CB
28	Tunisia	2.6017	Islamic, Conventional and Socially Responsible Banks	1 IB, 8 CB and 2 SRB
29	Lebanon	2.6689	Conventional Banks	24 CB
30	Yemen	3.1277	Islamic and Conventional Banks	4 IB and 1 CB
31	Jordan	3.4272	Islamic and Conventional Banks	1 IB and 7 CB
32	Bahrain	3.0096	Islamic and Conventional Banks	8 IB and 14 CB
33	Bolivia	12.660	Socially Responsible Banks	2 SRB
34	Nepal	3.8867	Socially Responsible Banks	1 SRB
35	Mongolia	9.9633	Socially Responsible Banks	1 SRB
36	Malta	2.2656	Conventional and Socially Responsible Banks	4 CB and 1 SRB
37	Palestine	4.4618	Islamic and Conventional Banks	1 IB and 2 CB
	All Banks	3.6301	Islamic, Conventional and Socially Responsible Banks	301 banks (37 IB, 229 CB and 35 SRB)

Flamini *et al.*, 2009). On the other side, some studies suggested the opposite finding which is smaller sized banks were more profitable (see Căpraru & Ihnatov, 2014; Haan & Poghosyan, 2012; Barry *et al.*, 2011; Lin & Zhang, 2009; Altunbas & Marques, 2008). The empirical findings confirm that capital ratio impacts the ROA and ROE negatively at a 0.1% and 1% levels, respectively, which means lowering capitalisation leads to an increase in profitability. These results are linked to the arguments of a few articles (Chronopoulos *et al.*, 2015; Mollah & Zaman, 2015;

Table 6.4: Results of profitability determinants for Islamic banks (UK and MENA), MT

Islamic Banks	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Profitability	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables						
LTA	-0.00182	0.0617**	0.0273***	0.0700**	0.890**	2.798*
	(-0.27)	(3.03)	(3.95)	(3.12)	(2.64)	(2.43)
EQTA	-0.141***	-0.460***	-0.0318	-0.198**	8.611*	-15.42
	(-4.04)	(-6.91)	(-0.90)	(-2.70)	(2.58)	(-1.61)
LOANSTA	-0.0891*	0.0590	-0.00433	-0.111	-3.162	-3.506
	(-2.15)	(1.01)	(-0.10)	(-1.72)	(-1.33)	(-1.06)
LOANSDEPO	-0.000061	-0.00026	0.000290	0.0000434	0.00442	-0.0382*
	(-0.17)	(-0.90)	(0.82)	(0.13)	(0.28)	(-2.54)
DEPOSITSTA	-0.0638*	0.0232	0.00189	0.178**	-1.262	0.794
	(-2.12)	(0.44)	(0.06)	(3.04)	(-0.51)	(0.20)
LAGE	-0.00900		0.0248		-0.0106	
	(-0.49)		(1.34)		(-0.01)	
LOGZ	0.0266**	0.328***	0.0496***	0.196***	0.383	6.698***
	(2.92)	(14.13)	(5.39)	(7.65)	(0.73)	(3.98)
FORE		-0.00990		0.114		
		(-0.13)		(1.41)		
DOM	-0.0159	-0.00433	-0.00786	0.0853	0.216	2.185
	(-0.78)	(-0.06)	(-0.38)	(1.14)	(0.21)	(0.97)
GOV	-0.0109		-0.0410		-1.772	3.354
	(-0.38)		(-1.42)		(-1.27)	(0.76)
Macroeconomic variables						
LGDP	0.0147*	-0.0884*	-0.0147*	-0.145***	-0.492	-10.61***
	(2.10)	(-2.37)	(-2.08)	(-3.54)	(-1.39)	(-5.36)
INFLATION	-0.239**	-0.0480	-0.487***	-0.371***	-7.001	3.587
	(-2.69)	(-0.61)	(-5.40)	(-4.25)	(-1.63)	(0.81)
MCAP	0.0275	-0.0211	0.0160	0.0146	-2.735**	-7.613***
	(1.48)	(-0.74)	(0.85)	(0.46)	(-2.95)	(-5.06)
GFC	-0.00442	-0.00517	0.0111	0.00735	0.200	-0.0886
	(-0.27)	(-0.41)	(0.67)	(0.53)	(0.25)	(-0.13)
Sigma	-0.252	1.043	0.0744	2.651**	11.25	240.2***
_cons	(-1.40)	(1.15)	(0.41)	(2.66)	(1.30)	(5.16)
R²	0.1745	0.5340	0.3565	0.3729	0.1240	0.2489
Number of banks	43	43	43	43	37	37
N	312	312	312	312	255	255

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

Shehzad *et al.*, 2013; Ćurak *et al.*, 2012; Dietrich & Wanzenried, 2011; Altunbas & Marques, 2008) but the majority goes to confirm that higher capital strengthen financial performance (see Ghosh, 2015; Mamatzakis *et al.*, 2015; Apergis, 2014; Mirzaei *et al.*, 2013; Chitan, 2012; Kutun *et al.*, 2012; Manlagnit 2011; Sufian & Habibullah, 2010; Flamini *et al.*, 2009; García-Herrero *et al.*, 2009 Altunbas & Marques, 2008; Athanasoglou *et al.*, 2008; Demircuc-Kunt & Huizinga, 1999). The loan intensity has a negative sign and is statistically significant at a 5% level with ROA referring to the OLS model. This proves that providing more loans that are generated from total assets could raise the risk of lowering ROA. This strongly linked to Chronopoulos *et al.* (2015) finding on US commercial banking system. The result is in contrast with Olson and Zoubi (2011) who claimed that providing loans maximises the profits of the MENA banking sector. The deposit ratio raises the ROE referring to FEM, which explains that operating more deposits to buy more assets improves the financial performance in banks. García-Herrero *et al.* (2009) employed the deposit ratio as an explanatory variable and he found the same positive relationship between deposit ratio and profitability ratio (ROA) in the Chinese banking sector. In contrast, deposit ratio impacted the ROA significantly and negatively in this study which is in line with Barry *et al.* (2011) finding. Additionally, the z-score was found to be highly correlated with profitability ratios at a 0.1% level. This demonstrates that profits increase the stability and reduce the risk of bankruptcy (similar to Mamatzakis *et al.*, 2015; Mollah & Zaman, 2015). The ownership did not affect the financial performance as in Table 6.4. Concerning macroeconomic factors, gross domestic production development reduces ROA in terms of FEM coefficient and ROE. This finding is consistent with the outcome of few studies (see; Bertay *et al.*, 2013; Shehzad *et al.*, 2013; Delis *et al.*, 2012; Sufian & Habibullah, 2010; Boubakri *et al.*, 2005). On the other side, following OLS result, GDP influences the ROA positively and significantly at the level of 5% which confirmed by the most recent studies (for example, Chronopoulos *et al.*, 2015; Guillén *et al.*, 2014; Rumler & Waschiczek, 2014; Bertay *et al.*, 2013; Dedu & Chitan, 2013; Lee & Kim, 2013; Mirzaei *et al.*, 2013; Chitan, 2012; Kutun *et al.*, 2012; Dietrich & Wanzenried, 2011; Houston *et al.*, 2010; Flamini *et al.*, 2009; Pasiouras & Kosmidou, 2007; Boubakri *et al.*, 2005). Moreover, inflation negatively and significantly affects profitability ratios (ROA or ROE) over the period, as Shehzad's *et al.* (2013) results suggest. On the other hand, Rumler and

Waschiczek (2014) claim that greater inflation rates led to higher profitability in the Austrian banking sector. Market capitalisation was found to be unimportant for Islamic banks as there is no relationship between profitability and stock market growth. Demircuc-Kunt and Huizinga (1999) could not find any impact on financial performance from market capitalisation. Also, there is no proven affect by the global financial crisis on profitability in Islamic banks. Apergis's (2014) results suggest that the financial global crisis influenced ROA positively. In general, the R squared measures for the ROA ratio are 17.45% and 53.40% for the OLS and fixed effects models, respectively. Additionally, the R squared of ROE ratios are 35.65% and 37.29% for the OLS and FE models. The R squared measures are representing high consistency between explanatory variables.

6.2.1.2 Determinants of NIM in Islamic banks (UK and MENA), MT

Based on the NIM in Table 6.4, due to the prohibition in dealing with interests in Islamic banking systems, the ratio of NIM can be calculated as financial investment (such as trade in stock market) over total earning assets. According to NIM determinants, as expected, larger sized banks attained more effective investment than smaller sized banks. Liang *et al.* (2013) and Sufian and Habibullah (2009) agreed that banks needed to have huge amount of assets to build interest earnings. Many studies confirmed the opposite relationship such as Căpraru and Ihnatov (2014), Hussain (2014), Tan and Floros (2012), Havrylchyk and Jurzyk (2011), Heffernan and Fu (2010) and Lanine and Vennet (2007) who encouraged banks to lower their assets to improve the NIM. Based on the OLS results, the association between the capitalisation and NIM is significant and positive at level of 5% as predicted. Higher capital allows banks to invest more in stock market. This finding is consistent with several studies (e.g., Căpraru & Ihnatov, 2014; Dietrich & Wanzenried, 2014; Ewijk & Arnold, 2014; Dietrich & Wanzenried, 2011; Heffernan & Fu, 2010; Claeys & Vennet, 2008; Lanine & Vennet, 2007). Few studies explained the negative correlation between NIM and capital ratio (Zhou & Wong, 2008). Regarding to the credit risk, the NIM reduces the credit risk which is a good sign for Islamic banks. This motivates banks to take more deposits and provide more loans. This goes against Liang *et al.* (2013) who argued that higher loans increased the credit risk. However, z-score improved the NIM which means that having more earning assets kept the Islamic banks stable

with less bankruptcy risk. Referring to the macroeconomic factors, against the expectations, the GDP (similar to Claey's & Vennet, 2008) and stock market growth have significant and negative signs with NIM. According to bank-specific variables, the age of banks and ownership are insignificant variables. Considering the industry-specific variables, the inflation and global financial crisis did not affect the NIM. The recorded R^2 are 12.40% and 24.89% for the OLS and FEM. Figure 6.9 below concludes the significant relationship between profitability and its determinants in Islamic banking system.

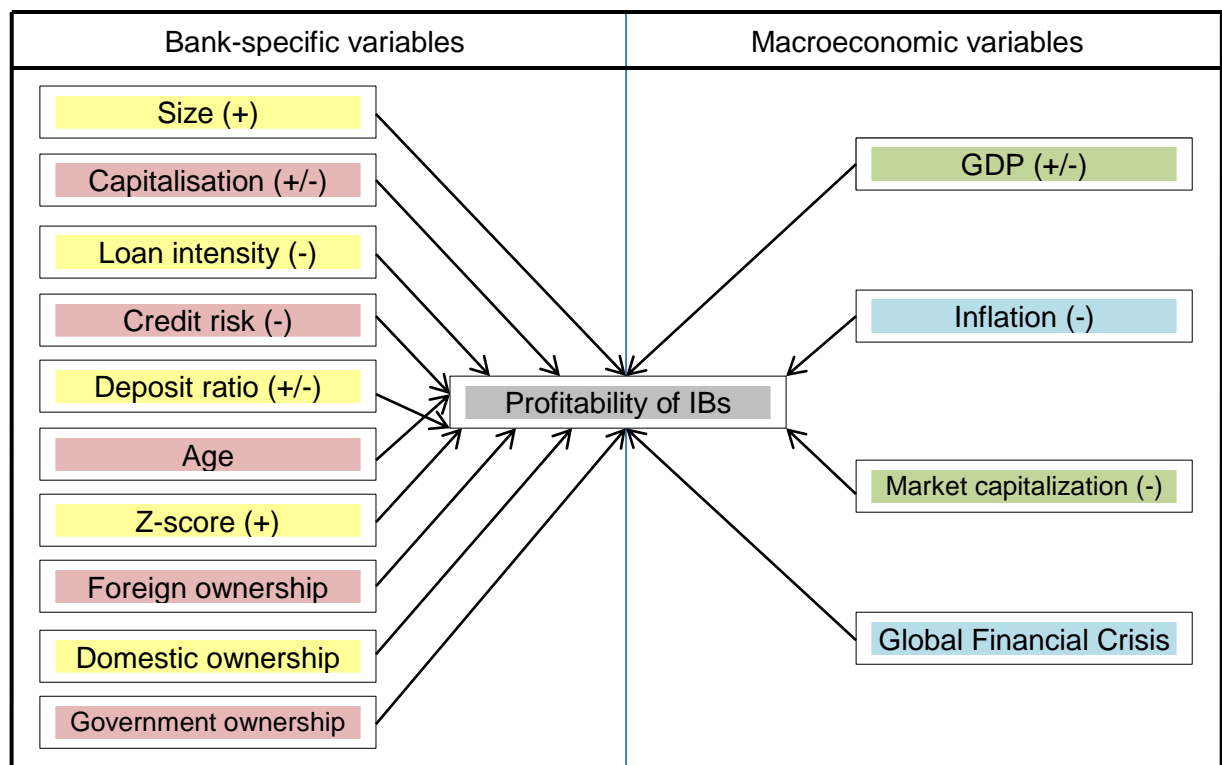


Figure 6.9: Significant variables that affect profitability for Islamic banks, MT

6.2.1.3 Determinants of profitability in Islamic banks (UK and MENA), MT

The relationships between profitability ratios and their determinants in Table 6.4 and Table 6.5 are consistent. Regarding the listing factor, the Islamic listed banks are more profitable than unlisted banks. This could be because listed banks could attract more investors and clients than unlisted banks. In addition, listed banks have more financial facilities from shareholders than unlisted banks. This result is in line with Saghi-Zedek and Tarazi's (2015) Lin and Zhang's (2009) outcome. Based on corruption control, higher public supervision allowed having better NIM but less ROE. Sufian and Habibullah (2010) and Demircuc-Kunt and Huizinga

Table 6.5: Results of profitability determinants for Islamic banks (UK and MENA), AT

Islamic Banks	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Profitability	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables						
LTA	-0.00310	0.0663**	0.0257***	0.0700**	0.818*	3.482**
	(-0.44)	(3.07)	(3.48)	(2.94)	(2.17)	(2.92)
EQTA	-0.144***	-0.457***	-0.00165	-0.197**	8.192*	-13.27
	(-4.33)	(-6.85)	(-0.05)	(-2.68)	(2.43)	(-1.38)
LOANSTA	-0.0885*	0.0590	0.0451	-0.111	-3.585	-3.405
	(-2.20)	(1.01)	(1.08)	(-1.72)	(-1.48)	(-1.03)
LOANSDEPO	-0.0000690	-0.000273	0.000245	0.0000433	0.00358	-0.0400**
	(-0.20)	(-0.93)	(0.69)	(0.13)	(0.22)	(-2.67)
DEPOSITSTA	-0.0633*	0.0259	-0.0404	0.177**	-1.073	2.175
	(-2.13)	(0.49)	(-1.30)	(3.02)	(-0.42)	(0.55)
LAGE	-0.0268		0.0215		0.147	
	(-1.48)		(1.14)		(0.15)	
LOGZ	0.0560***	0.329***	0.0378***	0.195***	0.556	6.642***
	(5.62)	(14.16)	(3.64)	(7.62)	(1.01)	(3.97)
FORE		-0.00881		0.114		
		(-0.12)		(1.41)		
DOM	-0.0201	-0.00198	-0.0210	0.0853	0.264	2.142
	(-0.99)	(-0.03)	(-0.99)	(1.13)	(0.26)	(0.96)
GOV	-0.0108		-0.0446		-1.691	3.695
	(-0.39)		(-1.55)		(-1.21)	(0.84)
LISTED*	0.00518		0.0672***		0.161	
	(0.27)		(3.41)		(0.16)	
Macroeconomic variables						
LGDP	0.0112	-0.0933*	-0.0188**	-0.145***	-0.602	-11.29***
	(1.68)	(-2.45)	(-2.68)	(-3.46)	(-1.61)	(-5.67)
INFLATION	-0.195*	-0.0385	-0.511***	-0.371***	-5.462	5.348
	(-2.15)	(-0.48)	(-5.41)	(-4.17)	(-1.20)	(1.19)
MCAP	0.0265	-0.0217	0.0242	0.0146	-3.117**	-7.607***
	(1.35)	(-0.76)	(1.18)	(0.46)	(-3.14)	(-5.10)
GFC	-0.00491	-0.00666	0.0113	0.00730	0.167	-0.293
	(-0.31)	(-0.52)	(0.69)	(0.52)	(0.21)	(-0.42)
CCONTROL*	0.000340	0.000716	-0.00121*	0.00000440	0.0237	0.128*
	(0.74)	(0.64)	(-2.52)	(0.00)	(1.04)	(2.03)
Sigma	-0.202	1.059	0.265	2.635**	12.49	243.7***
_cons	(-1.19)	(1.17)	(1.49)	(2.63)	(1.43)	(5.27)
R²	0.2325	0.5356	0.3654	0.3420	0.1283	0.2636
Number of banks	43	43	43	43	37	37
N	312	312	312	312	255	255

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LISTED: dummy equal 1 if listed bank and 0 if unlisted bank, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise, CCONTROL: control of corruption.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

* Additional variable

(1999) unanimously that corruption freedom increased the profits in banking. Depending on R^2 measures, after employing the additional variables (listing and corruption control), it is observable that a little increment in R^2 rates proved due to higher consistency between the profitability ratios and the additional factors.

6.2.2 Determinants of profitability in conventional banks (UK and MENA)

6.2.2.1 Determinants of ROA and ROA in conventional banks (UK and MENA), MT

Table 6.6 explains the determinants (bank characteristics and macroeconomic indicators) of profitability (ROA and ROA) in conventional banks over the period 2005-2012. According to bank size (LTA), the analysis of the OLS model proposes that larger size banks achieved better profitability than smaller banks. This complies with petria's *et al.* (2015) study which confirmed that more total assets led to achieving more profitability. On the other side, Căpraru and Ihnatov (2014) found completely opposite aspect as smaller banks were more profitable than larger banks in Tunisia. Unlike Islamic banks, capital ratio reveals a positive and significant relationship with ROA at a 0.1% level, which is in line with Mamatzakis's *et al.* (2015) study on Japanese commercial banks. However, the loans raise the ROA ratio referring to loan intensity coefficients which are highly and positively correlated with ROA at a 0.1% level. Apergis (2014) estimated the same results in the US banking sector. According to credit risk ratio, achieving more returns decrease the risk of credit which means that the growth in lending leads to score better ROA ratio. Referring to the literature review, Chitan (2012) and Altunbas and Marques (2008) found the same finding in their studies. Focusing on deposit ratio's coefficient, accepting additional deposits enlarges the ROA as deposit ratio is highly correlated with ROA at a 0.1 level. According to z-score, all profitability ratios are highly and positively correlated at the level of 0.1%. In other words, profitability increases the banks' stability and reduces the risk of insolvency (Mamatzakis *et al.*, 2015; Mollah & Zaman, 2015). However, there was no association between the age of banks and ownership with financial performance in conventional banks over the period 2005-2012. According to macroeconomic indicators, the growth in GDP tends to decrease ROA which is supported by Pasiouras and Kosmidou (2007) investigations. The stock market development

Table 6.6: Results of profitability determinants for conventional banks (UK and MENA), MT

Conventional Banks	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Profitability	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables						
LTA	0.00219*** (6.36)	0.0202*** (10.60)	0.00606 (1.52)	0.0702** (2.95)	-0.335*** (-15.13)	-0.526*** (-8.08)
	0.0833*** (20.09)	0.0941*** (15.12)	-0.0251 (-0.52)	-0.0725 (-0.93)	-0.332 (-1.24)	-0.0234 (-0.09)
LOANSTA	0.0108*** (4.12)	0.0178*** (3.83)	0.0441 (1.46)	0.0868 (1.49)	3.107*** (16.78)	0.705* (2.49)
	-0.00011* (-2.38)	-0.000011 (-0.23)	-0.000428 (-0.74)	-0.000069 (-0.11)	-0.000147 (-0.05)	0.0000830 (0.04)
DEPOSITSTA	0.0183*** (9.83)	0.0209*** (5.47)	-0.00638 (-0.30)	-0.0706 (-1.48)	-1.559*** (-12.35)	-0.657*** (-3.34)
	0.000697 (0.74)		0.00572 (0.52)		-0.00126 (-0.02)	
LOGZ	0.00477*** (8.25)	0.0142*** (7.18)	0.0716*** (10.73)	0.0986*** (3.98)	0.182*** (4.88)	0.276*** (3.50)
	-0.00698 (-0.74)		-0.135 (-1.24)		-0.845 (-1.43)	0.418 (1.55)
DOM	-0.00681 (-0.73)	-0.00293 (-0.63)	-0.111 (-1.03)	0.00247 (0.04)	-0.701 (-1.20)	0.201 (0.88)
	-0.00485 (-0.52)	-0.00963 (-1.42)	-0.0904 (-0.85)	-0.135 (-1.60)	-0.412 (-0.71)	
Macroeconomic variables						
LGDP	-0.0013*** (-3.65)	-0.018*** (-5.27)	-0.00781 (-1.84)	-0.0406 (-0.95)	-0.0700*** (-3.89)	0.0100 (0.60)
	0.00601 (0.64)	0.00625 (0.65)	0.0734 (0.68)	0.00290 (0.02)	0.0702 (0.12)	-0.911* (-2.35)
MCAP	-0.000025 (-0.06)	0.00847*** (3.38)	0.0000482 (0.01)	0.0802* (2.56)	-0.0908*** (-3.48)	-0.386*** (-4.35)
	-0.00228 (-1.84)	-0.00156 (-1.40)	-0.0230 (-1.61)	-0.0196 (-1.41)	0.152 (1.90)	0.157*** (3.44)
Sigma	-0.0129 (-0.90)	0.231** (2.84)	0.103 (0.62)	0.243 (0.24)	7.496*** (9.24)	6.298*** (8.23)
_cons						
R ²	0.4594	0.4474	0.0791	0.0757	0.2495	0.1006
Number of banks	242	242	242	242	229	229
N	1827	1827	1827	1827	1700	1700

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

improved the performance over the period. Demirguc-Kunt and Huizinga (1999) examined the market capitalisation to GDP and they could not find any impact on profitability in their study. The results conclude that the inflation and global financial crisis had no impact on conventional banks during the period 2005-2012. In general, the consistency between the explanatory variables in terms of ROA ($R^2 = 45.94\%$ and 44.77% for OLS and FEM, respectively) is more than the consistency in ROE (7.91% and 7.57%).

6.2.2.2 Determinants of NIM in conventional banks (UK and MENA), MT

After covering the ROA's and ROE's determinants, we can analyse the determinants of NIM. The smaller banks achieved more net interest income than larger banks. This result is differentiated with the expected sign between NIM and banks' sizes. However, loan intensity found to be improving the NIM. In this case, banks achieved their incomes through lending interests which motivated conventional banks to supply more loans. Hence, covering the interest costs could be easier for banks. This outcome is in line with Sufian and Habibullah (2009), Claey's and Vennet (2008) and Lanine and Vennet (2007). On the other side, accepting more deposits decreased the NIM significantly, this could be due to an increment in deposit interests which led to attain loss. Lanine and Vennet (2007) proposed the same correlation between deposit ratio and NIM. As the Islamic banks, the relationship between NIM and z-score found to be significant and positive. Regarding to the macroeconomic factors, banks in countries with higher GDP, inflation and stock market capitalisation were paying more interest expenses. Finally, during the global financial crisis, the conventional banks scored outstanding net interest margins; this could be due to imposing large rates of lending interests. The R-squared for OLS is 24.95% while, the R-squared for FEM is 10.06% . Figure 6.10 below illustrates the significant determinants of profitability of conventional banks.

6.2.2.3 Determinants of profitability in conventional banks (UK and MENA), AT

Adding the listing and corruption control factors reveal significant and inverse associations between the NIM in conventional banks, and international and local ownerships, as in Table 6.7. Based on the additional variables, the listed banks were found to be more profitable (ROA and ROE) than the unlisted banks. This

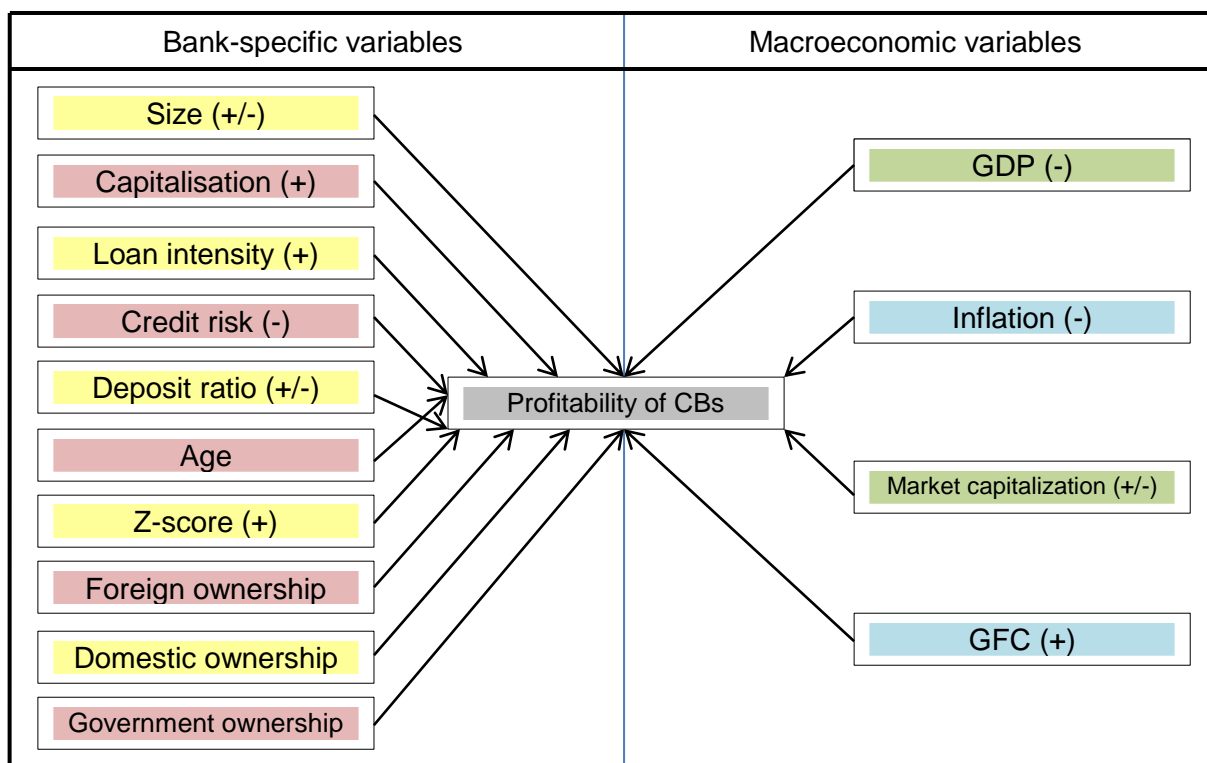


Figure 6.10: Significant variables that affect profitability for conventional banks

finding is similar to the Islamic banks' result. Moreover, conventional banks in countries with weaker supervision were found to be more profitable, which refers completely to unethical matters. In this case, government involvement should be increased in order to enhance the banking activities in the short and long term. However, the consistency of the independent variables (R^2) is greatly improved after utilising the additional variables (listing and corruption control).

6.2.3 Determinants of profitability in SRBs (across the world)

6.2.3.1 Determinants of ROA and ROE in SRBs (across the world), MT

Table 6.8 shows the OLS and fixed effects results for the ROA and ROE of socially responsible banks over the period 2005-2012. The relationship between the capitalisation and profitability (ROE) in socially responsible banks matches with Islamic OLS coefficient. According to FEM, z-score has a positive and significant relationship with ROA at a level of 0.1%, which explains that higher ROA raised the financial settlement of socially responsible banks through the whole period. According to ownership, foreign banks were found to be the most profitable (ROA) banks, having more capital tends to reduce the ROE referring to the banks with the maximum coefficients compared to domestic banks and

Table 6.7: Results of profitability determinants for conventional banks (UK and MENA), AT

CBs	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Profitability	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables						
LTA	0.00204*** (5.78)	0.0203*** (10.60)	0.00453 (1.11)	0.0707** (2.96)	-0.304*** (-14.03)	-0.534*** (-8.16)
EQTA	0.0855*** (20.39)	0.0941*** (15.12)	-0.0120 (-0.25)	-0.0725 (-0.93)	0.105 (0.40)	-0.0231 (-0.09)
LOANSTA	0.0101*** (3.62)	0.0178*** (3.82)	0.0335 (1.03)	0.0868 (1.49)	3.610*** (18.84)	0.703* (2.48)
LOANSDEPO	-0.000114* (-2.29)	-0.0000113 (-0.23)	-0.000385 (-0.67)	-0.0000716 (-0.12)	-0.000374 (-0.12)	0.000107 (0.06)
DEPOSITSTA	0.0175*** (8.87)	0.0209*** (5.47)	-0.00874 (-0.38)	-0.0706 (-1.48)	-1.996*** (-15.48)	-0.657*** (-3.34)
LAGE	0.000507 (0.54)		0.00456 (0.42)		-0.0397 (-0.68)	
LOGZ	0.00463*** (8.03)	0.0143*** (7.19)	0.0708*** (10.59)	0.0988*** (3.99)	0.137*** (3.81)	0.273*** (3.45)
FORE	-0.0124 (-1.31)	0.00951 (1.40)	-0.175 (-1.60)	0.134 (1.59)	-1.334* (-2.33)	0 (.)
DOM	-0.0119 (-1.27)	0.00664 (1.14)	-0.149 (-1.37)	0.137 (1.89)	-1.110* (-1.97)	-0.223 (-1.17)
GOV	-0.0104 (-1.12)		-0.131 (-1.22)		-0.926 (-1.66)	-0.429 (-1.59)
LISTED*	0.00493*** (3.42)		0.0413* (2.47)		-0.0823 (-0.96)	
Macroeconomic variables						
LGDP	0.0000255 (0.05)	-0.0180*** (-5.25)	0.00163 (0.28)	-0.0402 (-0.94)	0.0450* (2.21)	0.0105 (0.63)
INFLATION	-0.000396 (-0.04)	0.00688 (0.71)	0.0327 (0.30)	0.00658 (0.05)	-1.831** (-3.13)	-0.968* (-2.48)
MCAP	0.000316 (0.72)	0.00850*** (3.38)	0.00222 (0.44)	0.0803* (2.56)	0.00309 (0.12)	-0.386*** (-4.34)
GFC	-0.00215 (-1.74)	-0.00158 (-1.42)	-0.0221 (-1.55)	-0.0197 (-1.41)	0.191* (2.48)	0.159*** (3.49)
CCONTROL*	-0.000098** (-2.97)	0.0000738 (0.50)	-0.000596 (-1.56)	0.000434 (0.23)	-0.0218*** (-11.78)	-0.00687 (-1.14)
Sigma	-0.0362* (-2.35)	0.215** (2.59)	-0.0593 (-0.33)	0.0674 (0.07)	6.463*** (8.21)	7.224*** (8.28)
R²	0.4649	0.4475	0.0830	0.0791	0.3068	0.1129
Number of banks	242	242	242	242	229	229
N	1827	1827	1827	1827	1700	1700

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LISTED: dummy equal 1 if listed bank and 0 if unlisted bank, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise, CCONTROL: control of corruption.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

* Additional variable

Table 6.8: Results of profitability determinants for SRBs (across the world), MT

SRBs	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Profitability	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables						
LTA	0.000375	-0.00188	0.0196	-0.00976	-0.296***	-0.899**
	(1.04)	(-0.98)	(0.80)	(-0.07)	(-3.96)	(-3.03)
EQTA	-0.00474	-0.0316	-0.668*	-2.076	1.406**	0.103
	(-1.04)	(-1.61)	(-2.15)	(-1.39)	(3.07)	(0.18)
LOANSTA	-0.00953	0.00145	-0.494	0.172	-0.0287	-0.0200
	(-1.91)	(0.18)	(-1.45)	(0.28)	(-1.72)	(-1.37)
LOANSDEPO	0.00601	-0.00771	0.291	-0.0273	1.408**	1.064
	(1.45)	(-1.39)	(1.04)	(-0.06)	(3.19)	(1.79)
DEPOSITSTA	-0.00444	-0.0109	0.114	0.138	-1.392**	-0.107
	(-0.94)	(-1.88)	(0.36)	(0.31)	(-3.04)	(-0.19)
LAGE	-0.00039		-0.0229		0.0138	
	(-0.40)		(-0.34)		(0.08)	
LOGZ	0.000697	0.0139***	0.0558	0.218	-0.291*	-0.710
	(0.96)	(3.77)	(1.13)	(0.78)	(-2.29)	(-1.71)
FORE	-0.00554		-0.420*		-1.657**	
	(-1.87)		(-2.08)		(-3.15)	
DOM	-0.00817*		-0.484		-1.639*	
	(-2.08)		(-1.81)		(-2.42)	
GOV	-0.012***		-0.555**		-3.568***	
	(-4.43)		(-2.84)		(-6.32)	
Macroeconomic variables						
LGDP	-0.00126*	0.00703	-0.0285	0.621	-0.417***	1.055
	(-2.14)	(1.44)	(-0.71)	(1.68)	(-4.13)	(1.42)
INFLATION	0.000402	-0.0262	0.00932	-0.996	0.0199	-3.274
	(1.45)	(-1.52)	(0.50)	(-0.76)	(0.43)	(-1.38)
MCAP	0.00189	0.00850**	0.0481	0.552*	-0.905***	0.0827
	(1.38)	(2.76)	(0.52)	(2.36)	(-3.83)	(0.18)
GFC	-0.00142	-0.00096	0.0729	0.103	-0.00802	0.183
	(-1.18)	(-0.85)	(0.89)	(1.20)	(-0.04)	(1.11)
Sigma	0.0471*	-0.169	1.052	-15.87	19.79***	-10.89
_cons	(2.51)	(-1.48)	(0.82)	(-1.84)	(6.98)	(-0.64)
R²	0.1840	0.1600	0.0819	0.0501	0.7266	0.0859
Number of banks	38	38	38	38	35	35
N	284	284	284	284	260	260

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

followed by state-owned (government) banks which had the lowest coefficients. The concentrations of all types of ownership are reducing the profitability (negative relationship) which discourages socially responsible banks from opening more banks due to the risk of incurring more losses. Olson and Zoubi (2011) compared the financial performance of foreign and government banks in the MENA region during the period 2000-2008. Based on Olson and Zoubi's (2011) results, foreign banks scored more profits than government banks. Additionally, the existence of foreign banks had a positive impact on profitability, whereas the concentration of government banks decreased profitability. Focusing on the macroeconomic variables, GDP growth decreased the ROA over the period. According to market capitalisation, the relationship between ROA and market capitalisation is positive and significant at the level of 1% in terms of the FEM estimation. In addition, the market capitalisation growth strengthens ROE at a 5% level following FEM approach. The Inflation and the financial crisis had no significant influence on profitability in socially responsible banks. Overall, R squared was equal to 18.40% and 16% for ROA referring to the OLS and FEM, respectively. In addition, R squared for ROE was 8.19% and 5.01% for OLS and FEM, respectively.

6.2.3.2 Determinants of NIM in SRBs (across the world), MT

Focusing on NIM results in Table 6.8, as the conventional banks, smaller banks found to be more profitable than larger banks. However, as anticipated, the relationship between NIM and capital ratio is significant and positive. Comprehensive studies support this relationship like Căpraru and Ihnatov (2014), Dietrich and Wanzenried (2014), Ewijk and Arnold (2014), Dietrich and Wanzenried (2011), Heffernan and Fu (2010), Sufian and Habibullah (2009), Claey's and Vennet (2008) and Lanine and Vennet (2007). The results encourage the SRBs to reduce the lending activities due to the correlation between the NIM and the credit risk (positive sign). In addition, lowering the deposits is preferable as deposit ratio influence the NIM significantly and negatively. However, investing in interests is highly risky based on the negative coefficient of z-score which is against the expectations. Moreover, we can find that the foreign, domestic and public ownership decreased the NIM significantly. Similar to Islamic banks, GDP and market capitalisation affected the NIM significantly and negatively. The R^2 measures are 0.7266 and 0.0859 for OLS and FEM, respectively. Finally, Figure

6.11 summarises the relationship between profitability and its factors for the socially responsible banks.

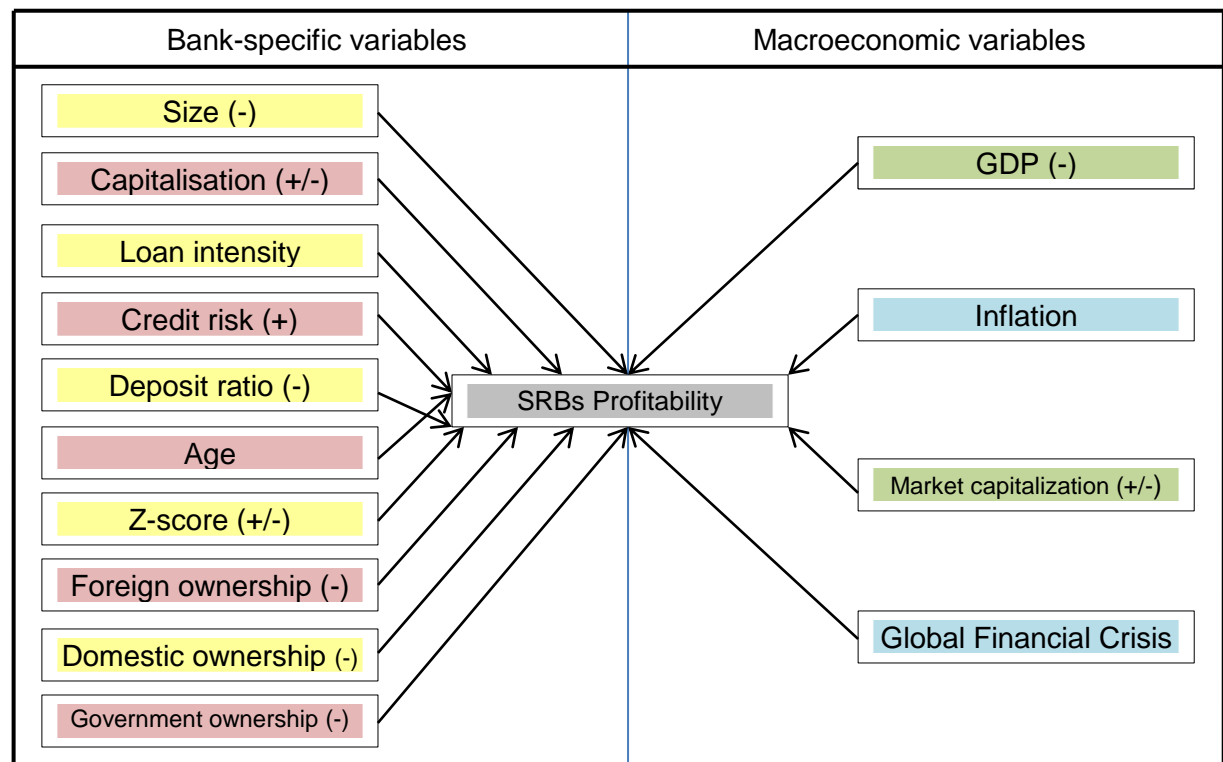


Figure 6.11: Significant variables that affect profitability for SRBs

6.2.3.3 Determinants of profitability in SRBs (across the world), AT

The main difference between Table 6.8 (main test) and Table 6.9 (additional test) is that in the additional test, the socially responsible banks are able to enhance their profitability through reduction of lending services due to an inverse and significant correlation between ROA and loan intensity. Over the period of the global financial crisis, SRBs had better indicators of NIM. According to the additional variables (listing and corruption control), unlisted banks achieved more interest income compared to listed banks. Finally, higher control of corruption by the government led to greater values of NIM. Based on the R^2 measures, there is evidence of higher consistency after adding listing and corruption control factors to the main test.

6.3 Profitability of MENA countries (including GCC)

6.3.1 Profitability measures description for MENA countries (including GCC)

Table 6.10 illustrates that conventional banks were more profitable than Islamic banks in terms of ROA (1.48%) and ROE (9.56%) ratios, which can be explained

Table 6.9: Results of profitability determinants for SRBs (across the world), AT

SRBs	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Profitability	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables						
LTA	0.000311	-0.00193	0.0191	-0.0171	-0.285***	-0.743**
	(0.85)	(-0.99)	(0.77)	(-0.12)	(-3.77)	(-2.97)
EQTA	-0.00528	-0.0323	-0.626	-2.198	1.154*	0.159
	(-1.08)	(-1.63)	(-1.87)	(-1.47)	(2.32)	(0.33)
LOANSTA	-0.0103*	0.00133	-0.505	0.151	-0.0239	-0.0147
	(-2.06)	(0.16)	(-1.47)	(0.24)	(-1.43)	(-1.20)
LOANSDEPO	0.00584	-0.00767	0.279	-0.0203	1.596***	0.663
	(1.41)	(-1.38)	(0.99)	(-0.05)	(3.50)	(1.32)
DEPOSITSTA	-0.00476	-0.0108	0.0950	0.157	-1.140*	-0.189
	(-1.00)	(-1.86)	(0.29)	(0.36)	(-2.29)	(-0.39)
LAGE	-0.000268		-0.0239		0.00312	
	(-0.27)		(-0.35)		(0.02)	
LOGZ	0.000873	0.0139***	0.0543	0.224	-0.315*	-0.380
	(1.17)	(3.77)	(1.07)	(0.80)	(-2.47)	(-1.08)
FORE	-0.00333		-0.416		-1.967**	
	(-0.99)		(-1.81)		(-3.12)	
DOM	-0.00553		-0.471		-2.051**	
	(-1.28)		(-1.60)		(-2.65)	
GOV	-0.0111***		-0.562**		-3.725***	
	(-3.53)		(-2.61)		(-5.67)	
LISTED*	0.00265		0.0448		-0.628*	
	(1.45)		(0.36)		(-2.04)	
Macroeconomic variables						
LGDP	-0.000935	0.00707	-0.0294	0.627	-0.454***	0.576
	(-1.45)	(1.45)	(-0.67)	(1.69)	(-3.91)	(0.92)
INFLATION	0.000593	-0.0258	0.00901	-0.917	-0.00548	-3.868
	(1.89)	(-1.49)	(0.42)	(-0.70)	(-0.10)	(-1.94)
MCAP	0.00242	0.00855**	0.0414	0.559*	-0.948***	-0.106
	(1.64)	(2.77)	(0.41)	(2.39)	(-3.67)	(-0.28)
GFC	-0.00140	-0.000983	0.0721	0.0998	-0.0141	0.278*
	(-1.16)	(-0.87)	(0.88)	(1.16)	(-0.07)	(2.01)
CCONTROL*	-0.0000202	-0.0000728	0.000862	-0.0128	-0.00178	0.234***
	(-0.49)	(-0.36)	(0.31)	(-0.84)	(-0.24)	(9.50)
Sigma	0.0366	-0.164	1.028	-15.12	21.20***	-16.08
_cons	(1.82)	(-1.44)	(0.75)	(-1.74)	(6.47)	(-1.12)
R²	0.1913	0.1605	0.0978	0.0862	0.7312	0.3571
Number of banks	38	38	38	38	35	35
N	284	284	284	284	260	260

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LISTED: dummy equal 1 if listed bank and 0 if unlisted bank, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise, CCONTROL: control of corruption.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

* Additional variable

as conventional banks charge high interests on lending, while Islamic banks charge only the administrative fees. However, the Islamic banks attained better NIM (3.952) due to non-availability of interest expenses in Islamic banking systems. The determinants of profits in Islamic and conventional banks in MENA region (including GCC) will be exhibited in the next section.

Table 6.10: Profitability indicators description of MENA countries (including GCC)

Islamic Banks					Conventional Banks				
Ratio	Mean	Std. Dev.	Min	Max	DEA	Mean	Std. Dev.	Min	Max
ROA	0.0077	0.0684	-0.59	0.38	ROA	0.0148	0.0390	-0.44	0.86
ROE	0.0744	0.1593	-1.13	0.53	ROE	0.0956	0.3239	-9.98	1.18
NIM	3.9523	6.6795	-26.27	64	NIM	3.1224	1.7456	-4.57	17.71

6.3.2 Determinants of profitability in MENA countries (including GCC)

The empirical results in Table 6.11 indicates that size played a very important role in profitability determination for Islamic banks, as greater total assets led to higher profits. This result concludes that the Islamic banks achieved economies of scale, which is in line with many recent studies such as Pervan *et al.* (2015) and Brighi and Venturelli (2015). According to conventional banks, the size of a bank has a positive and significant relationship with ROA and ROE, but size decreased the NIM significantly (consistent with Saghi-Zedek & Tarazi, 2015; Tan, 2015; Terraza, 2015). The conventional banks with greater capitals performed better financially than smaller capitalisation banks in terms of ROA (see Luo *et al.*, 2015). In contrast, Islamic banks with lower equity intensity attained better ROA and ROE (Chronopoulos *et al.*, 2015). With regards to NIM, Islamic banks scored higher capital ratios with positive and significant coefficient (11.40) than conventional banks including a negative and significant sign (-0.905). Marinkovića and Radovićb (2015) assume that the correlation between capitalisation and NIM was positive and significant, while Zhou and Wong's (2008) result claimed an inverse association with capitalisation. The results of conventional banks assume that the banks could increase their ROA (Lin & Zhang, 2009) and NIM (Sufian & Habibullah, 2009) through concentrating more on lending services (loan intensity). The NIM reduced the credit risk significantly in Islamic banks and ROA in conventional banks. This result supports the argument of Chavarín (2015) for the Mexico banking sector. The aim of any bank is to reduce their credit risk as much

as they can to ensure the ability of repayment to their depositors (more deposits decline the credit risks). In conventional banks, the deposits volume is highly and strongly correlated with ROA at the level of 0.1% (Saghi-Zedek & Tarazi, 2015), whereas a negative coefficient represents an inverse association between the NIM and deposits (Barry *et al.*, 2011). Considering z-score, banks with more financial stability and less default risk were found to be significantly more profitable (ROA, ROE and NIM). This demonstrates how important financial stability is to Islamic and conventional banks. Mamatzakis *et al.* (2015) and Mollah and Zaman (2015) found the same in their results. Concentrating on external variables, the GDP, inflation (insignificant correlation with NIM), and market capitalisation factors (significant association only with NIM) were found to be worsening the Islamic banks financial performance. Luo *et al.* (2015) concluded the same (negative and significant) correlation for GDP, Pervan *et al.* (2015) for inflation, and Dietrich and Wanzenried (2014) for market capitalisation. In conventional banks, based on OLS findings, banks in grown economies attained better profitability (consistent with studies of Alessandri & Nelson, 2015; Tan, 2015), but FEM supposed that banks in better economies financially performed worse (referring to ROA's coefficient). As expected, the NIM was impacted negatively and significantly by inflation as in countries with higher inflation rates, clients generally deposit less money, hence banks cannot generate more loans, which badly reduce earnings (Houston *et al.*, 2010). The stock market growth was found to be very important to enhance ROA and ROE (Pasiouras & Kosmidou, 2007) in conventional banks but strongly decreased the NIM (at a level of 0.1%). The empirical findings reveal that conventional banks encountered hurdles to score more ROA measures (Luo *et al.*, 2015; Haan & Poghosyan, 2012) in the global financial crisis period (2007-2009). In contrast, the conventional banks could enhance their NIM thorough 2007-2009 (Al-Musali & Ismail, 2014; Apergis, 2014). This could be due to imposing more lending interests by banks at that time as clients needed more funds (higher supply on loans) to compensate their losses by investing more. There is no significant evidence of any relationship between GFC and earnings. In Islamic banks, the minimum R^2 is scored by $OLS_{ROA} = 25.8\%$, while the maximum R^2 for $FEM_{ROA} = 40.29\%$. In conventional banks the R^2 ranged between 5.77% and 51.42%.

Table 6.11: Determinants of profitability for MENA countries (including GCC)

Banks	Islamic Banks						Conventional Banks					
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Ratio	ROA	ROA	ROE	ROE	NIM	NIM	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables												
LNTA	0.0120**	0.0459***	0.0213*	0.0673**	0.979*	2.640*	0.00128	0.0200***	0.00412	0.0782*	-0.429***	-0.500***
	(3.20)	(4.36)	(2.49)	(3.05)	(2.21)	(2.21)	(2.37)	(7.70)	(0.66)	(2.45)	(-14.34)	(-6.72)
EQTA	-0.0147	-0.156*	-0.149	-0.428**	11.40**	-20.57**	0.0971***	0.106***	-0.00266	-0.0813	-0.905**	-0.331
	(-0.44)	(-2.01)	(-1.97)	(-2.61)	(2.90)	(-1.95)	(19.97)	(14.23)	(-0.05)	(-0.88)	(-3.29)	(-1.23)
LOANSTA	-0.0216	-0.0240	-0.0930	-0.0982	-2.844	-3.429	0.00952	0.0134*	-0.0319	0.0365	2.445***	0.607
	(-0.93)	(-0.76)	(-1.74)	(-1.48)	(-1.02)	(-1.00)	(2.77)	(2.40)	(-0.80)	(0.53)	(11.06)	(1.73)
LOANSDEPO	-0.0000845	-0.000222	0.000309	0.0000728	0.00123	-0.0373*	-0.000164	-0.0000106	-0.000515	-0.0000233	-0.000180	0.000123
	(-0.55)	(-1.48)	(0.89)	(0.23)	(0.08)	(-2.43)	(-3.08)	(-0.20)	(-0.83)	(-0.04)	(-0.06)	(0.07)
DEPOSITSTA	-0.0186	0.0171	-0.0726	0.0944	-1.523	-0.269	0.0150***	0.0158***	0.0193	-0.0321	-1.028***	-0.412
	(-0.81)	(0.46)	(-1.37)	(1.21)	(-0.57)	(-0.07)	(6.47)	(3.35)	(0.72)	(-0.55)	(-7.19)	(-1.72)
LAGE	-0.0113		0.0335		-0.0275		-0.000927		-0.00152		-0.122	
	(-1.40)		(1.81)		(-0.03)		(-0.64)		(-0.09)		(-1.49)	
LOGZ	0.0242***	0.126***	0.0448***	0.259***	0.787	7.694***	0.00459***	0.0183***	0.0615***	0.120***	0.393***	0.219*
	(4.96)	(7.50)	(4.01)	(7.33)	(1.38)	(4.02)	(5.91)	(7.05)	(6.84)	(3.76)	(9.04)	(2.37)
FORE							-0.0103	0.000711	-0.188	0.00749	-0.383	
							(-1.01)	(0.08)	(-1.60)	(0.07)	(-0.69)	
DOM	0.00624	0.0206	-0.00527	-0.0153	0.792	4.314	-0.00819	0.00423	-0.163	0.0271	-0.605	-0.0429
	(0.67)	(0.79)	(-0.25)	(-0.28)	(0.74)	(1.55)	(-0.82)	(0.63)	(-1.42)	(0.33)	(-1.10)	(-0.17)
GOV	-0.000317	0.0130	-0.0428	-0.0957	-1.600	4.581	-0.00978		-0.156		-0.148	-0.206
	(-0.03)	(0.33)	(-1.51)	(-1.16)	(-1.12)	(1.00)	(-0.99)		(-1.36)		(-0.27)	(-0.63)
Macroeconomic variables												
LGDP	-0.00952	-0.0930***	0.00376	-0.133**	-0.516	-10.74***	0.00253**	-0.0181***	0.0281**	-0.0646	0.0710**	0.00895
	(-1.77)	(-4.86)	(0.31)	(-3.32)	(-0.75)	(-5.29)	(3.06)	(-4.22)	(2.94)	(-1.22)	(3.07)	(0.54)
INFLATION	-0.239***	-0.165***	-0.501***	-0.353***	-6.888	4.195	-0.00231	0.0102	0.0406	0.0379	-1.856**	-0.866*
	(-6.20)	(-4.08)	(-5.67)	(-4.14)	(-1.58)	(0.93)	(-0.21)	(0.88)	(0.32)	(0.27)	(-2.99)	(-2.07)
MCAP	0.000292	-0.0238	0.0265	0.0159	-2.942**	-8.187***	0.00254	0.0111***	0.0534**	0.0722	-0.379***	-0.516***
	(0.03)	(-1.57)	(1.29)	(0.50)	(-2.85)	(-5.09)	(1.51)	(3.31)	(2.74)	(1.74)	(-4.15)	(-4.98)
GFC	0.00802	0.00463	0.0160	0.00964	0.0760	-0.0898	-0.00269	-0.00321*	-0.0283	-0.0285	0.182*	0.152**
	(1.10)	(0.70)	(0.96)	(0.70)	(0.09)	(-0.12)	(-1.70)	(-2.18)	(-1.55)	(-1.57)	(2.03)	(2.85)
Sig	0.167	1.700***	-0.244	2.342*	9.391	239.7***	-0.0917***	0.209*	-0.674*	0.688	4.590***	6.731***
cons	(1.43)	(3.74)	(-0.92)	(2.45)	(0.66)	(5.04)	(-3.93)	(2.19)	(-2.50)	(0.59)	(5.32)	(8.37)
R ²	0.2580	0.4029	0.2849	0.3609	0.1425	0.2650	0.5142	0.4995	0.0577	0.1066	0.2708	0.1709
# of banks	40	40	40	40	35	35	168	168	168	168	160	160

<i>N</i>	291	291	291	291	241	241	1277	1277	1277	1277	1200	1200
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Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

6.4 Profitability of MENA countries (excluding GCC)

6.4.1 Profitability measures description for MENA countries (excluding GCC)

Table 6.12 states that conventional banks have the greatest ROA (0.98%) and NIM (3.2301) measures, however Islamic banks invested their equity more effectively to achieve the best ROE (9.34%) scores in MENA region (excluding GCC). The lowest profitability indicators were attained by socially responsible banks, because as previously mentioned, the SRBs concentrate on social and environment issues rather than profits. The SRBs score means ROA, ROE and NIM equal 0.45%, -10.86% and 2.976, respectively. These profitability indicators are specified by various internal and external factors, which are clearly outlined in the next section.

Table 6.12: Profitability indicators description of MENA countries (excluding GCC)

Banks	Islamic				Conventional Banks				Socially Responsible Banks			
Ratio	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
ROA	0.0096	0.0123	-0.03	0.05	0.0098	0.0181	-0.24	0.16	0.0045	0.0128	-0.08	0.03
ROE	0.0934	0.0934	-0.18	0.40	0.0812	0.3913	-9.98	1.18	-0.1086	1.3951	-11.07	0.26
NIM	3.0779	3.0665	-9.26	13.48	3.2301	1.8275	-2.08	17.71	2.9761	3.0897	-5.56	9.23

6.4.2 Determinants of profitability in MENA countries (excluding GCC)

Table 6.13 details that larger Islamic banks scored better ROE measures. Additionally, larger SRBs attained more ROA and FEM suggests that greater sized conventional banks have higher ROA, but OLS model provides a negative and significant coefficient of ROA. In contrast, the relationship between the NIM and banking volume was found to be negative and significant (smaller sized banks were profitable). With regards to capital ratio (EQTA), it is unexpected to find an inverse and significant correlation between ROE and capitalisation in Islamic banks. This relationship complies in conventional banks with ROA and NIM. The results of OLS model encouraged the Islamic banks to focus more on lending activities due to significant improvement of their ROA, but the FEM advised a reduction in loans to raise significantly ROA and ROE (ElBannan, 2015). In addition, loans enhanced the NIM significantly in conventional and socially responsible banking sectors. Moreover, higher ROE scores in Islamic banks and higher NIM in conventional banks caused the banks to face a potentially higher credit risk (Liang *et al.*, 2013). As expected, the deposits had a positive and

significant association at the level of 1% in Islamic banks (García-Herrero *et al.*, 2009). In contrast, against expectations, the deposits played negative and significant roles to decrease the ROA in conventional banks, and the NIM in Islamic and conventional banks (Barry *et al.*, 2011). The new Islamic banks attained better NIM and recent conventional banks had better NIM values. This finding supports both previous studies of Mirzaei *et al.* (2013) and Beck *et al.* (2005). The financial stability of conventional banks is remarkable and influences earnings positively (ROA, ROE and NIM). Evermore, more stable Islamic banks achieved better NIM scores. The domestic banks concentration led to lower ROA and NIM in socially responsible banking systems. Additionally, the public ownerships significantly reduced the ROA and ROE in Islamic and socially responsible banks (ElBannan, 2015). Based on OLS's coefficients, the Islamic banks in greater rates of economy growth tended to be more profitable (ROA, ROE and NIM), the same with ROA in conventional banks (Marinkovića & Radovićb, 2015; Pervan *et al.*, 2015; Guillén *et al.*, 2014). According to FEM's results, the Islamic banks in higher GDP values performed financially worse in terms of ROA and ROE, but FEM proposed that socially responsible banks acted financially (NIM) better in the developed economies. The inflation only impacted the ROA of Islamic banks significantly and positively. This advantage shows that Islamic banks performed effectively even with higher inflation rates, which is unexpected as inflation rates realistically reduce firms' profits (Tan, 2015). The socially responsible banks exploited the growth of stock market capitalisation and they could increase their ROA and ROE optimally (Pasiouras & Kosmidou, 2007). On the other hand, the Islamic banks suffered to earn more profits in countries with greater stock market indices; even the NIM in conventional banks decreased significantly (Dietrich & Wanzenried, 2014). Finally, the global financial crisis did not affect the profitability in Islamic banks. Moreover, there are insignificant impacts between the crisis and profitability (with the exception of NIM) in conventional and socially responsible banks. With regard to NIM, the conventional and socially responsible banks financially operated efficiently as both types of bank could maximise their interest income (similar to Dietrich & Wanzenried, 2014) through the crisis period (2007-2009). Overall, the percentages of R^2 started with 12.80% to 43.99% in Islamic banks, 5.66% to 53.55% in conventional banks, and 27.88% to 67.94% in socially responsible banks.

Table 6.13: Determinants of profitability for MENA countries (excluding GCC)

Banks	Islamic Banks						Conventional Banks						Socially Responsible Banks					
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Ratio	ROA	ROA	ROE	ROE	NIM	NIM	ROA	ROA	ROE	ROE	NIM	NIM	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables																		
LNTA	0.00222	-0.0037	0.0280**	-0.0157	-0.800*	-0.924	-0.001***	0.00456*	0.00156	0.0765	-0.480***	-0.699***	0.00493	0.0151*	0.583	0.975	-2.768**	-6.189***
	(1.67)	(-1.48)	(2.95)	(-0.87)	(-2.55)	(-1.28)	(-4.22)	(2.39)	(0.16)	(1.50)	(-12.65)	(-6.57)	(1.17)	(2.05)	(1.16)	(1.01)	(-3.20)	(-4.23)
EQTA	0.0188	-0.0493	-0.168	-0.536**	-7.499	-18.08	-0.027***	-0.142***	0.0950	0.0675	0.440	-1.735*	-0.0791	-0.0776	-7.946	-5.914	-6.469	-8.874
	(1.06)	(-1.77)	(-1.33)	(-2.69)	(-1.42)	(-1.96)	(-3.48)	(-11.56)	(0.53)	(0.20)	(0.63)	(-2.02)	(-1.78)	(-1.66)	(-1.49)	(-0.96)	(-0.67)	(-0.95)
LOANS TA	0.0251*	-0.025*	0.111	-0.239**	0.644	-2.549	0.00509	0.0102	-0.340	-0.0404	-1.003	2.657*	-0.0238	0.0125	0.259	3.096	13.09*	5.485
	(2.25)	(-2.21)	(1.39)	(-2.94)	(0.24)	(-0.93)	(0.42)	(0.59)	(-1.23)	(-0.09)	(-0.93)	(2.14)	(-0.93)	(0.47)	(0.08)	(0.88)	(2.31)	(0.93)
LOANS DEPO	-0.0113	0.00677	-0.0222	0.108*	-1.110	0.943	0.00156	-0.00888	0.171	0.0650	2.243*	-1.394	0.00514	-0.0282	-0.427	-2.962	0.931	1.989
	(-1.53)	(0.94)	(-0.42)	(2.10)	(-0.60)	(0.52)	(0.17)	(-0.73)	(0.81)	(0.20)	(2.74)	(-1.63)	(0.30)	(-1.68)	(-0.21)	(-1.34)	(0.28)	(0.57)
DEPOS ITSTA	-0.0241	0.0160	-0.0355	0.267**	-7.865*	-0.517	-0.0198*	-0.00213	0.108	-0.0543	-0.689	-2.062*	0.0103	-0.0389	-0.570	-5.147	-4.306	-2.075
	(-1.67)	(1.18)	(-0.34)	(2.75)	(-2.36)	(-0.16)	(-2.15)	(-0.17)	(0.52)	(-0.16)	(-0.84)	(-2.25)	(0.21)	(-0.86)	(-0.10)	(-0.87)	(-0.45)	(-0.23)
LAGE	-0.00493		-0.0553		-2.424*		-0.0025*		0.00455		0.0293		-0.00604		0.00267		0.531	
	(-1.24)		(-1.95)		(-2.58)		(-2.27)		(0.18)		(0.29)		(-1.24)		(0.00)		(0.47)	
LOGZ	0.000741	0.00874	-0.0135	0.0571	1.76***	2.308	0.005***	0.021***	0.078***	0.0619	0.294***	0.316*	0.00342	-0.00211	0.513	-0.580	-1.561	-0.819
	(0.42)	(1.89)	(-1.07)	(1.72)	(4.36)	(1.89)	(9.28)	(11.45)	(5.33)	(1.26)	(5.15)	(2.47)	(0.74)	(-0.22)	(0.93)	(-0.46)	(-0.79)	(-0.43)
FORE	0.00120		-0.0125		0.145		-0.00591		-0.135		-0.0845		-0.0105		-1.540		-1.749	
	(0.38)		(-0.56)		(0.19)		(-0.89)		(-0.90)		(-0.14)		(-1.14)		(-1.40)		(-0.65)	
DOM							-0.00844		-0.108		-0.573		-0.0632*		-7.003		-16.41*	
							(-1.32)		(-0.75)		(-1.01)		(-2.04)		(-1.89)		(-2.57)	
GOV	-0.015***		-0.11***		0.0247		-0.00374		-0.108		-0.192		-0.0295*		-3.562*		-1.519	
	(-3.63)		(-3.75)		(0.02)		(-0.60)		(-0.76)		(-0.35)		(-2.31)		(-2.33)		(-0.27)	
Macroeconomic variables																		
LGDP	0.0056**	-0.011*	0.0394**	-0.0726*	2.24***	2.310	0.00178*	-0.00264	0.0256	-0.0350	0.00692	0.0115	-0.00150	0.0159	-0.326	1.932	2.682	6.956**
	(3.14)	(-2.24)	(3.05)	(-2.07)	(5.35)	(1.88)	(2.48)	(-0.89)	(1.57)	(-0.44)	(0.28)	(0.62)	(-0.32)	(1.42)	(-0.58)	(1.31)	(1.73)	(3.14)
INFLA TION	-0.0249	0.0335*	-0.254	0.137	-5.265	-1.721	0.00279	-0.0206	0.176	0.000769	1.074	-0.536	-0.00325	-0.0146	-0.133	-1.444	1.373	9.244
	(-1.35)	(2.22)	(-1.94)	(1.27)	(-1.23)	(-0.47)	(0.24)	(-1.86)	(0.66)	(0.00)	(1.04)	(-0.69)	(-0.05)	(-0.26)	(-0.02)	(-0.19)	(0.12)	(0.84)
MCAP	-0.00062	-0.009*	-0.0227	-0.0701*	-1.239*	1.350	0.00141	0.00150	0.0377	0.0485	-0.118	-0.696***	0.0457**	0.0420**	5.162**	5.380**	3.681	6.133
	(-0.24)	(-2.22)	(-1.24)	(-2.30)	(-2.11)	(1.34)	(1.05)	(0.62)	(1.23)	(0.75)	(-0.99)	(-4.62)	(2.90)	(2.80)	(2.73)	(2.73)	(0.95)	(1.65)
GFC	-0.00067	0.00100	0.00015	0.00973	-0.396	-0.300	0.000269	0.000275	-0.0328	-0.0242	0.207	0.266***	0.00171	0.000452	0.276	0.222	1.816**	1.737**
	(-0.33)	(0.66)	(0.01)	(0.89)	(-0.83)	(-0.83)	(0.22)	(0.26)	(-1.17)	(-0.85)	(1.85)	(3.49)	(0.57)	(0.17)	(0.77)	(0.62)	(2.94)	(3.00)
Sig	-0.115**	0.287*	-0.783**	1.770*	-35***	-51.92	-0.00778	-0.00896	-0.780	0.168	5.715***	9.123***	0.0718	-0.414	9.503	-44.98	-27.13	-112.2*
cons	(-3.06)	(2.47)	(-2.93)	(2.13)	(-4.16)	(-1.82)	(-0.39)	(-0.14)	(-1.72)	(0.10)	(5.16)	(7.60)	(0.57)	(-1.78)	(0.63)	(-1.47)	(-0.80)	(-2.43)
R ²	0.2908	0.1769	0.3707	0.2030	0.4399	0.1276	0.1420	0.2309	0.0566	0.0701	0.5355	0.2882	0.4008	0.4412	0.2788	0.3151	0.6794	0.5222

# banks	17	17	17	17	16	16	108	108	108	108	103	103	9	9	9	9	8	8
<i>N</i>	129	129	129	129	117	117	813	813	813	813	762	762	64	64	64	64	56	56

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

6.5 Profitability of GCC countries

6.5.1 Profitability measures description for GCC countries

It can be seen in Table 6.14 that conventional banks in GCC have more returns on assets and equities (2.35% and 12.08%, respectively). This means that conventional banks invested their assets and capital more efficiently than Islamic banks over the period 2005-2012. On the contrary, the Islamic banks attained better NIM (4.77) due to Islamic banks having not had any interest expenses to be paid (based on prohibition of Sharia law). On the other hand, the interest expenses worsened negatively the NIM of conventional banks (2.935). Table 6.15 reports the causes that specifying the profitability of Islamic and conventional banks in GCC region.

Table 6.14: Profitability indicators description of GCC countries

Islamic Banks					Conventional Banks				
Ratio	Mean	Std. Dev.	Min	Max	DEA	Mean	Std. Dev.	Min	Max
ROA	0.0062	0.0911	-0.59	0.38	ROA	0.0235	0.0591	-0.44	0.86
ROE	0.0593	0.1956	-1.13	0.53	ROE	0.1208	0.1401	-1.41	0.46
NIM	4.7773	8.7621	-26.27	64	NIM	2.9351	1.5776	-4.57	10.33

6.5.2 Determinants of profitability in GCC countries

In Islamic banks in GCC region, the size of banking was found to be positively influential in the support of returns, as shown in Table 6.15. Evermore, size factor significantly improved the ROA and ROE in conventional banks but made significant decrement in NIM indices. According to equity ratio, the Islamic banks' lower equities tended to be more profitable in terms of ROA and ROE but well capitalised banks attained better NIM values. In conventional banks, the capital of banks has a strong and positive correlation with ROA at the level of 0.1% but it is unexpected to find that capital affected the ROE and NIM negatively and significantly. However, the analysis stimulated the conventional banks to concentrate more on providing loans in order to be more profitable, as loans also reduce the credit risk. The Islamic banks could attain more ROE by reducing deposits acceptance, also conventional banks with fewer deposits had greater interest revenues. With regards to the time (LAGE) variable, new Islamic banks achieved more ROA than older banks. Furthermore, the relationship between z-score and profitability's indicators in Islamic and conventional banks were found to

be strong, high, positive, and significant at a 0.1% level. This shows that financial stability is very important to obtain gains in the banking sector. With regard to ownership, more local and public conventional banks increased the NIM significantly and positively. Based on the coefficients' signs of macroeconomic factors, there are negative and significant associations between profitability and both external factors of GDP and inflation, in the Islamic banking system. In addition, the market capitalisation to GDP ratio has a positive and significant impact on ROE at the level of 5%, but worsened NIM significantly. Focusing on external variables for conventional banks, the GDP variable has two aspects; FE model suggests inverse correlations with ROA and ROE, but OLS models propose positive relationships with ROE and NIM. The inflation improved ROA significantly and decreased the NIM significantly in conventional banks. Additionally, the conventional banks took advantage of stock market development to enhance their financial returns. Finally, the global financial crisis impacted the profits very badly in conventional banks, especially ROA and ROE, which both indicators have significant coefficients. Conversely, Islamic banks in GCC were found to be more resistant and stable than conventional banks against the financial distress through the period 2007-2009. Overall, the consistency between independent variables varied between 19.04% and 54.08% in Islamic banks, and 10.78% and 70.93% in conventional banks.

6.6 Profitability of UK (as a benchmark)

6.6.1 Profitability measures description for UK

Table 6.16 illustrates that Islamic banks in the UK are the leaders in terms of ROA and NIM. This means that Islamic banks in the UK invested their total assets (3.10%) and earning assets (2.302) more effectively compared to conventional and socially responsible banks. In contrast, Islamic banks attained loss in terms of investing their capitals (-16.14%). Moreover, the best ROE was achieved by socially responsible banks. Additionally, conventional banks were found to be the least profitable in regard to ROA and NIM (0.03% and 1.990). By using UK profitability as a benchmark for Islamic, conventional and socially responsible banks across the world, MENA and GCC, we can conclude that Islamic banks in the UK have the best ROA ratios and Islamic banks in GCC have the worst ROA

Table 6.15: Determinants of profitability for GCC countries

Banks	Islamic Banks						Conventional Banks					
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Ratio	ROA	ROA	ROE	ROE	NIM	NIM	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables												
LNTA	0.0180 [*]	0.0717 ^{***}	0.0380 [*]	0.112 ^{***}	2.745 [*]	4.053 [*]	0.00581 ^{***}	0.0291 ^{***}	0.00663	0.0935 ^{***}	-0.188 ^{***}	-0.193
	(2.13)	(4.19)	(2.19)	(3.38)	(2.53)	(2.06)	(4.36)	(5.10)	(1.44)	(4.96)	(-4.00)	(-1.51)
EQTA	-0.0476	-0.229 [*]	-0.138	-0.535 [*]	21.47 ^{***}	-28.42	0.121 ^{***}	0.0956 ^{***}	-0.0676 ^{**}	-0.242 ^{***}	-1.081 ^{***}	-0.229
	(-0.74)	(-1.98)	(-1.05)	(-2.39)	(2.69)	(-1.69)	(16.04)	(8.75)	(-2.59)	(-6.69)	(-4.24)	(-0.93)
LOANSTA	-0.0703	-0.0656	-0.164	-0.167	0.981	-2.701	0.0205 ^{**}	0.0116	0.0463	0.0112	2.682 ^{***}	0.741
	(-1.48)	(-1.13)	(-1.69)	(-1.48)	(0.16)	(-0.36)	(2.93)	(1.45)	(1.91)	(0.42)	(6.93)	(1.78)
LOANSDEPO	-0.00000384	-0.000223	0.000396	0.0000812	-0.00179	-0.0396	-0.00019	-0.0000224	-0.000294	0.00000442	0.000542	-0.000492
	(-0.02)	(-1.22)	(0.98)	(0.23)	(-0.08)	(-1.95)	(-2.80)	(-0.35)	(-1.21)	(0.02)	(0.23)	(-0.35)
DEPOSITSTA	-0.0507	0.0394	-0.153 [*]	0.110	0.637	-1.892	0.00455	0.00852	-0.0100	-0.00413	-1.142 ^{***}	-0.343
	(-1.46)	(0.61)	(-2.15)	(0.88)	(0.14)	(-0.22)	(1.04)	(1.34)	(-0.66)	(-0.20)	(-5.15)	(-1.37)
LAGE	-0.0237 [*]		0.0132		-0.0972		0.00493		0.0244		0.0526	
	(-1.98)		(0.54)		(-0.07)		(1.21)		(1.73)		(0.39)	
LOGZ	0.0401 ^{***}	0.196 ^{***}	0.0761 ^{***}	0.410 ^{***}	0.659	9.714 ^{**}	0.00627 ^{***}	0.0652 ^{***}	0.0416 ^{***}	0.298 ^{***}	0.531 ^{***}	0.00806
	(4.16)	(7.54)	(3.85)	(8.14)	(0.52)	(3.02)	(3.58)	(9.84)	(6.85)	(13.62)	(8.84)	(0.05)
FORE		-0.00358		0.130	-1.707			0.0154		0.0456		0.226
		(-0.07)		(1.35)	(-0.55)			(1.43)		(1.28)		(0.94)
DOM	0.0290	0.0126	0.0338	0.103	1.691	5.730	0.00581	0.00896	0.0251	0.0409	0.748 ^{***}	0.127
	(1.61)	(0.29)	(0.91)	(1.23)	(0.74)	(1.41)	(1.42)	(1.11)	(1.76)	(1.54)	(5.35)	(0.72)
GOV	0.0241		0.0293			6.506	-0.00272		0.0106		0.762 ^{***}	
	(0.94)		(0.55)			(1.05)	(-0.63)		(0.70)		(5.04)	
Macroeconomic variables												
LGDP	-0.0239 [*]	-0.118 ^{***}	-0.00952	-0.122 [*]	-3.543 [*]	-17.40 ^{***}	0.00145	-0.0215 [*]	0.0248 ^{***}	-0.0868 ^{**}	0.260 ^{***}	0.142
	(-2.40)	(-3.76)	(-0.47)	(-2.00)	(-2.58)	(-4.70)	(0.75)	(-2.24)	(3.69)	(-2.73)	(3.94)	(0.67)
INFLATION	-0.316 ^{***}	-0.141 [*]	-0.619 ^{***}	-0.309 ^{**}	-6.839	6.471	-0.00293	0.0351 [*]	-0.0751	0.0863	-1.580 [*]	-0.776 [*]
	(-5.35)	(-2.53)	(-5.12)	(-2.87)	(-0.96)	(0.96)	(-0.15)	(2.02)	(-1.13)	(1.50)	(-2.43)	(-1.99)
MCAP	0.00189	-0.0241	0.0893 [*]	0.0686	-5.684 [*]	-11.65 ^{***}	0.00890 [*]	0.0214 ^{**}	0.0734 ^{***}	0.0830 ^{***}	-0.122	-0.107
	(0.10)	(-1.10)	(2.39)	(1.61)	(-2.58)	(-4.51)	(2.07)	(3.09)	(4.92)	(3.63)	(-0.83)	(-0.70)
GFC	0.00603	-0.00858	0.0136	-0.0101	-0.102	-1.891	-0.00976 ^{**}	-0.00759 [*]	-0.0251 [*]	-0.0167	-0.0141	-0.0781
	(0.49)	(-0.78)	(0.54)	(-0.48)	(-0.07)	(-1.34)	(-2.85)	(-2.51)	(-2.12)	(-1.67)	(-0.12)	(-1.15)
Sig	0.522 [*]	2.056 ^{**}	-0.0587	1.314	68.03 [*]	405.5 ^{***}	-0.144 ^{**}	0.0773	-0.825 ^{***}	0.637	-4.428 ^{**}	0.918
cons	(2.40)	(2.68)	(-0.13)	(0.88)	(2.38)	(4.55)	(-3.13)	(0.35)	(-5.18)	(0.88)	(-2.85)	(0.19)
R ²	0.3617	0.5352	0.4179	0.5408	0.1904	0.3813	0.6473	0.7093	0.2469	0.4124	0.4687	0.1078

# of banks	23	23	23	23	19	19	60	60	60	60	57	57
N	162	162	162	162	124	124	464	464	464	464	438	438

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

measures (0.62%). The best investors of capitals are Islamic banks in MENA (excluding GCC) region (9.34%), while Islamic banks in the UK have very weak ROE values. According to NIM, the Islamic banks in GCC highly and efficiently invested their earning assets (4.777) compared to Islamic banks in the UK, which have the minimum NIM scores. Regarding the profitability of conventional banks, the highest ROA ratios were scored by conventional banks around the world (10.3%), and the greatest mean ROE attained by conventional banks in GCC. In addition, conventional banks in MENA countries (excluding GCC) could maximise their interest earnings and minimise their paid interests. Conversely, conventional banks were found to be the least profitable banks (in terms of ROA, ROE and NIM). Focusing on SRBs allows us to figure that spread globally, they exploited their total and earning assets optimally (ROA = 0.5% and NIM = 3.484), whereas SRBs in the UK have the lowest ROA and NIM (0.26% and 2.157, respectively). On the contrary, the best inventors of capitals (6.76%) were found to be SRBs in the UK over the period 2005-2012.

Table 6.16: Profitability indicators description for UK

Banks	Islamic				Conventional Banks				Socially Responsible Banks			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
ROA	0.0310	0.5303	-0.87	2.2	0.0003	0.0192	-0.21	0.05	0.0026	0.0083	-0.024	0.01
ROE	-0.1614	0.1931	-0.57	0.31	0.0091	0.2602	-3.98	0.56	0.0676	0.1226	-0.36	0.3
NIM	2.3029	1.3321	0.64	4.61	1.9904	1.8333	-0.56	18.18	2.1579	0.7676	1.07	4.17

6.6.2 Determinants of profitability for UK

Table 6.17 shows the determinants of profitability in the UK for Islamic, conventional and socially responsible banks. It can be seen that conventional and socially responsible banks with greater total assets attained more ROA but worse NIM. The ROA has also been affected positively and significantly in conventional banks in GCC (including the UK), MENA and GCC (excluding the UK). Furthermore, NIM was found to be decreasing significantly in SRBs across the world and SRBs in MENA countries. According to the EQTA variable, lower capitalisation led to better ROA and ROE in conventional banks, while higher capitalisation allowed conventional banks to achieve higher interest earnings. The SRBs across the world, conventional banks in MENA (excluding GCC) and conventional banks in GCC also had inverse correlations between capital ratios and ROE. The lending operations were found to be highly important to the

profitability ratios of conventional banks (similar to GCC [including the UK] and MENA banks). In contrast, loans affected the ROE of SRBs significantly and negatively. In conventional banks, ROE and NIM reduced the credit risk significantly, whereas ROE increased the credit risk significantly in terms of SRBs. The empirical results encouraged SRBs to accept more deposits to enhance ROA and ROE, but encouraged conventional banks to lower deposits to raise ROE. Moreover, the relationship between age and NIM in SRBs was found to be negative and significant. This means that interest expenses significantly increases over time in SRBs. Referring to Islamic, conventional and socially responsible banks, banks with higher stability scored better ROA and ROE measures (in line with banks around the world, bank in MENA region, and banks in GCC countries), but in conventional banks interest income led to instability and higher risks. Regarding ownership, conventional banks are the only type of bank that are affected by ownerships as foreign and domestic levels increased ROA and ROE, but public ownerships led to lower ROA and ROE. The FEM suggests that foreign concentration decreased ROE significantly. Additionally, increment in foreign levels lower NIM significantly. Focusing on external determinants allow us to find that only conventional banks in the UK were influenced by industry-specific variables. In detail, more economic development (GDP) and financial market growth support profitability of conventional banks. Finally, during the crisis period, the conventional banks in the UK acted effectively in terms of investing earning assets. Overall, in Islamic banks, the minimum R^2 is 51.57% and the highest is 74.24%; the R^2 in conventional banks varied between 15.88% and 33.95%; and in SRBs the R^2 ranged between 56.08% and 80.80%.

6.7 Determinants of profitability for the whole sample

Generally, the whole sample results can be shown in Table 6.18. The findings point that in accordance to ROA and ROE ratios, size, loan intensity, deposit ratio (ROA), z-score and market capitalisation were supporting the profits positively. On the other side, banks were influenced significantly and negatively by capital ratio, ownership (foreign, domestic and public), GDP and inflation. However, in terms of raising the NIM, banks could increase the capitalisation. Finally, the relationship between NIM and size, credit risk, deposit ratio, age, ownership (foreign,

Table 6.17: Determinants of profitability for UK

Banks	Islamic Banks						Conventional Banks						Socially Responsible Banks					
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Ratio	ROA	ROA	ROE	ROE	NIM	NIM	ROA	ROA	ROE	ROE	NIM	NIM	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables																		
LNTA	-0.396	0.0803	0.325	0.593	-1.884	-1.884	0.000545	0.0069**	-0.00412	0.0246	-0.181***	-0.354*	0.0034**	-0.00656	0.0231	-0.0314	-1.052*	-0.459
	(-0.94)	(0.07)	(1.39)	(0.88)	(-0.23)	(-0.23)	(1.21)	(3.07)	(-0.66)	(0.71)	(-4.15)	(-2.26)	(3.20)	(-1.44)	(1.41)	(-0.42)	(-2.44)	(-0.56)
EQTA	-0.654	-0.101	-0.227	0.0844	-88.09	-88.09	-0.046***	-0.085***	-0.413**	-0.554*	5.517***	7.283***	-0.130	-0.635***	-1.173	-6.872***	-2.274	-16.51
	(-0.84)	(-0.07)	(-0.53)	(0.10)	(-2.06)	(-2.06)	(-4.55)	(-5.02)	(-2.93)	(-2.13)	(5.29)	(5.54)	(-1.53)	(-6.02)	(-0.90)	(-4.00)	(-0.13)	(-0.98)
LOANS TA	-3.856	-2.526	-0.980	-0.232	-28.75	-28.75	0.00556	0.035	0.162	0.497	2.720	2.005	-0.203	0.0552	-6.246*	-3.119	20.51	16.87
	(-1.04)	(-0.50)	(-0.48)	(-0.08)	(-0.60)	(-0.60)	(0.99)	(4.17)	(2.09)	(3.82)	(5.13)	(3.54)	(-1.39)	(0.55)	(-2.79)	(-1.90)	(0.90)	(0.70)
LOANS DEPO	0.276	0.156	1.067	0.999	-49.31	-49.31	0.00116	0.000942	-0.0237	-0.127*	0.294	-0.868***	0.189	-0.0584	5.642*	2.427	-21.42	-19.76
	(0.14)	(0.08)	(0.99)	(0.87)	(-2.59)	(-2.59)	(0.35)	(0.30)	(-0.52)	(-2.61)	(0.97)	(-4.25)	(1.42)	(-0.62)	(2.76)	(1.58)	(-1.00)	(-0.86)
DEPOS ITSTA	2.257	1.339	1.026	0.509	-126.8	-126.8	0.00636	-0.00515	-0.153	-0.523***	-0.634	-0.709	0.198*	-0.0418	4.379**	2.026	-8.918	-9.956
	(1.24)	(0.46)	(1.01)	(0.31)	(-2.45)	(-2.45)	(1.02)	(-0.68)	(-1.76)	(-4.50)	(-1.03)	(-1.30)	(2.16)	(-0.55)	(3.13)	(1.64)	(-0.36)	(-0.37)
LAGE	-6.124		-2.794		161.1		0.00123		0.00717		-0.00375		-0.00635		-0.0421		-1.376*	
	(-2.04)		(-1.68)		(1.59)		(1.35)		(0.57)		(-0.04)		(-1.63)		(-0.70)		(-2.65)	
LOGZ	0.594*	0.578*	0.313*	0.304*	-0.526	-0.526	0.007***	0.014***	0.097***	0.0457	-0.222***	-0.187	0.00176	0.029***	0.0678	0.511***	-0.487	1.574
	(3.01)	(2.73)	(2.86)	(2.59)	(-0.72)	(-0.72)	(11.32)	(5.93)	(10.29)	(1.22)	(-3.34)	(-1.13)	(0.67)	(6.06)	(1.67)	(6.55)	(-1.97)	(1.59)
FORE	-0.148		0.299		-12.07		0.0313**	-0.00002	0.780***	-0.157*	-0.570***	0.968						
	(-0.34)		(1.24)		(-1.83)		(3.19)	(-0.01)	(5.75)	(-2.24)	(-3.64)	(1.48)						
DOM		0.0904		-0.331		12.07	0.0291**		0.818***			0.371						
		(0.19)		(-1.25)		(1.83)	(2.96)		(6.04)			(0.52)						
GOV								-0.0368**		-1.129***	-1.435							
								(-3.31)		(-6.64)	(-1.60)							
Macroeconomic variables																		
LGDP	-0.583	-0.911	-0.629	-0.813	10.99	10.99	0.0205*	0.0204*	0.136	0.233	0.673	1.248*	0.0196	0.00727	0.162	-0.0657	0.447	-0.784
	(-0.43)	(-0.56)	(-0.84)	(-0.90)	(1.05)	(1.05)	(2.20)	(2.56)	(1.05)	(1.91)	(0.76)	(2.32)	(1.47)	(0.72)	(0.79)	(-0.40)	(0.31)	(-0.49)
INFLA TION	-39.76	-29.74	21.52	27.16	-224.9	-224.9	-0.0207	-0.0158	-0.281	-0.164	-1.786	-1.039	-0.191	-0.143	-0.625	0.411	-5.158	7.891
	(-1.40)	(-0.77)	(1.36)	(1.28)	(-1.00)	(-1.00)	(-1.23)	(-1.07)	(-1.21)	(-0.72)	(-1.16)	(-1.10)	(-0.79)	(-0.74)	(-0.17)	(0.13)	(-0.20)	(0.32)
MCAP	-1.218	-1.196	0.541	0.553	-7.926	-7.926	0.000997	0.00474	0.00946	0.130**	0.0129	0.237	-0.00139	-0.00246	0.0264	0.0260	-0.515	-0.238
	(-1.28)	(-1.19)	(1.02)	(0.99)	(-1.57)	(-1.57)	(1.77)	(1.62)	(1.21)	(2.91)	(0.25)	(1.20)	(-0.15)	(-0.36)	(0.18)	(0.23)	(-0.54)	(-0.26)
GFC	-0.456	-0.369	0.192	0.241	0.716	0.716	-0.00263	-0.00163	-0.0276	-0.0113	0.200	0.254**	-0.00132	0.000799	0.0439	0.0627	0.0191	0.123
	(-1.28)	(-0.86)	(0.97)	(1.01)	(0.38)	(0.38)	(-1.67)	(-1.12)	(-1.27)	(-0.51)	(1.34)	(2.63)	(-0.41)	(0.34)	(0.88)	(1.64)	(0.06)	(0.42)
Sig	34.40	26.91	19.68	17.34	-536.7	-170.3	-0.646*	-0.687**	-4.797	-6.740	-16.07	-31.80*	-0.726	-0.154	-8.720	-0.611	12.45	34.55
cons	(0.91)	(0.63)	(0.94)	(0.73)	(-2.65)	(-0.73)	(-2.43)	(-3.03)	(-1.31)	(-1.94)	(-0.63)	(-2.08)	(-1.86)	(-0.49)	(-1.46)	(-0.12)	(0.21)	(0.54)
R ²	0.6692	0.5157	0.6937	0.6163	0.7154	0.7424	0.2755	0.2343	0.2443	0.1588	0.3395	0.2459	0.6894	0.8080	0.6676	0.7921	0.7560	0.5608

# banks	3	3	3	3	2	2	74	74	74	74	68	68	5	5	5	5	4	4
<i>N</i>	21	21	21	21	14	14	550	550	550	550	500	500	37	37	37	37	29	29

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

Table 6.18: Results of profitability determinants for all banks

All banks	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Profitability	ROA	ROA	ROE	ROE	NIM	NIM
Bank-specific variables						
LTA	0.00135 [*]	0.0366 ^{***}	0.00653	0.0741 ^{**}	-0.192 ^{***}	-0.377 ^{**}
	(2.00)	(9.30)	(1.66)	(3.06)	(-6.01)	(-2.81)
EQTA	0.00260	-0.0263 [*]	-0.103 ^{**}	-0.0872	0.533 ^{**}	0.303
	(0.43)	(-2.04)	(-2.89)	(-1.10)	(3.86)	(1.07)
LOANSTA	0.0169 ^{***}	0.0171	0.0587 [*]	0.0803	0.00451	-0.0218
	(3.40)	(1.67)	(2.02)	(1.28)	(0.16)	(-0.86)
LOANSDEPO	-0.00012	-0.00015	-0.00013	-0.000183	0.00482	-0.0148 ^{***}
	(-1.35)	(-1.69)	(-0.26)	(-0.32)	(1.16)	(-4.08)
DEPOSITSTA	0.0176 ^{***}	0.0120	-0.00466	-0.0656	-0.524 ^{***}	-0.311
	(4.56)	(1.43)	(-0.21)	(-1.28)	(-3.78)	(-1.10)
LAGE	-0.00224		-0.00381		-0.266 ^{**}	
	(-1.21)		(-0.35)		(-3.01)	
LOGZ	0.00677 ^{***}	0.0680 ^{***}	0.0596 ^{***}	0.113 ^{***}	0.114 [*]	0.656 ^{***}
	(6.09)	(15.95)	(9.21)	(4.32)	(2.13)	(4.22)
FORE	-0.0167	0.0113	-0.480 ^{***}	0.129	-1.968 ^{***}	
	(-1.46)	(0.75)	(-7.24)	(1.38)	(-3.34)	
DOM	-0.0188	0.0108	-0.455 ^{***}	0.134	-1.720 ^{**}	0.0467
	(-1.64)	(0.82)	(-6.81)	(1.65)	(-2.89)	(0.12)
GOV	-0.0128		-0.451 ^{***}		-1.637 ^{**}	-0.360
	(-1.16)		(-7.00)		(-2.86)	(-0.60)
Macroeconomic variables						
LGDP	-0.00113	-0.049 ^{***}	-0.0114 ^{**}	-0.00678	-0.121 ^{***}	-0.0224
	(-1.58)	(-6.79)	(-2.74)	(-0.15)	(-4.30)	(-0.56)
INFLATION	-0.00104	-0.0535 ^{**}	-0.00333	-0.115	0.0205	-2.129 ^{**}
	(-1.03)	(-2.70)	(-0.57)	(-0.94)	(0.44)	(-2.68)
MCAP	0.000513	-0.00480	0.00312	0.115 ^{***}	-0.0692 [*]	-0.899 ^{***}
	(0.68)	(-0.89)	(0.71)	(3.45)	(-2.01)	(-4.67)
GFC	-0.00399	-0.00173	-0.00864	-0.00355	0.0326	0.0992
	(-1.60)	(-0.74)	(-0.59)	(-0.24)	(0.27)	(1.03)
Sigma	0.0125	0.796 ^{***}	0.608 ^{***}	-0.853	10.43 ^{***}	6.042 ^{***}
_cons	(0.56)	(4.54)	(4.65)	(-0.79)	(10.74)	(3.69)
R²	0.0643	0.1435	0.0683	0.0421	0.1284	0.0404
Number of banks	323	323	323	323	301	301
N	2423	2423	2423	2423	2215	2215

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, DEPOSITSTA: deposit ratio, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

domestic and public), GDP, inflation and stock market growth found to be significant and negative.

6.7 Conclusion of profitability and its determinants

The conventional banks found to be the most profitable banks scoring mean ROA equals to 1% whereas, average ROE is 7%. However, Islamic banks achieved moderate profitability ratios (mean ROA = 0.90% and mean ROE = 5.80%). Finally, socially responsible banks scored the least average ROA (0.50%) and ROE (2.50%) over the period 2005-2012.

In conclusion of NIM ratios, Islamic banks attained the highest NIM (3.862) followed by socially responsible banks which they scored mean NIM equal to 3.484. After that, conventional banks found to be the least profitable in terms of NIM (2.789). However, we can conclude the NIM determinants, Islamic banks determined positively by size of bank, capitalisation and z-score. On the other side, credit risk, GDP and market capitalisation had negative signs. According to the conventional banks, the relationship between the NIM and loan intensity, z-score and GFC were significant and positive. In contrast, size, deposit intensity, inflation, GDP and market capitalisation decreased the NIM significantly. Finally, the socially responsible banks were affected significantly negatively by size, deposit ratio, z-score, foreign ownership, domestic ownership, public ownership, GDP and market capitalisation. On the contrary, the capital ratio and credit risks had positive coefficient.

Overall, the size, deposit ratio (ROE), z-score and GDP (ROA-OLS) found to be affecting the Islamic banks' profitability positively. On the contrary, the capital ratio, loan intensity, GDP (ROA-FEM and ROE) and inflation influence the performance negatively. Concerning conventional banks, there is a positive and significant relationship between the profitability ratios (ROA/ROA) and the size, capital ratio, loan intensity, deposit ratio, z-score and market capitalisation. On the other side, the credit risk and GDP impacted ROA negatively and significantly. According to socially responsible banks, capital ratio, concentration of ownership and GDP minimised profitability, whereas z-score and market capitalisation development enhanced ROA and ROE over the period 2005-2012. According to NIM ratios, Islamic banks attained the highest NIM (3.862) followed by socially responsible

banks which they scored mean NIM equal to 3.484. After that, conventional banks found to be the least profitable in terms of NIM (2.789). However, we can conclude the NIM determinants, Islamic banks determined positively by size of bank, capitalisation and z-score. On the other side, credit risk, GDP and market capitalisation had negative signs. According to the conventional banks, the relationship between the NIM and loan intensity, z-score and GFC were significant and positive. In contrast, size, deposit intensity, inflation, GDP and market capitalisation decreased the NIM significantly. Finally, the socially responsible banks were affected significantly negatively by size, deposit ratio, z-score, foreign ownership, domestic ownership, public ownership, GDP and market capitalisation. On the contrary, the capital ratio and credit risks had positive coefficient.

However, Appendix 15 concludes the profitability averages for Islamic, conventional and socially responsible banks. In addition, Appendix 15 states the highest and lowest measures over the period 2005-2012.

Appendix 16 presents the significant variables that influenced profitability in Islamic, conventional and socially responsible banks through the 2005-2012 periods. Appendix 16 shows that market capitalisation was found to be the main factor for profitability. Thus, governments need to be concerned about improving the stock market. Additionally, banks can grow their profitability through investing more in countries with higher market capitalisation. However, inflation was found to be affecting significantly and negatively the profitability. This result is a warning to banks against operating in countries with higher inflation rates. The GFC has not affected profitability in Islamic, conventional and socially responsible banks.

In general, the additional variables (listing and corruption control) estimated that listed banks were more profitable and the corruption supervision increasing the returns of banks effectively in Islamic, conventional and socially responsible banks.

In MENA region including GCC countries, the conventional banks attained better ROA and ROE measures than Islamic banks. In contrast, Islamic banks had the advantage where NIM values are concerned. In MENA region without GCC countries, we can conclude that the socially responsible banks were found to be the least profitable banks compared to conventional (which have the highest ROA and NIM ratios) and Islamic banks (that have the best ROE measures). Finally, in

GCC region, conventional banks attained better ROA and ROE ratios but worse NIM values than Islamic banks over the period 2005-2012. According to the determinants of profitability, the stability in banking (z-score) is vitally important to improve profitability in Islamic, conventional, and socially responsible banks in terms of bank-specific factors. Regarding the macroeconomic variables, over the period of the global financial crisis (2007-2009), the socially responsible banks were found to be more profitable, which is against all expectations. Additionally, the profitability of Islamic banks was not influenced significantly by the global financial crisis.

In the UK, Islamic banks were found to be the most profitable banks in terms of ROA and NIM ratios but attained the worst ROE measures. The SRBs invested their capitals more efficiently compared to Islamic and conventional banks. Finally, the conventional banks attained very weak ROA and NIM over the period 2005-2012. According to determinants, the financial stability in Islamic, conventional and socially responsible banks was found to be very important to ROA and ROE. In addition, the results concluded that lending services are supportive to profitability ratios of conventional banks. Overall, conventional banks attained outstanding interest profits during the global financial crisis period.

Chapter Seven: Results and Discussion of Stability

7.1 Results of stability

Most studies in the recent studies estimated the financial stability by using z-score and utilised it as a dependant variable to find the determinants of insolvency risk (see Kohler, 2015; Tabak *et al.*, 2015; Anginer *et al.*, 2014; Chalermchatvichien *et al.*, 2014; Cubillas & González, 2014; Diaconu & Oanea, 2014; ; Dima *et al.*, 2014; Dong *et al.*, 2014; Fu *et al.*, 2014; Ghosh, 2014; Gulamhussen *et al.*, 2014; Lee & Hsieh, 2014; Rumler & Waschiczek, 2014; Williams, 2014). Furthermore, many studies focused on determinants of capitalisation (Horvath *et al.*, 2014; Schaeck and Cihák, 2014; DeYound & Torna, 2013). In this study, z-score and capital ratio are employed to find the factors of stability over the period 2005-2012 in Islamic, commercial and socially responsible banks. Table 7.1 below shows the data description of stability ratios (z-score and capital ratio), which specify the most stable type of banks. Table 7.1 concludes that the most stable banks are the socially responsible banks scoring 3.898 and 0.305 for log (z-score) and capitalisation, respectively (*H3* is accepted). In contrast, Islamic banks found to be the most unstable banking systems in terms of z-score measures (2.622), which mean that Islamic banks were highly exposed insolvency (default) risks compared to socially responsible and conventional banks. Finally, conventional banks had the minimum capital ratios (0.140); this result threatened the conventional banks to have more debts than equity (capital risk). However, the empirical results of the correlation between z-score (explained variable) and the explanatory variables can be shown in this chapter. This relationship estimates the determinants of stability in Islamic, conventional and socially responsible banks through the period 2005-2012. Appendix 14 shows the average natural logarithms of z-score measures in yearly order.

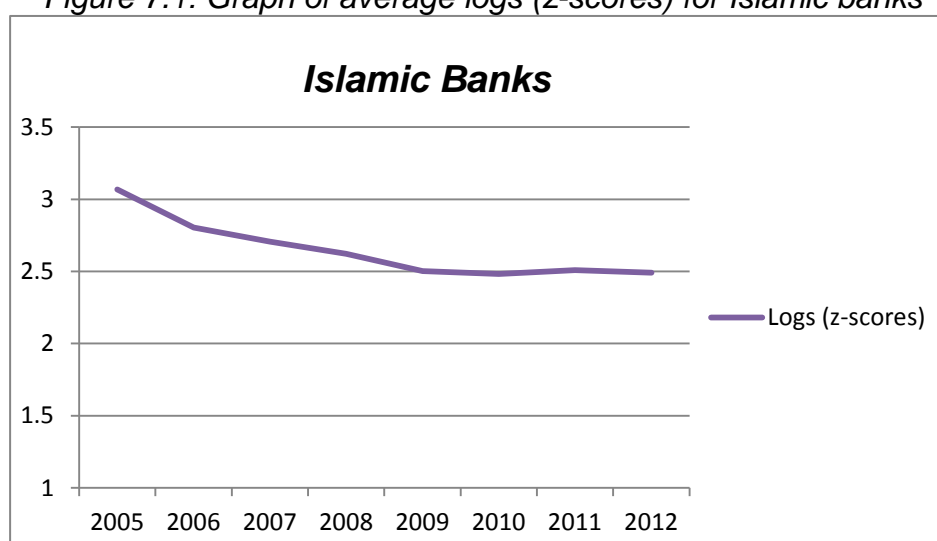
With regard to Islamic banks, it is clear from Figure 7.1 below that the z-score in Islamic banks started very high in 2005, achieving a log (z-score) equal to 3.0680, then the graph kept decreasing until 2010 (2.4829, which is the minimum value). In 2011, the z-score increased slightly to 2.5096, then dropped again in 2012 (2.490).

Table 7.1: Data description of stability ratios

Type	Ratio	Obs	Mean	Std. Dev.	Min	Max
Islamic Banks	Log (z-score)	312	2.622	1.002	-1.72	5.51
	Capital ratio	312	0.249	0.309	0.02	4.01
Conventional Banks	Log (z-score)	1827	2.985	1.085	-3.27	5.19
	Capital ratio	1827	0.140	0.18	0.01	5.23
Socially Responsible Banks	Log (z-score)	284	3.898	1.165	0.92	6.26
	Capital ratio	284	0.305	0.326	0.01	0.96
All Banks	Log (z-score)	2423	3.045	1.134	-3.27	6.26
	Capital ratio	2423	0.231	0.229	0.005	5.23

Overall, Islamic banks were very settled in 2005, but more at risk of going bankrupt in 2010 due to scoring the lowest value of mean log (z-score).

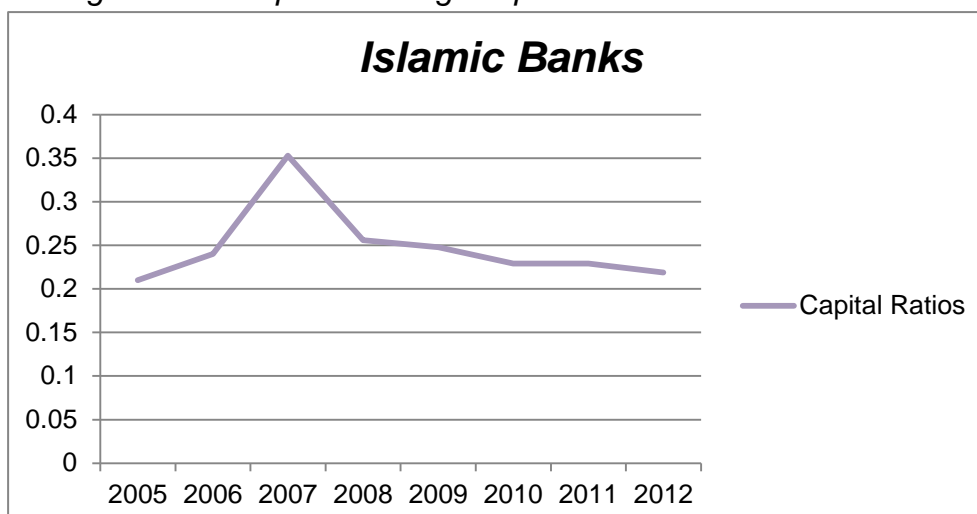
Figure 7.1: Graph of average logs (z-scores) for Islamic banks



Later, the results of OLS and fixed effects regressions explain the factors that increased or reduced the stability of Islamic banks over the period 2005-2012.

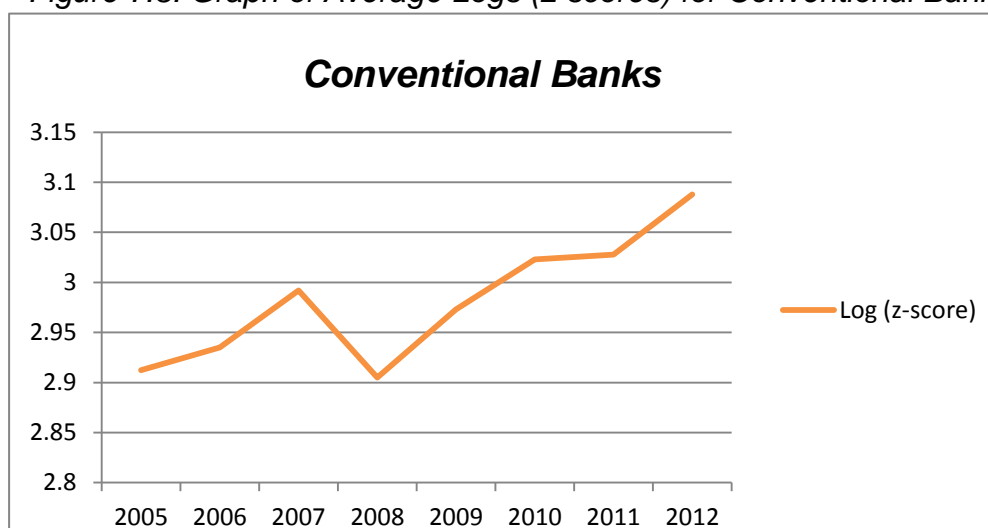
According to capital ratios, Figure 7.2 below demonstrates that in Islamic banking, the capitalisation was increased from 2005 (0.210) to 2007 (0.240, the highest value). After that the capital ratio collapsed over the period 2007-2012 (0.219). These reductions threaten the stability in Islamic banks very badly. Therefore, finding the reasons of collapsing allow banks to improve their stability.

Figure 7.2: Graph of average capital ratios for Islamic banks



As regards conventional banks, the highest overall log (z-score) attained in 2012 was a score of 3.0877, whereas the lowest was achieved in 2008 (2.9049), as seen in Figure 7.3 below. This may have been due to the global financial crisis. As a result, the OLS and FEM could find if there is an impact of the financial crisis on stability. During the period 2005-2007, stability rose continuously (3.0680, then 2.8038 and 2.7063 in 2005, 2006 and 2007, respectively) but collapsed in 2008. After 2008, the z-score graph kept improving from 2.9731 in 2009 to 3.0877 in 2012.

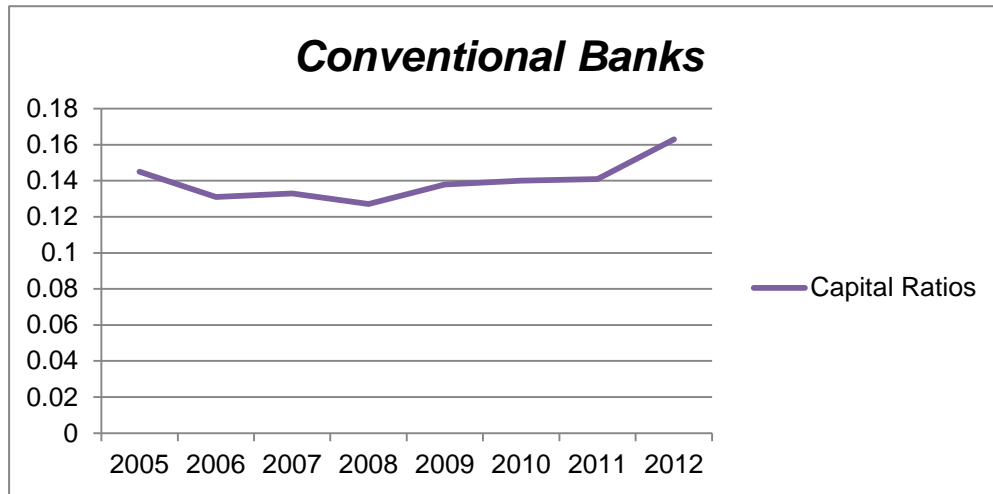
Figure 7.3: Graph of Average Logs (z-scores) for Conventional Banks



Regarding the capital ratios in conventional banks, Figure 7.4 below illustrates how capitalisation kept dropping from 0.145 in 2005 to 0.127 in 2008. Then slightly the capital ratios improved over the period 2008- 2011 (0.141). After that, majorly,

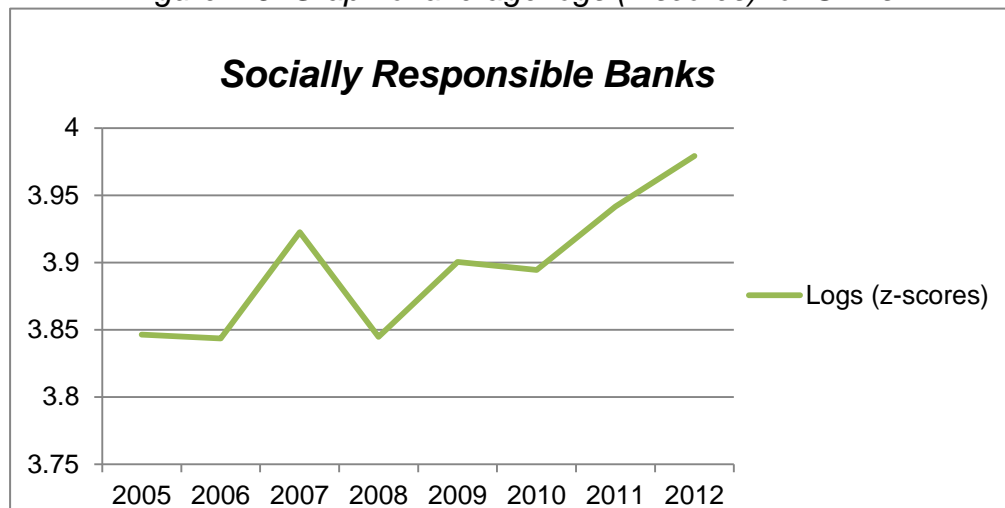
the capitalisation maximise in 2012 scoring 0.163 which considered being the highest measure.

Figure 7.4: Graph of Average capital ratio for Conventional Banks



Focusing on socially responsible banks, Figure 7.5 below illustrates that the mean log (z-score) ranged between 3.8434 in 2006 and 3.9792 in 2012. However, stability grew outstandingly in 2007 (3.9226) then reduced in 2008 (3.8447). After that, the z-score improved in 2009 (3.9004), but in 2010 the graph dropped slightly to 3.8944. Over the period 2011-2012, Figure 7.5 below shows that these years were financially steady compared to the rest of the years, scoring an average log (z-score) equal to 3.9415 and 3.9792 for 2011 and 2012, respectively.

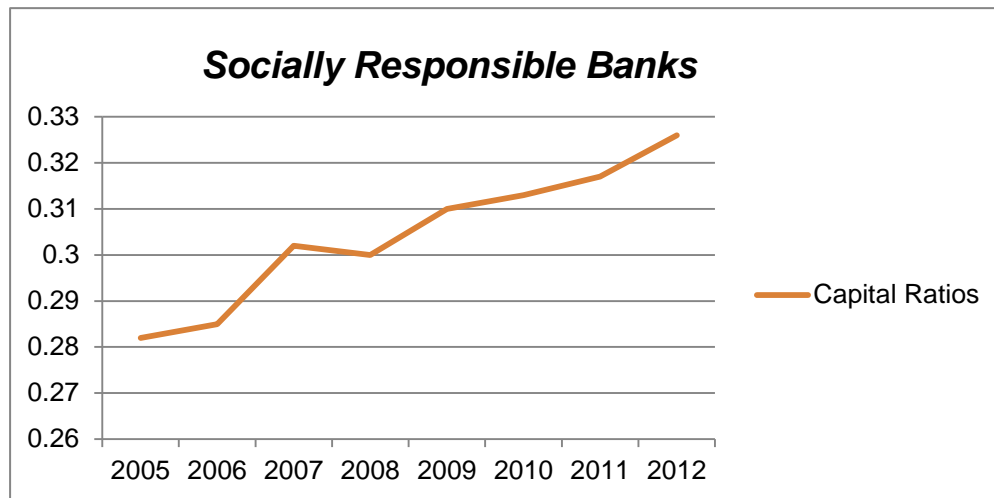
Figure 7.5: Graph of average logs (z-scores) for SRBs



The capital ratios for SRBs in Figure 7.6 below started in 2005 very low (0.282) then improved in 2006 (0.285) and 2007 (0.302). In 2008, the capitalisation faintly decreased (0.300) but after 2008, the capital constantly enlarged from 2009-2012

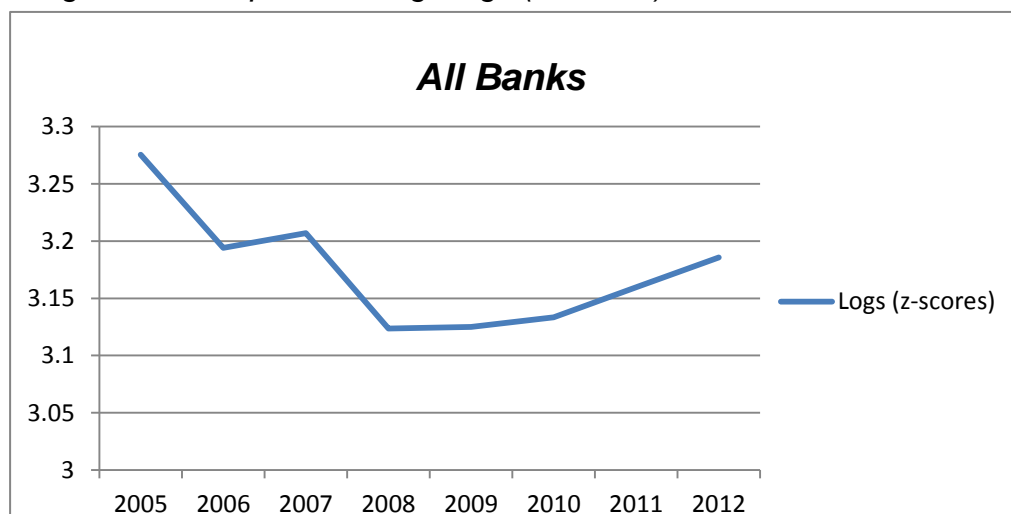
scoring average capital ratios equal to 0.310 in 2009 and 0.326 (the largest) in 2012.

Figure 7.6: Graph of average capital ratios for SRBs



Overall, all banks confirm that the most stable year was 2005 (as shown in Figure 7.7 below), scoring average logs (z-scores) equal to 3.2755. In 2006, the risk of insolvency increased as the z-score was reduced (3.1941), but in 2007 all banks attained a higher z-score (3.2069). The riskiest year was 2008 (3.1236), which may have been due to the global financial crisis. Over the period 2009-2012, the financial stability of all banks carried on improving from a mean log (z-score) equal to 3.1250 in 2009 to 3.1857 in 2012.

Figure 7.7: Graph of average logs (z-scores) for all banks



Referring to capitalisation ratios, Figure 7.8 indicates varied between 0.212 in 2005 to 0.262 in 2007. In 2008, the average capital ratio declined to 0.227 and weakly changed over the period 2009-2012 (0.232-0.236).

Figure 7.8: Graph of average capital ratios for all banks

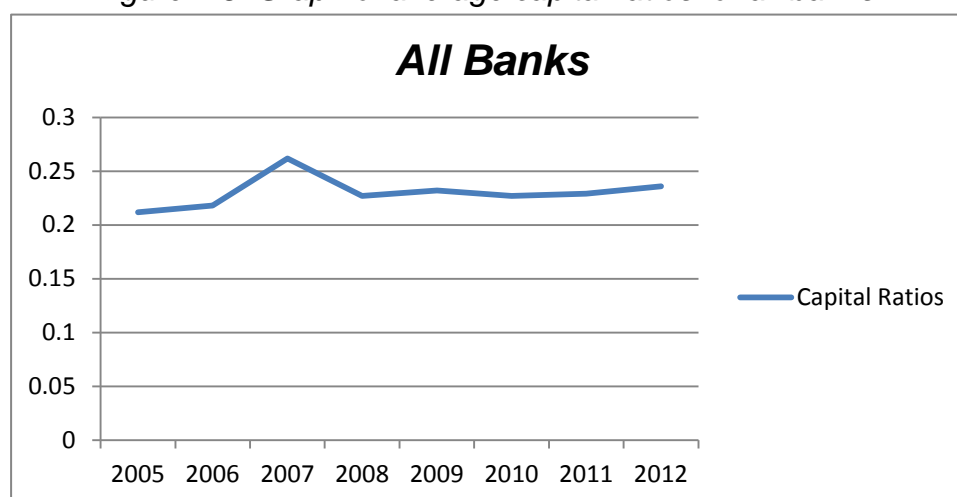


Table 7.2 below compares the stability between the countries in the sample to demonstrate which country faced high or low risk of insolvency (bankruptcy). In addition, it determines the highest and lowest banking capitalisation. Table 7.2 however indicates that Nepalese socially responsible bank found to be the most well capitalised bank (0.850), which means that this capital includes 85% of owners' equity and 15% debts. In comparison, a majority of capital in German banks in the sample derived from debts, which is very risky for the banks to obligate with liabilities.

The Bolivian socially responsible banks (Banco FIE and Banco Solidario) attained the highest mean log (z-score), scoring 5.3783, which means the most stable banking sector in this study was in Bolivia. However, the socially responsible Canadian bank, namely the Citizens Bank of Canada, was exposed to a very high risk of failure compared to the rest of the banks. In general, all banks strove to maximise their z-score (stability) by increasing capitalisation and ROA and minimising the risk of failure.

7.2 Determinants of stability

The natural logarithm of z-score dealt as an explained variable (following the approach of Chalermchatvichien *et al.*, 2014) in Table 7.3. Regarding the capital

Table 7.2: Averages stability ratios by country

N	Country	Mean Log (z)	Mean Capital R.	Banks in the sample	Number of Banks
1	USA	2.223	0.408	Socially Responsible Banks	1 SRB
2	Germany	4.530	0.047	Socially Responsible Banks	3 SRB
3	France	3.945	0.083	Socially Responsible Banks	1 SRB
4	UK	2.737	0.126	Islamic, Conventional and Socially Responsible Banks	3 IB, 74 CB and 6 SRB
5	Canada	1.666	0.098	Socially Responsible Banks	1 SRB
6	Australia	3.667	0.081	Socially Responsible Banks	1 SRB
7	Spain	2.312	0.091	Socially Responsible Banks	1 SRB
8	Netherlands	4.075	0.059	Socially Responsible Banks	2 SRB
9	Saudi Arabia	2.720	0.249	Islamic and Conventional Banks	3 IB and 9 CB
10	Switzerland	4.798	0.064	Socially Responsible Banks	1 SRB
11	Norway	3.504	0.111	Socially Responsible Banks	1 SRB
12	Austria	3.458	0.460	Socially Responsible Banks	1 SRB
13	UAE	2.890	0.187	Islamic and Conventional Banks	6 IB and 17 CB
14	Iran	3.763	0.240	Islamic and Socially Responsible Banks	7 IB and 1 SRB
15	Denmark	3.136	0.137	Socially Responsible Banks	5 SRB
16	Israel	3.479	0.061	Conventional Banks	8 CB
17	Egypt	2.554	0.104	Islamic and Conventional Banks	2 IB and 21 CB
18	Iraq	2.528	0.230	Conventional Banks	2CB
19	Algeria	3.340	0.264	Islamic, Conventional and Socially Responsible Banks	1 IB, 9 CB and 3 SRB
20	Qatar	3.001	0.331	Islamic and Conventional Banks	3 IB and 6 CB
21	New Zealand	3.382	0.083	Socially Responsible Banks	1 SRB
22	Kuwait	2.543	0.138	Islamic and Conventional Banks	2 IB and 6 CB
23	Bangladesh	3.090	0.071	Socially Responsible Banks	1 SRB
24	Morocco	3.853	0.197	Conventional and Socially Responsible Banks	8 CB and 1 SRB
25	Oman	3.246	0.140	Conventional Banks	7 CB
26	Syria	2.897	0.129	Conventional Banks	5 CB
27	Libya	3.293	0.076	Conventional Banks	5 CB
28	Tunisia	3.252	0.233	Islamic, Conventional and Socially Responsible Banks	1 IB, 8 CB and 2 SRB
29	Lebanon	3.734	0.091	Conventional Banks	28 CB
30	Yemen	3.091	0.135	Islamic and Conventional Banks	4 IB and 1 CB
31	Jordan	3.457	0.152	Islamic and Conventional Banks	1 IB and 7 CB
32	Bahrain	2.258	0.303	Islamic and Conventional Banks	9 IB and 15 CB
33	Bolivia	5.378	0.832	Socially Responsible Banks	2 SRB
34	Nepal	4.891	0.850	Socially Responsible Banks	1 SRB
35	Mongolia	4.863	0.666	Socially Responsible Banks	1 SRB
36	Malta	3.806	0.322	Conventional and Socially Responsible Banks	4 CB and 1 SRB
37	Palestine	3.263	0.143	Islamic and Conventional Banks	1 IB and 2 CB
	All Banks	3.368	0.216	Islamic, Conventional and Socially Responsible Banks	323 banks (43 IB, 242 CB and 38 SRB)

ratio, equity to total assets formula is employed (Nguyen & Nghiem, 2015) as in Table 7.4. However, the statistical models employed are OLS and FEM to find the association between stability ratios (z-score and capitalisation) and their determinants (as in Table 7.3 and Table 7.4) over the period 2005-2012 for Islamic, conventional and socially responsible banks.

7.2.1 Determinants of stability in Islamic banks (UK and MENA), MT

7.2.1.1 Determinants of z-score in Islamic banks (UK and MENA), MT

The empirical results for Islamic banks of the OLS and FEM are presented in Table 7.3. The main aim is to find which variables affected stability over the period 2005-2012. According to bank-specific variables, OLS finding suggest that larger banks were more stable and less risky than smaller banks. Many studies confirmed that higher total assets enhance stability such as studies of for Tabak *et al.* (2015), Cubillas and González (2014), Beck *et al.* (2013a), Srairi (2013), Nguyen *et al.* (2012), Soedarmono *et al.* (2011), Houston *et al.* (2010) and Berger *et al.* (2009). Regarding FEM result, larger-sized Islamic banks engaged in more risk-taking than smaller banks. This was proposed by Kohler (2015), Zhang *et al.* (2015), Dong *et al.* (2014), Fu *et al.* (2014), Beck *et al.* (2013b), Mirzaei *et al.* (2013), Tan and Floros (2013), Agoraki *et al.* (2011) and Barry *et al.* (2011). However, the coefficients of capital ratio are highly and significantly correlated with z-score at a 0.1% level, which means that higher banks' capitalisation raises the capabilities of banks to be more stabilised, like Ghosh (2015), Kohler (2015), Tabak *et al.* (2015), Williams (2014), Mirzaei *et al.* (2013), Nguyen *et al.* (2012) and Zhang *et al.* (2012) who have the same result. Regarding the loan intensity, two aspects have been generated by OLS and FEM. The OLS finding shows that providing more loans tends to increase stability. This encourages banks to raise their lending activities due to be further from insolvency risk which supported by Kohler (2015). On the other side, FEM supposes that higher loans raise the threat of insolvency, which agrees with Rumler and Waschiczek's (2014), Beck's *et al.* (2013), Bourkhis and Nabi's (2013), Berger's *et al.* (2009) findings. Concerning profitability, ROA was found to be a major determinant of stability as there is a positive and significant relationship between ROA and z-score (similar to Anginer *et al.*, 2014) at the level of 0.1% and 1% for OLS and FEM, respectively. As a result, banks strive to generate the maximum profits by using the minimum amount of inputs. Ghosh (2014) could not prove any relationship between ROA and z-score. Concentrating on operating leverage ratio, there is a negative association between operating leverage and bank risk (OLS). In other words, greater concentration of fixed assets against total assets leads to a decrease in stability. The assumption is the same with Berger's *et al.* (2009) argument. This underlines

Table 7.3: Results of z-score determinants for Islamic (UK and MENA), conventional (UK and MENA) and SRBs (across the world), MT

Stability	Islamic Banks		Conventional Banks		Socially responsible Banks	
	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
	Log(z)	Log(z)	Log(z)	Log(z)	Log(z)	Log(z)
Bank-specific variables						
LTA	0.180***	-0.182***	-0.056***	-0.329***	-0.107***	-0.0924**
	(4.37)	(-4.05)	(-4.07)	(-13.89)	(-3.52)	(-2.84)
EQTA	1.557***	1.432***	-0.371*	0.823***	0.931**	3.347***
	(5.88)	(12.50)	(-2.02)	(10.63)	(2.79)	(14.48)
LOANSTA	0.844***	-0.511***	-0.278**	-0.102*	0.298	-0.101
	(3.50)	(-4.56)	(-3.18)	(-2.06)	(0.91)	(-0.96)
LOANSDEPO	-0.00127	0.000501	0.00443*	0.000218	0.0300	0.565***
	(-0.58)	(0.81)	(2.22)	(0.35)	(0.11)	(7.06)
ROA	1.066***	1.439***	7.422***	2.065***	4.339	4.427***
	(3.01)	(14.89)	(8.23)	(6.63)	(0.84)	(4.12)
FATA	-7.718**	-1.333	2.009	3.295***	0.354	2.984
	(-2.88)	(-1.27)	(1.16)	(3.78)	(0.08)	(1.92)
LAGE	0.643***		-0.00480		0.173*	
	(5.99)		(-0.13)		(2.03)	
FORE		0.0405	-1.842***	-0.114	-1.245***	
		(0.26)	(-4.92)	(-1.34)	(-5.16)	
DOM	0.447***	0.0298	-1.636***	-0.0755	-2.078***	
	(3.58)	(0.21)	(-4.42)	(-1.03)	(-6.73)	
GOV	0.357*		-1.747***		-0.924***	
	(2.00)		(-4.77)		(-3.81)	
Macroeconomic variables						
LGDP	-0.292***	0.129	-0.089**	0.438***	-0.176***	0.293***
	(-7.31)	(1.61)	(-5.99)	(10.38)	(-3.54)	(3.45)
INFLATION	-0.422	-0.245	-1.975***	-0.0276	-0.153***	-0.563
	(-0.75)	(-1.47)	(-5.32)	(-0.23)	(-7.06)	(-1.90)
MCAP	-0.696***	0.00738	0.0278	0.154***	-0.163	0.0235
	(-6.30)	(0.12)	(1.63)	(4.89)	(-1.40)	(0.43)
GFC	-0.0385	0.000955	-0.00806	-0.0317*	-0.0150	0.0149
	(-0.38)	(0.04)	(-0.16)	(-2.26)	(-0.15)	(0.76)
Sigma	6.201***	0.560	7.708***	-5.941***	10.39***	-3.940
_cons	(5.81)	(0.29)	(13.92)	(-5.80)	(7.28)	(-1.92)
R ²	0.5095	0.7139	0.1101	0.3706	0.5126	0.6109
Number of banks	43	43	242	242	38	38
N	312	312	1827	1827	284	284

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global Financial Crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

strategies against fixed assets such as selling (or depreciation) more fixed assets due to higher costs (of fixed assets). According to age of banks, older banks scored better z-score than new banks, which means that older banks were less risky than new banks. Lee and Chich's (2013) and Mirzaei's *et al.* (2013) studies proved the same result. As regards ownership, OLS regression confirms that Islamic domestic banks are more settled than government banks, but OLS could not determine a coefficient for foreign banks. The FEM failed to estimate the coefficient of government banks, but FEM claims that Islamic foreign banks were less risky than domestic banks over the period 2005-2012. Overall, the Islamic domestic and government banks concentration level raise stability. In the literature, many studies analysed the effect of ownership upon stability in banking, such as Mirzaei *et al.* (2013) who found that increment in foreign bank levels tends to reduce the risk-taking percentages and Agoraki *et al.* (2011) approved that public ownership enhanced the stability. In contrast, Agoraki *et al.* (2011) and Berger *et al.* (2009) assumed that foreign ownership concentration increased the risk of insolvency. Referring to the macrocosmic variables, OLS findings states that GDP growth decreases the stability of Islamic banking, which is consistent with the results of Cubillas and González (2014). In contrast, Nguyen *et al.* (2012) confirm that GDP development leads to more stable banks. Finally, market capitalisation was found to have a negative and significant relationship to stability at the level of 0.1% following the OLS coefficient. This contrast with Nguyen *et al.* (2012) who noted that growth in the stock market makes banks steadier against any loss.

In general, Islamic banks have not been influenced by inflation and the global financial crisis. These two indicators represent the main challenges to any profitable or non-profitable firm. Williams (2014) did not find a relationship between inflation rate and z-score. In addition, Bourkhis and Nabi (2013) could not find any impact of the global financial crisis on banking stability.

According to R squared values, the consistency between the explanatory variables is very high, with log (z-score) measures as R^2_{OLS} equal to 50.95% and R^2_{FEM} equal to 71.39%. Figure 7.9 draws the association between z-score and its factors.

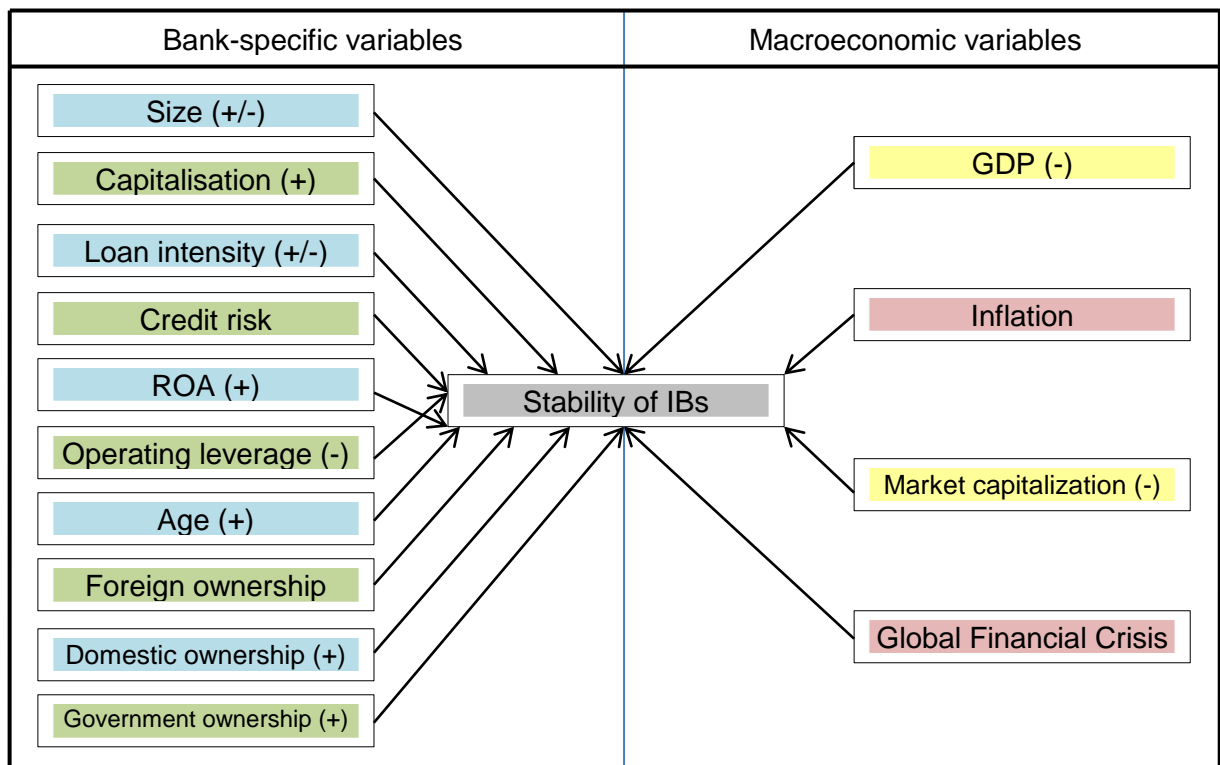


Figure 7.9: Significant variables that influence z-score for Islamic banks, MT

7.2.1.2 Determinants of capital ratio in Islamic banks (UK and MENA), MT

According to capital ratio determinants, Table 7.4 displays the empirical results of OLS and FEM for Islamic banks. Based on the Table 7.4 results of capital ratio determinants for Islamic banks, smaller sized found to be better capitalised than greater sized banks, which is opposite the expectation. This could be due to Islamic banks used their own equity to invest rather than borrowing. Many studies estimated the same result, e.g. Ghosh (2014), Schaeck and Cihák (2014), Horváth *et al.* (2014), Beck *et al.* (2013a), Bertay *et al.* (2013) and Berger *et al.* (2009). But, as anticipated, loan intensity has a strong influence on capitalisation at a 0.1% level. This encourages banks to raise lending activities. Berger *et al.* (2009) found inverse association between capital ratio and loan intensity. However, credit risk shows a significant and positive relationship with capital ratio. In this case, banks could accept more deposits due to reduce the credit risk. This finding is consistent with Nguyen and Nghiem (2015) argument. However, there is a negative and significant correlation between capitalisation and ROA. This relationship shows that costs of banks found to be greater than income. Banks could find strategies to cut costs due to achieving more stability and avoid any default risks. According to operating leverage, fixed assets intensity supported the stability positively and

Table 7.4: Results of capital ratio determinants for Islamic (UK and MENA), conventional (UK and MENA) and SRBs (across the world), MT

Stability	Islamic Banks		Conventional Banks		Socially responsible Banks	
	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
	Capital ratio	Capital ratio	Capital ratio	Capital ratio	Capital ratio	Capital ratio
Bank-specific variables						
LTA	-0.0518***	-0.0194	-0.021***	-0.0621***	0.0121*	-0.0126
	(-6.19)	(-0.98)	(-12.47)	(-8.03)	(2.18)	(-1.87)
LOANSTA	0.00904	0.348***	0.121***	0.230***	-0.457***	0.0919***
	(0.17)	(7.74)	(11.11)	(15.85)	(-8.78)	(4.42)
LOANSDEPO	0.00104*	0.0000269	0.00176***	0.0000038	0.175***	-0.151***
	(2.25)	(0.10)	(7.00)	(0.02)	(3.79)	(-9.96)
ROA	-0.211**	-0.347***	2.230***	1.657***	-1.615	-0.564*
	(-2.68)	(-6.63)	(21.23)	(18.38)	(-1.75)	(-2.51)
FATA	5.828***	3.177***	0.870***	0.104	1.382	-0.451
	(12.49)	(7.83)	(3.96)	(0.38)	(1.76)	(-1.41)
LAGE	-0.0996***		-0.0213***		-0.00330	
	(-4.12)		(-4.48)		(-0.21)	
LOGZ	0.0491***	0.264***	-0.00607*	0.0814***	0.0302**	0.141***
	(3.57)	(12.51)	(-2.02)	(10.63)	(2.79)	(14.48)
FORE		-0.0456	-0.0480	-0.0336	0.106*	
		(-0.68)	(-1.00)	(-1.25)	(2.36)	
DOM	-0.0540*	-0.0378	-0.0634	-0.0121	-0.0518	
	(-2.01)	(-0.61)	(-1.33)	(-0.53)	(-0.86)	
GOV	-0.0261			-0.0101	0.0475	
	(-0.68)			(-0.21)	(1.06)	
Macroeconomic variables						
LGDP	0.0207*	0.0148	0.00637***	0.0490***	-0.049***	0.00897
	(2.41)	(0.43)	(3.32)	(3.58)	(-5.75)	(0.50)
INFLATION	0.00153	-0.0408	-0.0204	-0.0476	-0.00677	0.0708
	(0.01)	(-0.57)	(-0.43)	(-1.25)	(-1.60)	(1.16)
MCAP	0.151***	0.0172	-0.000275	-0.0216*	-0.0107	0.00624
	(6.57)	(0.67)	(-0.13)	(-2.16)	(-0.51)	(0.56)
GFC	0.0308	0.0154	-0.00232	0.00346	-0.00204	-0.00206
	(1.43)	(1.37)	(-0.37)	(0.78)	(-0.11)	(-0.51)
Sigma	0.0859	-0.884	0.208**	-0.954**	1.487***	-0.391
_cons	(0.37)	(-1.07)	(2.80)	(-2.94)	(5.59)	(-0.92)
R ²	0.6533	0.8236	0.4689	0.5661	0.7976	0.6051
Number of banks	43	43	242	242	38	38
N	312	312	1827	1827	284	284

Notes: LTA: bank size, LOANSTA: loans intensity, LOANSDEPO: credit risk, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, LOGZ: z-score, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

significantly and further Islamic banks from insolvency risks. Berger *et al.* (2009) and Beck *et al.* (2013a) underlined how fixed assets could effectively enhance the stability and capitalisation. Regarding age of banks, on the contrary of anticipation, new banks found to be well capitalised compared to older banks. This finding is confirmed by Schaeck and Cihák (2014) for European commercial banks. However, a strong positive and significant association at the level of 0.1% found to be between capital ratio and z-score. Banks with higher capital were more stable and less risky. Horvath's *et al.* (2014) study also attained that capital ratio was highly correlated with z-score in Czech Republic banking sector. Furthermore, domestic banks only had a significant and negative sign, due to high competition in banking sector, Islamic banks suffered from decreasing in capitalisation, which increase bankruptcy risks. Regarding to industry-specific variables, banks operating in countries with higher GDP growth and stock market development were more constant and able to reduce default risk. Finally, we can conclude that the independent variables are highly consistent with the dependent variable (capital ratio) scoring $R^2 = 65.33\%$ and 82.36% for OLS and FE models.

The recent significant results for capital ratio can explained in Figure 7.10 below.

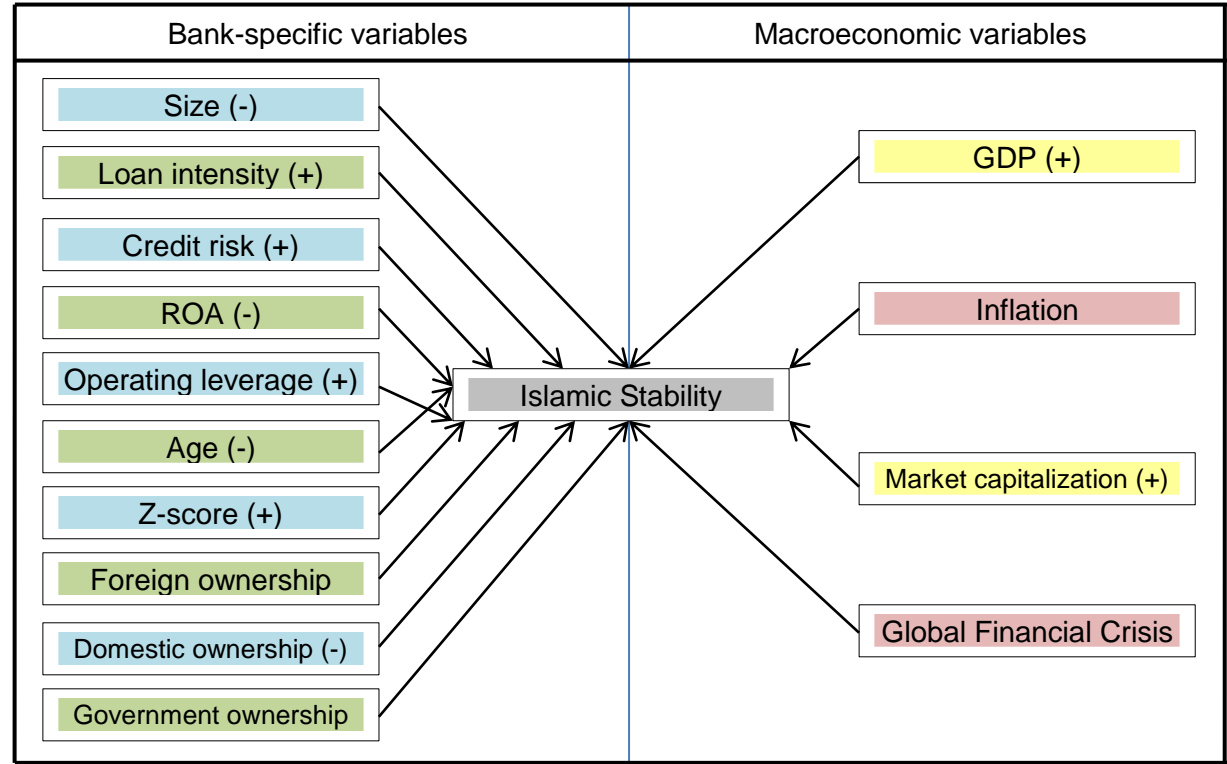


Figure 7.10: Significant variables that influence capital ratio for Islamic banks, MT

7.2.2 Determinants of stability in conventional banks (UK and MENA), MT

7.2.2.1 Determinants of z-score in conventional banks (UK and MENA), MT

The recent Table 7.3 demonstrates the results of OLS and FEM for conventional banks over the period 2005-2012. Focusing on the determinants of stability (z-score) in conventional banks, banks with lower total assets were found to be more resistant against bankruptcy, like Islamic banks. The capital ratio has a negative and significant relationship with stability at a 5% level in terms of OLS coefficient (see Tabak *et al.*, 2013). Further, capital ratio has a high correlation with z-score at a 0.1% level. More capitalisation leads to more stability in conventional banks. The determinant relationship with z-score is also consistent with Islamic banks. Moreover, loan intensity affects the stability negatively and significantly at 0.1% referring to OLS regression. Thus, conventional banks need to reduce loans that are generated by total assets due to raise the stability. The z-score increases the credit risk referring to the OLS results. Jeon and Lim (2013) found the same relationship between z-score and credit risk. On the other hand, Lee and Chih (2013) argue that there is a negative and significant correlation between z-score and credit risk (loans to deposits ratio). Concerning the profitability ratio, ROA is found to be affecting stability positively and ROA is strongly correlated with z-score at 0.1% as with Islamic banks. According to operating leverage ratio, FEM proposes that higher fixed assets make conventional banks less risky and more stable. Consequently, banks need to invest in necessary fixed assets to achieve their goals (consistent with Williams, 2014; Srairi, 2013). With regard to ownership, the OLS model confirms that the existence of domestic, foreign and government banks raises the risk of insolvency. The most stabilised conventional banks are domestic banks which have a higher coefficient (-1.636) than government banks (-1.747) and the riskiest banks are foreign commercial banks (-1.842) following the OLS regression. All macroeconomic variables determine the stability of conventional banks. In detail, the OLS model noted that countries which have less gross domestic production tend to have steadier banks referring to the OLS coefficient (-0.0892). On the contrary, the FEM coefficient (0.438) identifies that GDP influences stability positively and significantly at a 0.1% level. Moreover, inflation increases the overall risk and makes banks nearer from failure. This relationship is consistent with Cubillas and González's (2014) conclusion. In contrast, Bourkhis and Nabi (2013) proved that inflation determines stability

positively in Islamic and commercial banks in their study. However, the growth in the stock market (the market capitalisation variable) stabilises the conventional banks (less risk). Nguyen *et al.* (2012) confirm that market capitalisation development leads to making banks more resistant to bankruptcy. The global financial crisis affected the stability significantly and negatively. This correlation between GFC and stability is in line with Anginer's *et al.* (2014) and Williams's (2014) point of view demonstrating that the GFC decreased z-scores and increased the risk-taking in their studies.

Overall, the R squared of OLS regression was 11.01%, whereas the R squared of FEM scored 37.06%. In other words, the independent variables following FEM are more appropriate than the OLS model. Figure 7.11 simplifies the relationship between the stability and its factors for conventional banks.

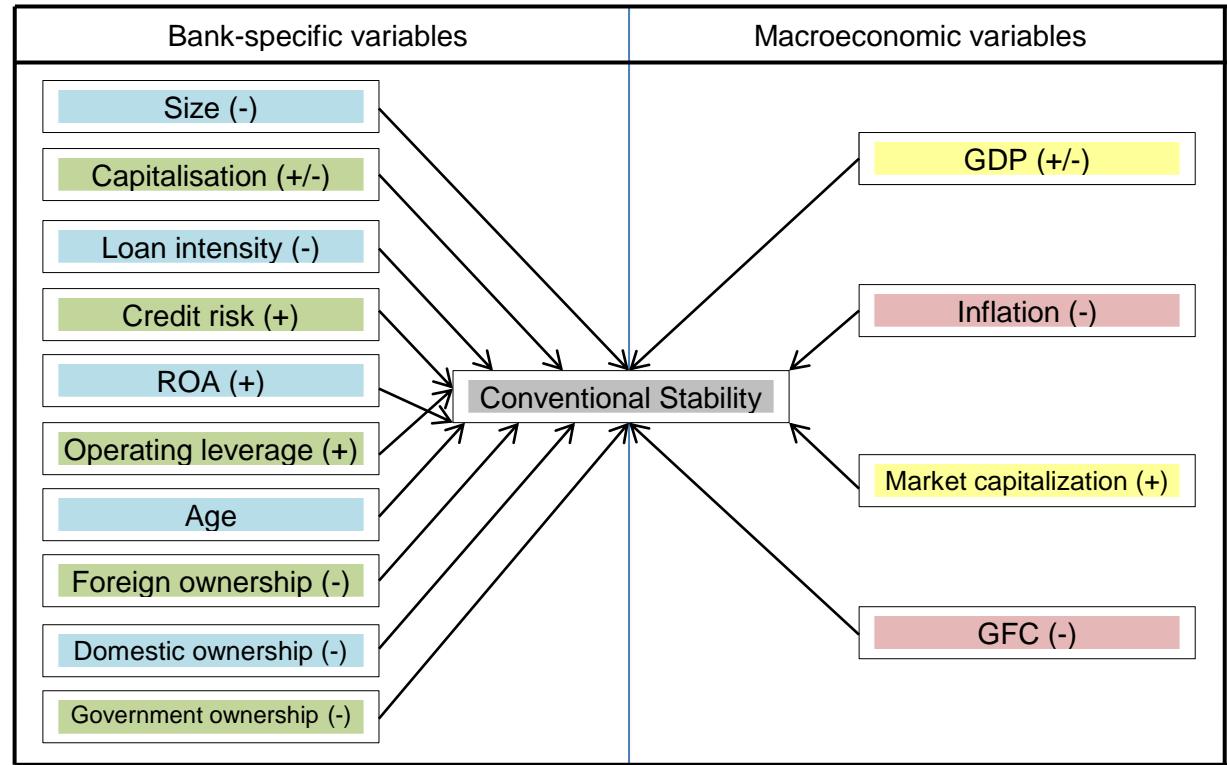


Figure 7.11: Significant variables that influence z-score for conventional banks

7.2.2.2 Determinants of capital ratio in conventional banks (UK and MENA), MT

Focusing on the capitalisation determinations as mentioned earlier in Table 7.4. As Islamic banks, conventional smaller banks found to be steadier than larger banks. Furthermore, the relationship between capital ratio and loan intensity is significant

and positive. Evermore, credit risk has a significant and positive sign. As expected, ROA was significantly and positively improving capitalisation in conventional banking sector. The profits allowed banks to invest more, which made banks financially stabilised and able to face any financial distress. This outcome is in line Ghosh (2012) finding for GCC banking systems. According to fixed assets intensity, operating leverage had a positive and significant relationship with capitalisation, like Islamic banks. Also, new banks scored better capital ratios than older banks. Regarding to z-score's coefficients, OLS suggests that increasing capital resulted to raise instability (more default risk). On the other side, FEM proposes that banks higher capital were steadier and less risky. In this case, we can confirm that FEM is more accurate and more realistic. However, based on the macroeconomic variables, GDP growth is highly and strongly having a positive and significant correlation (at the level of 0.1%) with capital ratio. In contrast, market capitalisation decreased the stability (capitalisation) significantly at the 5% level. This result discourages conventional banks to invest and operates in countries with depression in financial markets. Finally, R-squared equal 46.89% and 56.61% for OLS and FE regressions. These recent significant variables (influencing capitalisation) are presented in as a summary in Figure 7.12 below.

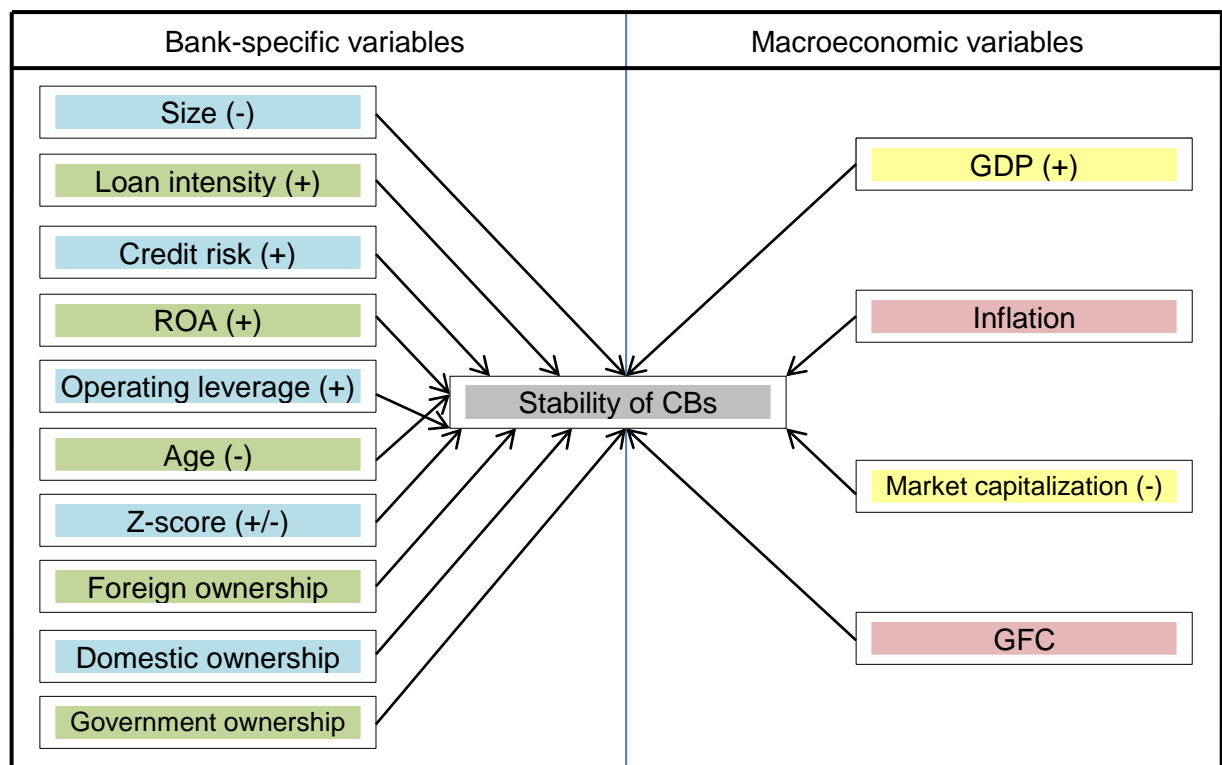


Figure 7.12: Significant variables that influence capital ratio for conventional banks, MT

7.2.3 Determinants of stability in SRBs (across the world), MT

7.2.3.1 Determinants of z-score in SRBs (across the world), MT

The recent Table 7.3 indicates the determinants of stability (z-score) in socially responsible banks over the period 2005-2012. The statistical models' findings suggest that smaller socially responsible banks were found to be more resistible against risk of insolvency than larger-sized banks, which match the results for Islamic and conventional banks. This outcome is in line with the study by Beck *et al.* (2013a) but conflicts with the relationship between size and z-score seen by Nguyen *et al.* (2013). As for Islamic and commercial banks, capital ratio is the main indicator of stability as capitalisation improves the socially responsible banks' stability and reduces the risk of bankruptcy. Regarding the FEM coefficient (0.565), credit risk affects stability positively, which matches with conventional banks. Additionally, the ROA (profitability ratio) coefficient (4.427) has a positive and significant correlation with the log (z-score) at 0.1% with respect to the fixed effects model. As in Islamic and conventional banks, profitability is very important as ROA is highly correlated with z-score in all banks at a level of 0.1%. In other words, achieving higher profits leads to more stability in the banking sector. As for conventional banks, ownership concentration was found to lower stability (z-score) in accordance with the OLS results. The most stable banks are governmental banks, scoring a coefficient equal to -0.924, and the riskiest banks are domestic banks which scored the minimum coefficient (-2.078). According to the external variables, the GDP variable has two different associations with z-score. The OLS model provides evidence that countries achieving additional GDP growth tend to threaten socially responsible banks with bankruptcy. In contrast, the FEM estimator demonstrates a statistically positive correlation at a level of 0.1% between GDP and stability, which means socially responsible banks in countries generating more GDP were able to resist the insolvency risk. As for conventional banks, inflation exposes banks to a high risk of failure referring to the OLS result. However, the results confirmed that the market capitalisation and global financial crisis did not affect the socially responsible banks' stability, which raises the importance of the study for the socially responsible banking sector. Ghosh (2014) proved that the global financial crisis did not impact stability in GCC Islamic and commercial banks.

Generally, the R^2 of OLS is 51.26% and the R^2 of FEM is 61.09%, which is relatively high. Figure 7.13 shows the factors of stability for the socially responsible banks. Figure 7.13 details the significant variables that affect stability of SRBs.

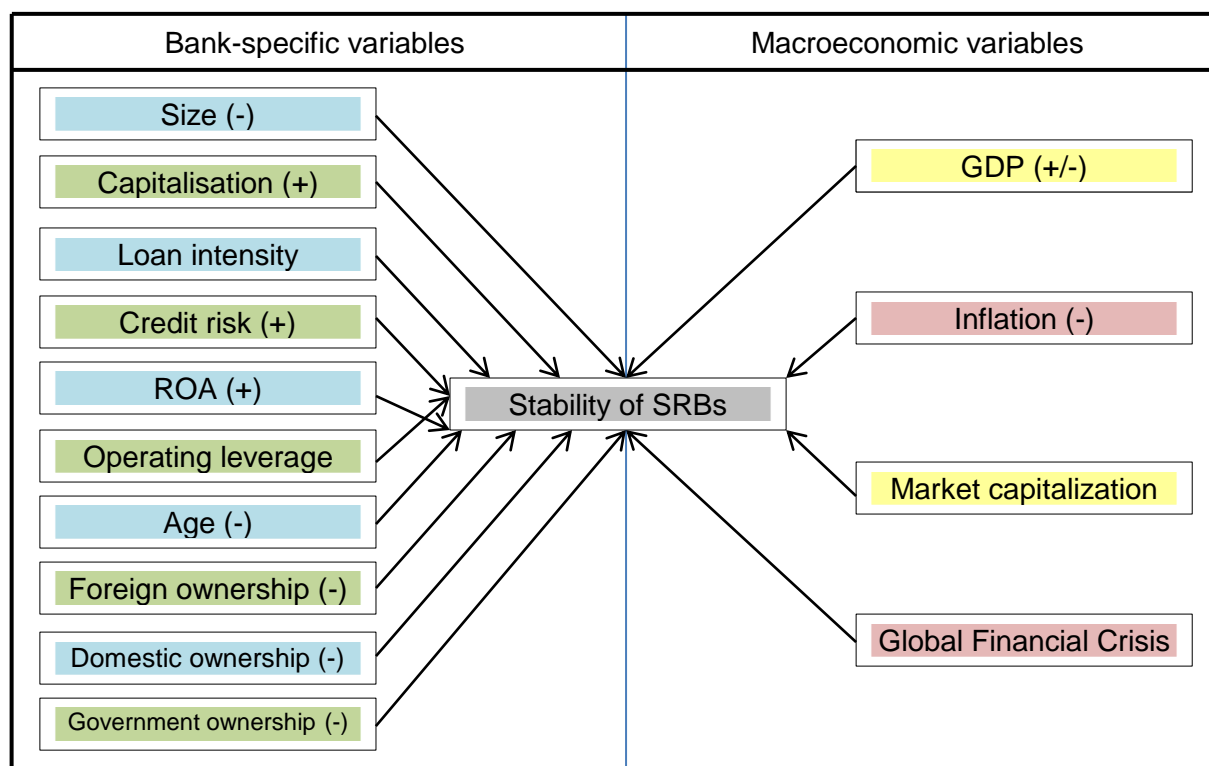


Figure 7.13: Significant variables that influence z-score for SRBs, MT

7.2.3.2 Determinants of capital ratio in SRBs (across the world), MT

Concentrating on capital ratios and their determinants in Table 7.4 for socially responsible banks, as anticipated, larger sized banks were more stable (capital) than smaller sized banks. Two results attained in accordance to loan intensity, positive (FEM) and negative (OLS) signs but the most result was the fixed effects model which suggests the positive relationship. Like Islamic and conventional banks, socially responsible banks had a positive relationship between capital ratios and credit risk. As Islamic banks, ROA decreased the capitalisation, which increased the instability (insolvency risk). Moreover, z-score affected the capitalisation significantly and positively. With regards to ownership, foreign bank concentration (level) found to be supporting stability positively. Berger *et al.* (2009) found the same relationship between capitalisation and foreign ownership. Regarding the external factors, GDP variable only indicates significance (negative sign with capital ratio). However, R-squared indicates a high consistency between

explanatory variables scoring $R^2_{OLS} = 79.76\%$ and $R^2_{FEM} = 60.51\%$ Figure 7.14 below displays the determinants of capitalisation of socially responsible banks.

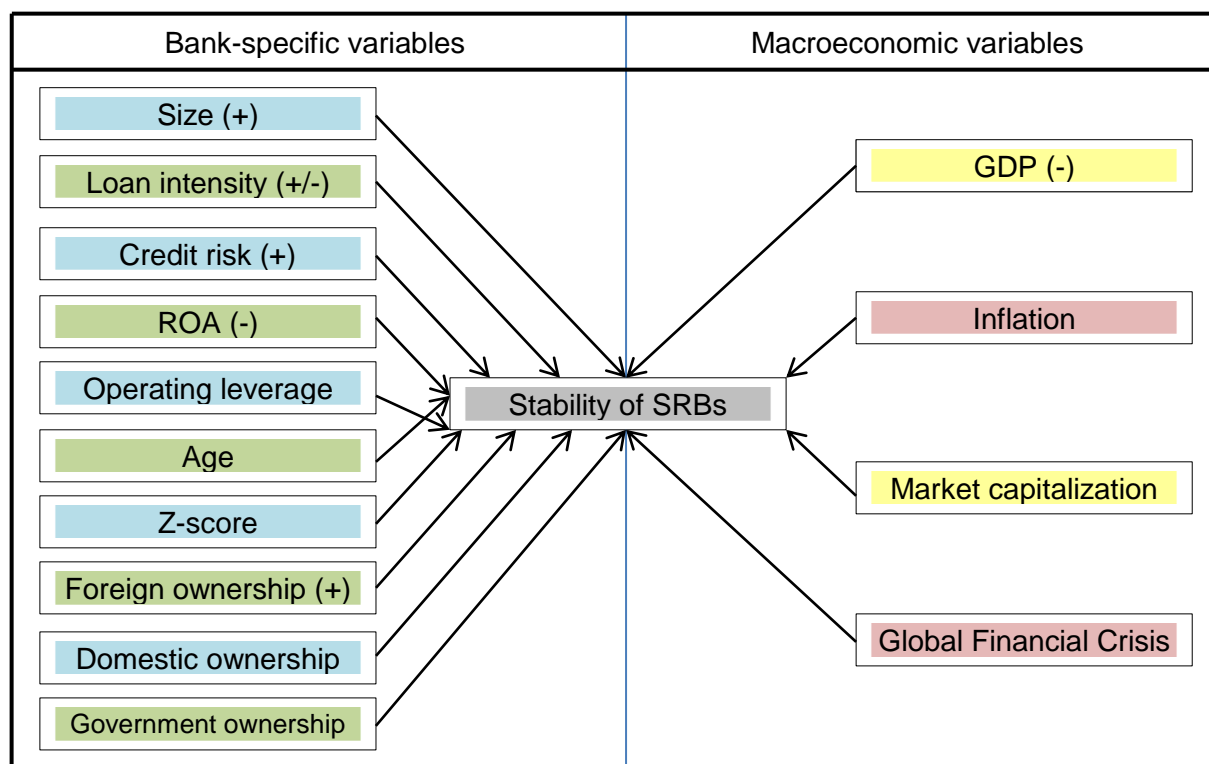


Figure 7.14: Significant variables that influence capital ratio for SRBs, MT

7.3.1 Determinants of stability in Islamic, conventional and socially responsible banks (UK and MENA), AT

7.3.1.1 Determinants of z-score in Islamic, conventional and socially responsible banks (UK and MENA), AT

According to the additional test in Table 7.5 below, the results are similar to the main test in Table 7.3. For the listing factor, there is no such evidence for any relationship between z-score and listing on the stock market. Nguyen *et al.* (2012) and Barry *et al.* (2011) estimate an insignificant correlation between z-score and listing. Regarding corruption, the Islamic and conventional banks were found to be more stable and less risky in the countries with lower corruption supervision from the government. On the other hand, the socially responsible banks are financially more resistible in countries with higher corruption control. Hoque *et al.* (2015) found that corruption did not affect the conventional banks in Europe in their study. Overall, the advantage of examining the additional variables (listing and corruption control) is that R^2 values are remarkably improved compared to the MT (Table 7.3).

Table 7.5: Results of z-score determinants for Islamic (UK and MENA), conventional (UK and MENA) and SRBs (across the world), AT

Stability	Islamic Banks		Conventional Banks		Socially responsible Banks	
	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
	Log(z)	Log(z)	Log(z)	Log(z)	Log(z)	Log(z)
Bank-specific variables						
LTA	0.112**	-0.189***	-0.0525***	-0.331***	-0.0815**	-0.0924**
	(2.94)	(-4.01)	(-3.64)	(-13.96)	(-2.69)	(-2.83)
EQTA	0.957***	1.423***	-0.295	0.821***	1.349***	3.347***
	(4.19)	(12.25)	(-1.58)	(10.61)	(3.95)	(14.38)
LOANSTA	0.553*	-0.512***	-0.248*	-0.103*	0.305	-0.101
	(2.67)	(-4.57)	(-2.74)	(-2.07)	(0.94)	(-0.96)
LOANSDEPO	-0.000193	0.000516	0.00448*	0.000231	-0.0336	0.565***
	(-0.10)	(0.83)	(2.25)	(0.37)	(-0.13)	(7.04)
ROA	1.718***	1.442***	7.109***	2.069***	5.196	4.427***
	(5.67)	(14.91)	(7.77)	(6.64)	(1.03)	(4.11)
FATA	-3.860	-1.307	1.278	3.322***	5.524	2.986
	(-1.67)	(-1.24)	(0.73)	(3.81)	(1.14)	(1.88)
LAGE	0.578***		-0.0132		0.101	
	(6.13)		(-0.35)		(1.18)	
FORE		0.0388	-1.899***	-0.109	-1.562***	
		(0.25)	(-5.03)	(-1.28)	(-5.98)	
DOM	0.263*	0.0258	-1.684***	-0.0734	-2.368***	
	(2.37)	(0.18)	(-4.51)	(-1.00)	(-7.28)	
GOV	0.134		-1.813***		-1.239***	
	(0.87)		(-4.91)		(-4.95)	
Listing*	-0.0935		-0.00988		-0.130	
	(-0.90)		(-0.17)		(-0.81)	
Macroeconomic variables						
LGDP	-0.0637	0.136	-0.0670***	0.435***	-0.234***	0.293***
	(-1.78)	(1.67)	(-3.38)	(10.30)	(-4.55)	(3.43)
INFLATION	-0.899	-0.259	-2.117***	-0.0514	-0.189***	-0.563
	(-1.79)	(-1.53)	(-5.60)	(-0.42)	(-8.12)	(-1.89)
MCAP	-0.232*	0.00798	0.0357*	0.153***	-0.334**	0.0235
	(-2.14)	(0.13)	(2.04)	(4.85)	(-2.78)	(0.43)
GFC	0.00322	0.00363	-0.00663	-0.0311*	-0.0319	0.0149
	(0.04)	(0.14)	(-0.13)	(-2.21)	(-0.32)	(0.75)
CCONTROL*	-0.0105***	-0.00115	-0.00275*	-0.00283	0.0138***	-0.0000226
	(-4.32)	(-0.49)	(-2.12)	(-1.51)	(3.84)	(-0.01)
Sigma	1.896*	0.584	7.344***	-5.667***	11.31***	-3.940
_cons	(2.04)	(0.30)	(12.32)	(-5.46)	(7.60)	(-1.91)
R ²	0.04760	0.07147	0.1125	0.3716	0.5421	0.6109
Number of banks	43	43	242	242	38	38
N	312	312	1827	1827	284	284

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LISTING: dummy equal 1 if listed bank and 0 unlisted, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global Financial Crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise; CCONTROL: Control of corruption.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

* Additional variable

7.3.1.2 Determinants of capital ratio in Islamic, conventional and socially responsible banks (UK and MENA), AT

The determinants of capitalisation for the main test in Table 7.4 are similar to the determinants of capitalisation for the additional test in Table 7.6 below. The difference is that governmental involvement benefits the capital of socially responsible banks. This positive result occurs because the government has more financial abilities than local and foreign banks. Based on the additional variables, unlisted conventional banks were found to be better capitalised compared to conventional listed banks. This result is in line with the outcome of Kanagaretnam *et al.* (2015) and Ghosh (2014). For the corruption supervision factor, the findings of the additional test show that the association between corruption supervision and capital ratio is significant and positive in Islamic and conventional banks. This contradicts with the result of the socially responsible banks, which indicates that corruption control impacts capital ratios significantly and negatively. Generally, testing the additional variables (listing and corruption control) allows for more consistency between the independent factors.

7.4 Stability of MENA countries (including GCC)

7.4.1 Stability measures description for MENA countries (including GCC)

Table 7.7 shows that conventional banks are further from bankruptcy (3.078) compared to Islamic banks, which attained lower z-scores values (2.715). On the opposite side, Islamic banks were more stable than conventional banks in terms of having better invested capitalisation (15.04%) over the period 2005-2012. However, there are many reasons behind these stability measures, which are explained in detail in the following section.

Table 7.7: Stability measures description for MENA countries (including GCC)

Islamic Banks					Conventional Banks				
Stability	Mean	Std. Dev.	Min	Max	Stability	Mean	Std. Dev.	Min	Max
Log (z-score)	2.7151	0.8836	-0.17	5.51	Log (z-score)	3.0786	1.0504	-3.27	5.19
Capital ratio	0.2264	0.2150	0.02	0.99	Capital ratio	0.1504	0.2020	0.01	5.23

Table 7.6: Results of capital ratio determinants for Islamic (UK and MENA), conventional (UK and MENA) and SRBs (across the world), AT

Stability	Islamic Banks		Conventional Banks		Socially responsible Banks	
	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
	Capital R.	Capital R.	Capital R.	Capital R.	Capital R.	Capital R.
Bank-specific variables						
LTA	-0.0581*** (-6.48)	-0.0305 (-1.47)	-0.0212*** (-12.18)	-0.0623*** (-8.02)	0.00570 (1.07)	-0.0129 (-1.91)
LOGZ	0.0585*** (4.19)	0.260*** (12.25)	-0.00464 (-1.58)	0.0813*** (10.61)	0.0409*** (3.95)	0.140*** (14.38)
LOANSTA	-0.00930 (-0.18)	0.340*** (7.56)	0.109*** (9.91)	0.230*** (15.84)	-0.389*** (-7.55)	0.0913*** (4.39)
LOANSDEPO	0.000907* (1.98)	0.0000499 (0.19)	0.00165*** (6.68)	0.00000466 (0.02)	0.172*** (3.95)	-0.150*** (-9.93)
ROA	-0.219** (-2.81)	-0.339*** (-6.47)	2.300*** (22.26)	1.657*** (18.38)	-1.575 (-1.81)	-0.568* (-2.53)
FATA	5.875*** (12.73)	3.171*** (7.85)	1.199*** (5.48)	0.106 (0.39)	-0.561 (-0.66)	-0.380 (-1.16)
LAGE	-0.0899*** (-3.71)		-0.0167*** (-3.55)		0.0140 (0.94)	
FORE		-0.0475 (-0.71)	-0.000353 (-0.01)	-0.0333 (-1.24)	0.163*** (3.45)	
DOM	-0.0518 (-1.88)	-0.0434 (-0.71)	-0.0198 (-0.42)	-0.0120 (-0.52)	0.0245 (0.40)	
GOV	-0.0155 (-0.41)		0.0398 (0.85)		0.120** (2.67)	
Listing*	0.0247 (0.97)		-0.0195** (-2.71)		-0.0126 (-0.45)	
Macroeconomic variables						
LGDP	0.0137 (1.55)	0.0257 (0.73)	-0.00720** (-2.90)	0.0488*** (3.57)	-0.0302** (-3.31)	0.0105 (0.59)
INFLATION	0.107 (0.86)	-0.0630 (-0.87)	0.0572 (1.20)	-0.0491 (-1.28)	0.00354 (0.78)	0.0753 (1.23)
MCAP	0.114*** (4.35)	0.0182 (0.72)	-0.00440* (-2.01)	-0.0216* (-2.16)	0.0323 (1.53)	0.00705 (0.63)
GFC	0.0271 (1.27)	0.0191 (1.68)	-0.00311 (-0.50)	0.00349 (0.79)	0.00346 (0.20)	-0.00238 (-0.59)
CCONTROL*	0.00168** (2.74)	-0.00180 (-1.80)	0.00137*** (8.56)	-0.000175 (-0.30)	-0.00364*** (-6.07)	-0.000764 (-1.07)
Sigma	0.171 (0.74)	-0.957 (-1.17)	0.415*** (5.37)	-0.937** (-2.85)	1.073*** (3.86)	-0.377 (-0.89)
_cons						
R²	0.6377	0.8258	0.4901	0.5662	0.8223	0.6070
Number of banks	43	43	242	242	38	38
N	312	312	1827	1827	284	284

Notes: LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LISTING: dummy equal 1 if listed bank and 0 unlisted, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global Financial Crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise; CCONTROL: Control of corruption.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

* Additional variable

7.4.2 Determinants of stability in MENA countries (including GCC)

Table 7.8 concludes the significant factors that impact on financial stability (positively or negatively) in MENA countries (including GCC) using OLS and FE regressions. The statistical findings show that both stability indicators are very important to each other as they both correlated robustly at 0.1%. Large capitalised banks were found to face less insolvency risk (Carretta *et al.*, 2015). In addition, more stable banks had greater capitals (Kick & Prieto, 2015; Baselga-Pascual *et al.*, 2015). Against our predictions and hypothesis, smaller banks were found to be more resistant against banking risk-taking with higher standards of capital (Kohler, 2015; Ghosh, 2014). However the OLS estimated that conventional banks with more total assets tended to be steadier with higher capital rates (Fazio *et al.*, 2015). The OLS model advised the Islamic banks to raise their stability (based on z-score) by focusing more on lending operations (Keffala, 2015) but alerted the conventional banks to provide more loans (Kasman & Kasman, 2015). With regards to capital ratios, generating more loans led to strengthening of the conventional banking shares but worsened the standards of capitalisation in Islamic banks (ElBannan, 2015). The credit risk encouraged the Islamic banks to accept more deposits in order to maintain their stability (Chiaramonte *et al.*, 2015; Nguyen & Nghiem, 2015). The relationship between profits (ROA) and log (z-score) in Islamic and conventional banks is distinctly positive at 0.1%. This estimation shows how important it is for banks to maximise their returns to achieve financial stability and to avoid any failure. Using capital ratio as a benchmark, the conventional banks with greater equities had lower earnings than low-capital banks. Baselga-Pascual *et al.* (2015) and Anginer *et al.* (2014) investigated the same result. On the other hand, lower capitalised Islamic banks tended to be more profitable than higher capitalised banks. It is a very rare situation to find that well-capitalised banks attain worse profits, as lack of recent studies found the same relationship between capitalisation and profitability. This can be an important disadvantage to the performance of Islamic banking in MENA region (including GCC), and also warned that financial stability will struggle and incur losses. As predicted, the operating leverage ratio indicates that conventional banks with more invested fixed assets are less risky. Srairi (2013) argues that operating leverage also has a positive and significant effect on stability. Based on OLS's results, a powerful and positive link was found between capital ratio and operating leverage

Table 7.8: Determinants of stability for MENA countries (including GCC)

Banks	Islamic				Conventional			
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Indicator	Log(z)	Log(z)	Cap. R.	Cap. R.	Log(z)	Log(z)	Cap. R.	Cap. R.
Bank-specific variables								
LOGZ			-0.00199	0.163***			-0.00285	0.0839***
			(-0.16)	(12.82)			(-0.72)	(8.21)
EQTA	-0.0491	2.492***			-0.143	0.691***		
	(-0.16)	(12.82)			(-0.72)	(8.21)		
LTA	-0.0121	-0.0980*	-0.053***	-0.0216*	0.0715***	-0.29***	-0.0274***	-0.048***
	(-0.27)	(-2.50)	(-6.32)	(-2.15)	(3.51)	(-10.02)	(-9.83)	(-4.63)
LOANSTA	0.594*	-0.129	-0.279***	-0.0744**	-0.289*	-0.0828	0.131***	0.260***
	(2.24)	(-1.19)	(-5.47)	(-2.70)	(-2.98)	(-1.53)	(9.89)	(15.16)
LOANSDEPO	-0.000051	0.00012	0.00106**	0.000192	0.00523**	0.00019	0.0017***	-0.00003
	(-0.03)	(0.23)	(2.97)	(1.45)	(2.74)	(0.32)	(6.44)	(-0.19)
ROA	3.471***	1.551***	0.237	-0.132*	5.597***	2.258***	2.552***	1.822***
	(4.93)	(7.45)	(1.61)	(-2.26)	(5.70)	(6.72)	(21.13)	(17.19)
FATA	1.652	0.703	2.800***	0.0131	4.092*	3.000**	0.343	-0.560
	(0.65)	(0.75)	(5.79)	(0.05)	(2.03)	(3.24)	(1.20)	(-1.73)
LAGE	0.569***		-0.0585*		0.155*		-0.0142*	
	(6.38)		(-3.10)		(3.09)		(-2.00)	
FORE		0.0996			-1.858***	-0.171	-0.0187	0.00150
		(0.74)			(-5.18)	(-1.68)	(-0.37)	(0.04)
DOM	0.103	0.0556	-0.0693**	0.0210	-1.505***	-0.109	-0.0529	-0.00740
	(0.95)	(0.46)	(-3.21)	(0.95)	(-4.26)	(-1.43)	(-1.05)	(-0.28)
GOV	0.105		-0.00642	0.0488	-1.752***		0.0248	
	(0.70)		(-0.21)	(1.43)	(-5.00)		(0.50)	
Macroeconomic variables								
LGDP	-0.0372	0.128	0.054***	-0.0180	-0.178***	0.420***	-0.00467	0.0306
	(-0.61)	(1.86)	(4.60)	(-1.02)	(-6.12)	(8.80)	(-1.12)	(1.78)
INFLATION	0.200	-0.131	0.0983	-0.00404	-1.750***	-0.0436	0.0446	-0.0525
	(0.41)	(-0.91)	(1.01)	(-0.11)	(-4.47)	(-0.33)	(0.80)	(-1.15)
MCAP	-0.331**	0.0570	0.138***	-0.0284*	-0.212***	0.150***	0.0286***	-0.0332*
	(-3.16)	(1.09)	(6.99)	(-2.14)	(-3.55)	(3.91)	(3.38)	(-2.48)
GFC	-0.0142	-0.0216	0.0233	0.0140*	0.0315	-0.00774	-0.00241	0.00546
	(-0.16)	(-0.96)	(1.35)	(2.44)	(0.56)	(-0.46)	(-0.30)	(0.94)
Sig	1.738	-0.329	-0.543*	0.433	8.328***	-5.20***	0.447***	-0.599
cons	(1.27)	(-0.20)	(-1.98)	(1.05)	(10.33)	(-4.83)	(3.79)	(-1.58)
R ²	0.3818	0.6290	0.5775	0.5693	0.1445	0.3665	0.5384	0.6109
# of banks	40	40	40	40	168	168	168	168
N	291	291	291	291	1277	1277	1277	1277

Notes: LOGZ: z-score, EQTA: capital ratio, LTA: bank size, LOANSTA: loans intensity, LOANSDEPO: credit risk, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

in Islamic banks. Bank age is significant and positive with log (z-score) but significant and negative with capital ratio. In the literature, Schaeck and Cihàk (2014), Lee and Chih (2013), and Mirzaei *et al.* (2013) go with the concept that older banks have more stability, but no studies prove that new banks are more stable than older banks. In Islamic banks, the concentration of private (domestic) banks was significantly decreasing capitalisation. In conventional banks, higher levels of foreign (consistent with Kasman & Kasman, 2015), private and public (ElBannan, 2015) ownership led to destabilisation with higher risks. Focusing on country-specific data, In Islamic banks, the GDP tended to have a positive, strong and significant correlation at the level of 0.1% with capital levels. With regards to conventional banks, higher GDP levels strongly and significantly increased the default risk based on OLS's coefficient (-0.178) but the FE models estimated a positive coefficient (0.420), which supported the stability. Most studies agreed with the positive relationship between GDP and stability (z-score), e.g. Chen *et al.* (2015), Doumpos *et al.* (2015), Keffala (2015) and Saghi-Zedek and Tarazi (2015). On the contrary, very few studies investigated the negative impact on stability such as Wang *et al.* (2015). The conventional banks in countries with greater inflation rates were easily breakable due a strong and inverse association between inflation and z-score (similar to Baselga-Pascual *et al.*, 2015). The financial development (market capitalisation to GDP ratio) has several different estimations. In detail, OLS suggests Islamic and conventional banks face a very high bankruptcy risk in countries with more financial investments. This result is completely contrary to expectations, but FE model estimated a positive and significant coefficient that represents conventional banking (in line with Carretta *et al.*, 2015). Depending on capital ratio as a stability indicator, OLS proposed that stock market growth led to better stability, but FEM confirmed a negative relationship between capitalisation and stock market development. Lastly, the FE regression underlines that Islamic banks operated their capitals effectively (significant and positive relationship between capital ratio and GFC variable) than conventional banks over the period of the global financial crisis (2007-2009) but no correlation was found between the rest of OLS's and FEM's coefficients for log (z-score) and capital ratio. According to R² measures, Islamic banks scored values between 38.18% and 62.90%, while conventional banks achieved between 14.45% and 61.09%.

7.5 Stability of MENA countries (excluding GCC)

7.5.1 Stability measures description for MENA countries (excluding GCC)

Based on both stability's indicators (z-score and capital ratio), the socially responsible banks were found to be the most financial settled type of banking by far (scoring averages 4.876 and 69.58% for log (z-score) and capital ratio, respectively) compared to Islamic and conventional banks as in Table 7.9 below. According to z-score's measures, the conventional banks (3.228) were more resistant against risk than Islamic banks (3.158) but the capital ratio confirmed an opposite point as Islamic banks (13.57%) operated their equities more efficiently than conventional banks (11.39%) over the period 2005-2012.

Table 7.9: Stability measures description for MENA countries (excluding GCC)

Banks	Islamic				Conventional Banks				Socially Responsible Banks			
Stability	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Log (z-score)	3.1585	0.6819	1.53	5.51	3.2287	1.0454	-3.27	5.19	4.8767	0.9487	2.74	6.1
Capital ratio	0.1357	0.1047	0.02	0.57	0.1139	0.0918	0.01	1.29	0.6958	0.2553	0.03	0.96

7.5.2 Determinants of stability in MENA countries (excluding GCC)

To find the positive and negative causes of the financial stability, Table 7.10 exhibits the factors that impact stability. The empirical findings in Table 7.10 go with the previous results of MENA countries including GCC region in Table 7.8, which concludes that the log (z-score) and capital ratio influence each other positively, significantly, and strongly at a level of 0.1%. According to the size variable's results, the smaller Islamic and conventional banks were found to be more highly capitalised (in line with Schaeck & Cihàk, 2014). Following the OLS method led us to know that large-sized conventional and socially responsible banks were further from bankruptcy (similar to Brighi & Venturelli, 2015), however FE model approved that conventional banks with lower total assets tended to be steadier. The loan intensity was significant only with capital ratios of those in the Islamic and conventional banking sectors. In particular, OLS suggests that loans threatened the stability of Islamic and conventional banking. The FEM proposed that loans strengthened the capitals in conventional banks but worsened Islamic banking stability. ElBannan (2015), Kanagaretnam *et al.* (2015) and Berger *et al.* (2009) also claim that loan intensity is a negative and important determination of capitalisation in the banking sector. The credit risk factor shows that more stabilised Islamic banks tended to have fewer default risks. With regards to capital ratio, Islamic and conventional banks (OLS) with higher capitalisation levels

Table 7.10: Determinants of stability for MENA countries (excluding GCC)

Banks	Islamic				Conventional Banks				Socially Responsible Banks			
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Indicator	Log(z)	Log(z)	Cap. R.	Cap. R.	Log(z)	Log(z)	Cap. R.	Cap. R.	Log(z)	Log(z)	Cap. R.	Cap. R.
Bank-specific variables												
LOGZ			0.0425***	0.124***			0.0172***	0.0862***			0.0139	0.144***
			(4.98)	(11.16)			(5.70)	(18.62)			(0.78)	(4.98)
EQTA	4.177***	4.422***			2.267***	3.862***			0.883	2.429***		
	(4.98)	(11.16)			(5.70)	(18.62)			(0.78)	(4.98)		
LTA	0.126	-0.0950	-0.0388***	0.00450	0.162***	-0.129***	-0.0177***	-0.0364***	0.293*	0.0897	0.0128	0.0217
	(1.81)	(-1.69)	(-6.33)	(0.47)	(7.01)	(-3.62)	(-8.94)	(-7.00)	(2.42)	(0.85)	(0.80)	(0.84)
LOANSTA	-0.947	-0.0618	-0.117*	-0.0632*	-0.0143	-0.0581	-0.0966***	0.0611***	-1.066	0.494	0.139	0.00705
	(-1.95)	(-0.36)	(-2.41)	(-2.22)	(-0.05)	(-0.49)	(-3.81)	(3.47)	(-1.38)	(1.39)	(1.44)	(0.08)
LOANSDEPO	0.0234	-0.175*	0.139***	0.0697***	-0.224	0.157	0.122***	-0.0234	0.194	0.292	-0.166***	-0.174***
	(0.10)	(-2.04)	(7.39)	(5.41)	(-1.02)	(1.39)	(6.50)	(-1.39)	(0.52)	(1.71)	(-4.05)	(-5.04)
ROA	0.741	2.995	0.589	-0.508	16.28***	7.537***	-0.465***	-1.131***	10.16	3.610	-2.250***	-1.913***
	(0.15)	(1.41)	(1.19)	(-1.43)	(9.22)	(11.46)	(-2.89)	(-11.52)	(1.98)	(1.65)	(-3.83)	(-4.07)
FATA	11.04*	2.524	0.0723	-0.167	10.99***	2.351*	0.441*	0.235	17.33*	11.99***	-2.876***	-2.648***
	(2.09)	(1.19)	(0.13)	(-0.47)	(4.36)	(2.11)	(1.99)	(1.41)	(2.45)	(4.04)	(-3.39)	(-3.55)
LAGE	0.891***		-0.0763***		0.273***		-0.0206***		-0.569***		0.0329	
	(4.69)		(-3.88)		(4.67)		(-4.02)		(-3.86)		(1.60)	
FORE	0.0947		-0.0216		-1.842***		0.0287		-0.567*		0.0252	
	(0.57)		(-1.30)		(-5.40)		(0.95)		(-2.11)		(0.72)	
DOM					-1.398***		-0.0116		-0.832		-0.721***	
					(-4.20)		(-0.40)		(-0.89)		(-12.20)	
GOV	-0.553*		0.0744**		-1.670***		0.0359		-0.427		0.0329	
	(-2.25)		(3.06)		(-5.17)		(1.26)		(-1.04)		(0.63)	
Macroeconomic variables												
LGDP	-0.136	0.102	0.0345***	0.0133	-0.222***	0.300***	-0.00135	0.0220**	-0.885***	0.137	0.0518*	0.00755
	(-1.42)	(0.96)	(3.75)	(0.74)	(-6.02)	(5.49)	(-0.41)	(2.65)	(-6.41)	(0.90)	(2.32)	(0.20)
INFLATION	0.382	-0.252	0.102	0.0539	-0.790	0.475*	-0.0403	-0.0648*	9.784***	0.182	-0.0872	0.158
	(0.40)	(-0.75)	(1.06)	(0.96)	(-1.29)	(2.27)	(-0.75)	(-2.07)	(8.22)	(0.24)	(-0.38)	(0.85)
MCAP	0.168	-0.000598	-0.0263	0.0188	0.00699	0.0961*	0.0158*	0.00507	-0.930	0.0377	0.120	0.0510
	(1.22)	(-0.01)	(-1.92)	(1.21)	(0.10)	(2.10)	(2.52)	(0.74)	(-1.86)	(0.17)	(1.92)	(0.96)
GFC	-0.0581	-0.0567	0.000383	0.00822	0.0401	0.0177	-0.0103	-0.00625*	-0.0759	-0.0102	0.0224	0.00755

	(-0.55)	(-1.73)	(0.04)	(1.49)	(0.62)	(0.89)	(-1.84)	(-2.10)	(-0.75)	(-0.25)	(1.82)	(0.76)
Sig	2.367	0.853	-0.393	-0.652	7.659***	-3.912**	0.266**	-0.431*	25.86***	-1.543	-0.683	-0.204
cons	(1.16)	(0.33)	(-1.93)	(-1.53)	(7.83)	(-3.26)	(3.02)	(-2.40)	(8.73)	(-0.47)	(-1.17)	(-0.26)
R²	0.3654	0.6541	0.7256	0.7067	0.2931	0.4792	0.3023	0.5307	0.9011	0.6109	0.9785	0.7633
# of banks	17	17	17	17	108	108	108	108	9	9	9	9
N	129	129	129	129	813	813	813	813	64	64	64	64

Notes: LOGZ: z-score, EQTA: capital ratio, LTA: bank size, LOANSTA: loans intensity, LOANSDEPO: credit risk, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

struggled with great credit risk rates but in accordance to socially responsible banks, the more capital achieved the lower credit risk rates recorded. Soedarmono *et al.* (2011) argue that credit risk is significantly and positively related with z-score and capital ratio for an Asian study. The ROA factor indicates that profitable banks were found to be less risky as the correlation between z-score and ROA is very strong and significant at a level of 0.1%. On the other hand, low-capitalised conventional and socially responsible banks tended to have better profitability than high-capitalised banks. However, the results of fixed assets intensity (FATA) encouraged all banks to invest more in fixed assets in an attempt to avoid any insolvency risk. In addition, the capital in conventional banks was affected by fixed assets significantly and positively while, fixed assets decreased the capital significantly in socially responsible banks. The age of bank (AGE) factor is very important variable to determine the stability in banking. In detail, there is a robust and positive association at the level of 0.1% between age and z-score in Islamic and conventional banks. On the contrary, age impacted the stability of socially responsible banks inversely and significantly. With regard to capitalisation, new Islamic and conventional banks attained greater capital levels than older banks. Schaeck and Cihák (2014) investigated that age of bank is highly important to support z-score and capital ratio to a significant level. Based on the coefficients of ownership, public possession significantly increased bankruptcy probabilities and capitalisation. All type of (private, foreign and public) ownerships affected the stability (z-score) significantly and negatively in conventional banking systems. Finally, in socially responsible banks, higher levels of international banks neared the banks from failure and domestic banks concentrations significantly reduced the capitalisation. Based on macroeconomic factors, the only variable that affects Islamic banks is GDP, and the relationship between capital ratio and GDP is positive and strong at a level of 0.1%. The GDP also enhanced the capitals of conventional and socially responsible banks significantly. With regards to log (z-score), the OLS estimated negative and significant coefficients of GDP for conventional and socially responsible banks, but FEM provided a positive and significant coefficient in the conventional banking sector. However, higher rates of inflations influenced the stability of conventional socially responsible banks positively and significantly but decreased the capitalisation badly in conventional banks. The conventional banks exploited the growth of stock market efficiently as

conventional banks in better rates of market capitalisation tend to be more fixed (based on z-score and capital ratio). The empirical results of GFC shows that only conventional banks' capitalisation was affected inversely and significantly over the period 2007-2009, but there is no evidence of any impact on the capitalisation of Islamic and socially responsible banks. Over the period of the global financial crisis, the stability of all banks was not affected due to insignificant correlations between GFC and log (z-score). Kanagaretnam *et al.* (2015) also found insignificant relationships between stability (z-score and capitalisation) and GFC. Overall, the consistency percentage in Islamic banks ranged between 36.54% and 72.56%, conventional banks recorded 29.31% to 53.07%, and socially responsible banks scored 76.33% to 97.85%.

7.6 Stability of GCC countries

7.6.1 Stability measures description for GCC countries

Table 7.11 reports that conventional banks (2.815) are further from insolvency risk than Islamic banks (2.361). In contrast, the Islamic banks achieved better capitalisation levels (29.86%) than conventional banks (21.45%) in GCC region through the period 2005-2012. As a result, OLS and FEM reveal the causes that determine the stability's indicators in Table 7.9 (this is discussed in the next part).

Table 7.11: Stability measures description for GCC countries

Islamic Banks					Conventional Banks				
Stability	Mean	Std. Dev.	Min	Max	Stability	Mean	Std. Dev.	Min	Max
Log (z-score)	2.3619	0.8681	-0.17	4.34	Log (z-score)	2.8155	1.0074	-1.06	4.82
Capital ratio	0.2986	0.2504	0.06	0.99	Capital ratio	0.2145	0.3021	0.01	5.23

7.6.2 Determinants of stability in GCC countries

Table 7.12 explains that the stability estimators (z-score and capitalisation) are positively and significantly influential to each other. This complies with the recent results of MENA countries including and excluding GCC region. The fixed effects model summarises that smaller Islamic and conventional banks tended to be more stable and less risky. Regarding the OLS's findings, large-sized Islamic banks were more resistant against failure. In addition, OLS concludes that smaller Islamic and conventional banks had better capital standards than larger banks. The lending activities were found to be very important in raising the stability of Islamic banks. Additionally, loans impacted the capital ratio of Islamic banks

Table 7.12: Determinants of stability for GCC countries

Banks	Islamic				Conventional			
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Indicator	Log(z)	Log(z)	Cap. R.	Cap. R.	Log(z)	Log(z)	Cap. R.	Cap. R.
Bank-specific variables								
LOGZ			0.0562 ^{***}	0.178 ^{***}			-0.00820	0.133 ^{***}
			(3.85)	(8.49)			(-0.92)	(4.05)
EQTA	1.620 ^{***}	2.033 ^{***}			-0.231	0.301 ^{***}		
	(3.85)	(8.49)			(-0.92)	(4.05)		
LTA	0.265 ^{***}	-0.121 [*]	-0.101 ^{***}	-0.0288	-0.0101	-0.20 ^{***}	-0.0612 ^{***}	-0.0229
	(3.96)	(-2.25)	(-9.87)	(-1.80)	(-0.27)	(-5.25)	(-9.35)	(-0.85)
LOANSTA	1.581 ^{***}	0.0279	-0.477 ^{***}	-0.161 ^{***}	-0.00398	0.0450	0.105 ^{***}	0.257 ^{***}
	(4.53)	(0.17)	(-8.33)	(-3.47)	(-0.03)	(0.90)	(4.81)	(8.43)
LOANSDEPO	-0.000969	0.00028	0.00087 ^{**}	0.000195	0.00424 [*]	0.00021	0.0015 ^{***}	-0.00017
	(-0.60)	(0.54)	(3.00)	(1.27)	(2.25)	(0.49)	(4.46)	(-0.59)
ROA	2.697 ^{***}	1.590 ^{***}	0.0750	-0.181 [*]	4.057 ^{**}	3.049 ^{***}	3.104 ^{***}	2.159 ^{***}
	(4.13)	(7.36)	(0.58)	(-2.42)	(3.25)	(9.82)	(16.52)	(10.61)
FATA	2.629	0.243	0.889	0.0567	-6.062 [*]	-1.336	0.320	-1.397
	(1.04)	(0.23)	(1.91)	(0.19)	(-1.97)	(-1.19)	(0.55)	(-1.88)
LAGE	0.389 ^{***}		-0.00630		-0.495 ^{***}		-0.000325	
	(4.14)		(-0.34)		(-4.65)		(-0.02)	
FORE		0.0144		-0.0463		-0.198 ^{**}		0.00279
		(0.11)		(-1.15)		(-2.70)		(0.06)
DOM	0.140	-0.0286	-0.123 ^{***}	-0.0181	0.267 [*]	-0.130 [*]	-0.0479 [*]	0.00349
	(0.95)	(-0.23)	(-4.79)	(-0.50)	(2.45)	(-2.36)	(-2.33)	(0.09)
GOV	0.335		-0.162 ^{***}		0.172		0.0330	
	(1.60)		(-4.38)		(1.48)		(1.51)	
Macroeconomic variables								
LGDP	-0.0523	0.0627	0.0660 ^{***}	-0.0222	0.0535	0.116	0.00473	0.0764
	(-0.64)	(0.66)	(4.64)	(-0.80)	(1.03)	(1.75)	(0.48)	(1.74)
INFLATION	0.625	-0.129	-0.130	-0.0383	-0.715	-0.202	0.0387	-0.0467
	(1.20)	(-0.81)	(-1.35)	(-0.81)	(-1.41)	(-1.70)	(0.40)	(-0.59)
MCAP	0.150	0.0358	0.0114	-0.0439 [*]	-0.157	0.0299	0.0150	-0.0434
	(1.02)	(0.57)	(0.41)	(-2.42)	(-1.37)	(0.62)	(0.69)	(-1.36)
GFC	0.0227	0.0118	0.0114	0.00572	-0.0406	-0.0320	0.0251	0.0285 [*]
	(0.23)	(0.38)	(0.61)	(0.62)	(-0.44)	(-1.54)	(1.45)	(2.07)
Sig	-1.199	1.102	-0.380	0.808	3.344 ^{**}	1.608	0.484 [*]	-2.072 [*]
cons	(-0.66)	(0.49)	(-1.13)	(1.22)	(2.73)	(1.07)	(2.09)	(-2.08)
R ²	0.5351	0.6962	0.8060	0.6186	0.1334	0.6484	0.6476	0.7176
# of banks	23	23	23	23	60	60	60	60
N	162	162	162	162	464	464	464	464

Notes: LOGZ: z-score, EQTA: capital ratio, LTA: bank size, LOANSTA: loans intensity, LOANSDEPO: credit risk, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

inversely and significantly at the level of 0.1% but the conventional banks invested their loans very efficiently to support their capitals. The credit risk ratio encouraged Islamic banks to accept more deposits to reduce risks. Thus, lower credit risk led to more stability in Islamic and conventional banks. Based on profitability ratio (ROA), there are strong associations between log (z-score) and profits in Islamic and conventional banks; this result allowed banks to have lower risks. The profits had a significant effect on the shareholders, encouraging them to support equities in conventional banks. Conversely, high-capitalised Islamic banks tended to be less profitable. With regards to fixed assets intensity, owning more fixed assets threatened the stability of conventional banks and significantly maximised their risks. With regard to time of establishment, the age of the bank significantly supported the stability of Islamic banks but considerably worsened the stability of conventional banks. Considering ownerships, the results conclude that international conventional banks were financially very fragile due to a negative and significant correlation between foreign ownership and z-score. Focusing on domestic ownership, more investment in local banking led to weak capitals in Islamic and conventional banking sectors. The OLS suggest that the increment in local banks enhanced stability and reduced risk-taking significantly. In contrast, FEM proposed that domestic banks were instable with higher rates of risks. Finally, in Islamic banks, the relationship between capital ratio and public ownership was found to be negative and significant at the level of 0.1%. Focusing on external factors, higher levels of economic development (GDP) affected the capital ratio of Islamic banks robustly and positively at 0.1%; however, oppositely, Islamic banks could not improve their capitals in countries with developed stock markets. The GFC shows a very interesting outcome as conventional banks invested their equities effectively (based on a positive and significant coefficient) at the crisis period (2007-2009). In Islamic banks, there is no statistical evidence for any impact from GFC on stability. The R^2 in Islamic banks varied from 53.51%- 80.60%, and 13.34%-71.76% in conventional banks.

7.7 Stability of UK (as a benchmark)

7.7.1 Stability measures description for UK

Based on Table 7.13, the social responsible banks are financially the most stable banking system (2.872), unlike Islamic banking which faced very high risks (1.339) over the period 2005-2012. In contrast, Islamic banks invested the most through

their equities (56.14%) while, SRBs have the minimum capitalisation (6.30%). In MENA (excluding GCC) region, banks (Islamic, conventional and socially responsible banks) are highly ready to solve any risks due to high measures of z-scores. Unfortunately, banks in UK (Islamic, conventional and socially responsible banks) found to be instable and risky compared to banks across the world, banks in MENA and GCC areas. According to capital ratios, in Islamic banking, banks in UK have the greatest capital ratio (56.14%) compared to capital ratio of Islamic banks in MENA (excluding GCC) countries 13.60%. In conventional banks, the best capitalisation is recorded in GCC countries scoring 21.45% whereas, the lowest capital ratio attained by conventional banks in UK scoring 11.44%. In the SRBs, banks in MENA countries are well capitlaised 69.58% but in UK, SRBs have very weak capitals.

Table 7.13: Stability measures description for UK

Banks	Islamic				Conventional Banks				Socially Responsible Banks			
Stability	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Log (z-score)	1.3395	1.5628	-1.72	4.34	2.7663	1.1333	-2	5.15	2.8724	0.8583	1.14	4.36
Capital ratio	0.5614	0.8402	0.08	4.01	0.1145	0.1069	0.01	0.94	0.0630	0.0357	0.03	0.18

7.7.2 Determinants of stability in UK

Table 7.14 shows that stability's indicators (z-score and capital ratio) were found to be very important to each other within Islamic and conventional banks. According to SRBs, OLS suggests that lower capitalisation banks are risky and unstable, but FEM proposes that higher-capitalised banks are more resistant against insolvency risks. These results comply with Islamic and conventional banks in MENA and GCC regions. Regarding the size, smaller conventional banks are bound to be more stable and better capitalised. In SRBs, the relationship between size and capital ratio is negative and significant. The conventional banks in the UK (including GCC) and GCC regions have the same conclusions. Focusing on loans, in conventional and SRBs, banks with greater loans were found to be stable, whereas in conventional banks, fewer loans led to lower capitalisation (similar to conventional banks in GCC region). In conventional banks, those with higher stability have fewer credit risks and more capitalisation, allowing for more crediting risks (consistent to conventional banks in the UK [including GCC], MENA [including GCC] and GCC banks). Based on profitability ratio, the more profitable Islamic, conventional and SRB banks were found to be fixed and less risky (in line

Table 7.14: Determinants of stability for UK

Banks	Islamic				Conventional Banks				Socially Responsible Banks			
Model	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)	(OLS)	(FEM)
Indicator	Log(z)	Log(z)	Cap. R.	Cap. R.	Log(z)	Log(z)	Cap. R.	Cap. R.	Log(z)	Log(z)	Cap. R.	Cap. R.
Bank-specific variables												
LOGZ			0.209**	-0.0210			0.0174***	0.0790***			-0.0122*	0.0334***
			(4.47)	(-0.36)			(5.01)	(13.75)			(-2.13)	(5.39)
EQTA	3.414**	-0.852			2.570***	3.665***			-12.57*	17.05***		
	(4.47)	(-0.36)			(5.01)	(13.75)			(-2.13)	(5.39)		
LTA	-0.661	-1.884	0.433	-0.220	-0.0754***	-0.188***	-0.0173***	-0.0449***	-0.0407	0.147	-0.00692*	-0.0179***
	(-0.51)	(-1.43)	(1.50)	(-1.00)	(-3.69)	(-4.47)	(-11.34)	(-7.55)	(-0.36)	(1.13)	(-2.10)	(-3.92)
LOANSTA	-1.896	-1.509	-0.0943	-0.0818	0.0752	0.552***	-0.0569	-0.0796**	8.026*	0.0664	-0.164	-0.0838
	(-0.45)	(-0.41)	(-0.09)	(-0.14)	(0.30)	(4.19)	(-2.79)	(-4.12)	(2.38)	(0.06)	(-1.48)	(-1.77)
LOANSDEPO	0.227	-1.213	0.589	-0.160	-0.185	-0.265***	0.101***	0.0559***	-5.935	0.522	0.173	0.0667
	(0.08)	(-0.48)	(0.90)	(-0.40)	(-1.23)	(-5.40)	(8.80)	(8.03)	(-2.02)	(0.43)	(1.87)	(1.28)
ROA	1.211*	1.053*	-0.271*	-0.0161	25.28***	4.857***	-1.045***	-0.472***	3.073	22.60***	-0.370	-1.036***
	(2.80)	(2.72)	(-2.34)	(-0.18)	(11.49)	(5.83)	(-5.31)	(-3.78)	(0.22)	(6.19)	(-0.85)	(-6.87)
FATA	-22.08	6.361	14.11	8.725	3.258	-0.337	1.288***	1.830***	15.84	6.447	-1.167	-0.601*
	(-0.51)	(0.16)	(1.47)	(1.60)	(1.09)	(-0.14)	(5.35)	(5.53)	(0.61)	(0.99)	(-1.51)	(-2.28)
LAGE	6.007		-1.787		-0.0763		-0.0224***		-0.557		-0.0195*	
	(1.16)		(-1.45)		(-1.47)		(-5.40)		(-1.92)		(-2.21)	
FORE	-0.201		0.0345		0.628	0.108	-0.0145	-0.0399**				
	(-0.26)		(0.18)		(1.12)	(1.29)	(-0.31)	(-3.27)				
DOM		0.461		0.0671	0.607		-0.000899					
		(0.67)		(0.62)	(1.08)		(-0.02)					
GOV						0.0780		-0.0389				
						(0.38)		(-1.29)				
Macroeconomic variables												
LGDP	3.407	2.587	-0.772	-0.136	-0.325	0.0904	0.000159	0.00680	-0.0609	-0.133	0.0616	0.0190
	(1.26)	(1.08)	(-1.13)	(-0.33)	(-0.61)	(0.61)	(0.00)	(0.31)	(-0.05)	(-0.43)	(1.63)	(1.46)
INFLATION	-13.74	-19.15	-0.832	-2.549	0.231	-0.0397	-0.0245	0.0127	-10.14	3.002	-1.237	-0.236
	(-0.27)	(-0.44)	(-0.07)	(-0.37)	(0.24)	(-0.15)	(-0.31)	(0.32)	(-0.47)	(0.55)	(-1.97)	(-1.00)
MCAP	0.502	0.821	-0.288	0.0357	-0.0389	0.0753	-0.000669	-0.00537	-0.275	0.0629	-0.0391	-0.00599
	(0.29)	(0.53)	(-0.68)	(0.14)	(-1.22)	(1.40)	(-0.25)	(-0.68)	(-0.37)	(0.34)	(-1.77)	(-0.73)
GFC	0.0731	-0.112	-0.0961	-0.0635	-0.0464	-0.0603*	-0.0102	0.00114	0.142	-0.00369	-0.00397	0.00134
	(0.11)	(-0.19)	(-0.60)	(-0.71)	(-0.52)	(-2.28)	(-1.39)	(0.29)	(0.55)	(-0.06)	(-0.49)	(0.49)

Sig	-107.1	-62.00	23.96	5.496	12.17	1.133	0.266	0.0966	7.867	4.040	-1.458	-0.430
cons	(-1.34)	(-0.94)	(1.19)	(0.51)	(0.80)	(0.27)	(0.21)	(0.16)	(0.22)	(0.47)	(-1.36)	(-1.17)
R²	0.8823	0.9161	0.9750	0.8050	0.3285	0.5549	0.4891	0.6728	0.8288	0.8720	0.9040	0.9275
# of banks	3	3	3	3	74	74	74	74	5	5	5	5
N	21	21	21	21	550	550	550	550	37	37	37	37

Notes: LOGZ: z-score, EQTA: capital ratio, LTA: bank size, LOANSTA: loans intensity, LOANSDEPO: credit risk, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

with banks across the world, MENA banks and GCC banks). In contrast, banks with large capitals attained less profit. The assets intensity was found to be highly important to capitalisation in conventional banking systems (similar to banks in the UK [including GCC] and MENA [excluding GCC]) but assets affected the capital ratio in SRBs inversely and significantly (the same as MENA banks [excluding GCC]). New conventional banks and SRBs were well capitalised compared to older banks. Foreign banks' investment led to worse capitalisation. Finally, over the period of global financial crisis, conventional banks faced a very high probability of failure due to a significant correlation between z-score and GFC. Overall, the R^2 in Islamic banks varied between 80.50% and 97.50%, the R^2 in conventional banks scored between 32.85% and 67.28%, and finally, SRBs had consistency measures between 82.88% and 92.75%.

7.8 Determinants of stability for the whole sample

Considering the full sample, we can conclude the determinants of stability (z-score and capitalisation) in Table 7.15. Firstly, the positive determinants of z-score for the full sample are capital ratio, size, ROA, age, GDP (FEM) and market capitalisation (FEM). Secondly, there are inverse relationships between z-score and loan intensity, GDP (OLS) and market capitalisation.

Focusing on capital ratios' results for the full sample allow us to find that z-score, loan intensity, credit risk, ROA, operating leverage, banking (foreign, domestic and public) ownerships GDP and market capitalisation were supporting the capitalisation significantly and positively. In contrast, size and age unsecured the financial stability due to an inverse correlation with capital ratios.

7.9 Conclusion of stability and its determinants

The socially responsible banks are the most stabilised banks scoring average log (z-score) equals to 3.896 following by conventional banks (2.981) then Islamic banks (2.647). On other words, Islamic banks are highly exposed a threat to bankrupt over the period 2005-2012.

This chapter explained that the stability (z-score) of Islamic banks is affected positively and significantly by size (OLS), bank capitalisation, loans (OLS), ROA, age and ownership (domestic and stat-owned banks), while total assets (FEM),

Table 7.15: Results of stability determinants for all banks

Stability	All Banks		All Banks	
	(OLS)	(FEM)	(OLS)	(FEM)
	Log(z)	Log(z)	Capital ratio	Capital ratio
Bank-specific variables				
LOGZ			0.0262***	0.127***
			(7.28)	(17.00)
EQTA	0.822***	0.955***		
	(7.28)	(17.00)		
LTA	-0.0211	-0.291***	-0.00804***	-0.0360***
	(-1.70)	(-15.32)	(-3.64)	(-4.96)
LOANSTA	-0.266***	-0.111**	0.0958***	0.336***
	(-3.66)	(-2.66)	(7.45)	(25.22)
LOANSDEPO	-0.000450	0.000249	0.00172***	0.0000789
	(-0.27)	(0.54)	(5.90)	(0.47)
ROA	2.269***	1.661***	0.245***	0.0413
	(6.09)	(15.92)	(3.67)	(1.02)
FATA	-0.547	1.063	3.590***	2.346***
	(-0.38)	(1.80)	(14.61)	(11.19)
LAGE	0.162***		-0.0530***	
	(4.89)		(-9.07)	
FORE	-0.167	-0.0850	0.372***	-0.0226
	(-0.80)	(-1.15)	(10.25)	(-0.83)
DOM	0.0206	-0.0533	0.328***	-0.00565
	(0.10)	(-0.83)	(8.89)	(-0.24)
GOV	0.0468		0.405***	
	(0.23)		(11.55)	
Macroeconomic variables				
LGDP	-0.0690***	0.392***	-0.00206	0.0346**
	(-5.26)	(11.06)	(-0.87)	(2.60)
INFLATION	-0.000384	-0.103	-0.00480	-0.0300
	(-0.02)	(-1.05)	(-1.47)	(-0.84)
MCAP	-0.0491***	0.136***	0.00520*	0.00276
	(-3.59)	(5.18)	(2.13)	(0.29)
GFC	-0.0286	-0.0220	-0.000132	0.00463
	(-0.63)	(-1.90)	(-0.02)	(1.10)
Sigma	4.496***	-4.994***	-0.0609	-0.993**
_cons	(10.93)	(-5.80)	(-0.81)	(-3.14)
R²	0.0791	0.4119	0.2824	0.5209
Number of banks	323	323	323	323
N	2423	2423	2423	2423

Notes: LOGZ: z-score, EQTA: capital ratio, LTA: bank size, LOANSTA: loans intensity, LOANSDEPO: credit risk, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, FORE: dummy equal 1 if foreign bank and 0 otherwise, DOM: dummy equal 1 if domestic bank and 0 otherwise, GOV: dummy equal 1 if government bank and 0 otherwise, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis; dummy equal 1 if the study period falls within year 2007-2009 and 0 otherwise.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, t statistics in parentheses.

loans (FEM), operating leverage, GDP (OLS) and market capitalisation impact stability negatively.

With regard to conventional banks, there were positive and significant relationships between z-score and capital ratio (FEM), loans to deposits ratio (OLS), ROA, operating leverage, GDP (FEM) and market capitalisation. On the contrary,

a negative and significant relationship was found between z-score and size, capitalisation (OLS), loan intensity, ownership, GDP (OLS), inflation and GFC. Focusing on socially responsible banks, the factors found to be decreasing the threats of risk insolvency and raise the stability were as capitalisation, loans to deposits ratio, ROA, age and GDP (FEM). In contrast, the variables increasing the probability of failure are total assets, ownership and GDP (OLS) and inflation.

Overall, ROA increased the stability (z-score) of Islamic, conventional and socially responsible banks during the period of study, 2005-2012. The financial crisis influenced only the stability of conventional banks and the effect was positive and significant.

Based on the capital ratios' results, we can conclude that the positive and significant determinants in Islamic banking sector are loan intensity, credit risk, operating leverage, z-score, GDP and market capitalisation. On the other side, capital ratios decreased from size, ROA and age.

Regarding to conventional banks, the capitalisation was affected positively and significantly by loan intensity, credit risk, ROA, operating leverage, z-score (FEM) and GDP. In contrast, the capital ratios had a negative and significant relationship with size, age, z-score (OLS) and market capitalisation.

Finally, socially responsible banks' capitalisations were influenced positively and significantly through size, loan intensity (FEM), credit risk, z-score and foreign ownership. By the contrary, loan intensity (OLS), ROA and GDP growth threaten the stability of SRBs.

In conclusion, the bank-specific variables that increase stability are important for bank which leads to make policy makers in banks to focus on drawing better

strategies (plans) such as increasing the capital of bank. Regarding the countries that increase stability, banks always try to invest in countries which raise stability.

However, Appendix 15 concludes the stability averages for Islamic, conventional and socially responsible banks. In addition, Appendix 15 states the highest and lowest measures over the period 2005-2012.

Appendix 16 presents the significant variables that impacted stability of Islamic, conventional and socially responsible banks through the 2005-2012 periods. Appendix 16 shows that ROA supported stability (z-score) and lowered the risk of bankruptcy for all banks over the period 2005-2012. This is the reason behind striving to maximise profits, which improves stability in the banking sector. Regarding the external variables, market capitalisation was found to be the main factor for stability (excluding Islamic banks). Thus, governments need to be concerned about improving the stock market. However, inflation was found to be affecting negatively stability over the period 2005-2012. This result is a warning to banks against operating in countries with higher inflation rates. In addition, the GFC made the conventional banks suffering from high insolvency risk over the period of the crisis (2007-2009).

In MENA region including GCC countries, the conventional banks attained better z-scores than Islamic banks. In contrast, Islamic banks had the advantage of capitalisation (better than conventional banks). In MENA region without GCC countries, we can conclude that the socially responsible banks were found to be the most stabilised compared to conventional (which have the lowest capital ratios) and Islamic banks (that have the minimum z-scores). Finally, in GCC region, conventional banks attained better z-scores but Islamic banks were found to be more highly capitalised over the period 2005-2012. Based on the determinants of stability, the most remarkable results cover that stability's indicators (z-score and capitalisation) influence each other strongly, positively and significantly in MENA banking system.

In the UK, the most stabilised banking system is the socially responsible, while Islamic banks were found to be unstable. On the contrary, Islamic banks have the best capital ratios but SRBs attained the worst capitalisation. Overall, stability's

indicators (z-score and capital ratio) were found to be very important to each other in Islamic and conventional banks. Regarding SRBs, OLS suggests that lower capitalisation banks are risky and unstable, but FEM proposes that higher-capitalised banks are more resistant against insolvency risks.

Chapter Eight: Conclusion and Recommendations

8.1 Introduction

The main aim of this study was to investigate the determinants of Islamic, conventional, and socially responsible banks through the period 2005-2012. The statistical models were OLS and FEM. However, the structure of this thesis was divided as follows:

Chapter One presented an overview of efficiency, profitability, and stability within the banking sector. It provided a comparison between Islamic, conventional, and socially responsible banks. Additionally, the objectives of the study and research questions were shown in Chapter One. Furthermore, the contributions of this thesis were explained. Finally, a brief explanation of data selection, including regions of banks, was included.

Chapter Two introduced the recent studies on efficiency in banking, which helped in selecting the most suitable approaches and models. Additionally, Chapter Two noted the dependant variables and independent variables used by the researchers which simplified selection of the determinants of efficiency before running any statistical model.

Chapter Three provided the literature review of profitability and its determinants in banking. In addition, the literature review of stability and its determinants was explained in detail. Finally, the conceptual framework was covered in this chapter.

Chapter Four presented the sample of banks which included Islamic, conventional and socially responsible banks for the period 2005-2012. This chapter also outlined the indicators of efficiency, profitability, and stability and their determinants.

Chapter Five included the results and discussion of efficiency and its determinants. A comparison between Islamic, conventional and socially responsible banks was conducted in this chapter using OLS and FEM.

Chapter Six compared the profitability between Islamic, conventional, and socially responsible banks. Furthermore, this chapter analysed the data to find the determinants of profitability.

Finally, **Chapter Seven** exhibited the differences in stability between Islamic, conventional, and socially responsible banks. The determinants of stability were then identified through statistical models.

8.2 Conclusion of efficiency results

The socially responsible banks scored the highest averages of efficiency measures during the period 2005-2012, because SRBs aim to minimise the inputs in their operations. In contrast, the least scores were achieved by conventional banks due to higher interest expenses. Regarding the determinants, the variables which increase efficiency in Islamic banks have more total assets, and provide more loans to support outputs. Furthermore, investing more in financial markets as well as higher profitability resulted in greater efficiency. Finally, banks in countries with better stock market indices operated more efficiently. On the contrary, the threats against Islamic banks were attained from capital ratio and age. Lower capitalised banks were found to be more efficient. Moreover, newer banks operated more efficiently than older banks. With regards to conventional banks, the results reveal that size of bank matters in terms of more total assets, which help banks to provide better services and diversify risks. Capitals also supported efficiency effectively. In addition, lending services were found to increase efficiency in conventional banks. Similar to Islamic banks, financial investment and earnings influenced the efficiency significantly and positively. Finally, wealthier countries had more efficient banks in terms of GDP and stock market growth. On the other hand, inflation and the global financial crisis significantly reduced efficiency, which reveals that conventional banks are not resistant to economic distress. In terms of the socially responsible banks, well-capitalised banks were found to be more efficient. The threat of credit risk was higher due to a positive and significant correlation between efficiency and credit risk, which discouraged SRBs from providing more loans and accepting more deposits. According to macroeconomic variables, similar to conventional banks, richer countries (GPD and market capitalisation) included more efficient banks. Finally, GFC influenced the efficiency significantly and negatively.

8.3 Conclusion of profitability results

The highest ROA and ROE were attained by conventional banks, due to charging high interest expenses. On the other side, SRBs scored the lowest ROA and ROE,

as the aim of SRBs is to provide social and environmental services rather than profitability. According to NIM, the Islamic banks had the highest NIM measures in this study, because Islamic banks do not have interest expenses; while conventional banks had the minimum NIM ratios due to higher interest expenses. Focusing on Islamic banks, larger Islamic banks were found to be more profitable than smaller banks. Additionally, accepting more deposits increased the profits significantly. Further, more stable banks could maximise their earnings. Finally, banks in richer countries performed better financially. On the contrary, lower capitalised banks had more ROA and ROE, and providing more loans decreased the returns badly. Additionally, the Islamic banks in countries with higher inflation rates were not able to achieve outstanding profits. Concerning conventional banks, there is a positive and significant relationship between profitability ratios (ROA/ROA) and size. Contrary to Islamic banks, higher capitalised conventional banks attained greater earnings. The findings show that attracting more depositors supports the profitability significantly. In addition, stable banks were more profitable than unstable banks. Moreover, growth in the stock market allowed banks to financially perform better. On the other side, the development in economies impacted ROA negatively and significantly. According to socially responsible banks, capital ratio minimised profitability significantly, whereas the financial stability and financial markets development enhanced ROA and ROE over the period 2005-2012. However, we can conclude from the NIM determinants that Islamic banks are impacted positively by size of bank, capitalisation, and financial stability. On the other side, GDP and market capitalisation had negative signs. In terms of conventional banks, the relationship between NIM and loan intensity, z-score, and GFC were significant and positive. In contrast, size, deposit intensity, inflation, GDP, and market capitalisation decreased the NIM significantly. Finally, the socially responsible banks were affected significantly and negatively by size, deposit ratio, z-score, foreign ownership, domestic ownership, public ownership, GDP, and market capitalisation. On the contrary, capital ratio and credit risks had positive coefficients.

8.4 Conclusion of stability results

Socially responsible banks were the most stable (due to higher efficiency) compared to conventional and Islamic banks (highly risky) over the period 2005-

2012. The stability of Islamic banks is affected positively and significantly by size of bank. Better capitalisation leads to stability in Islamic banking. Lending activities allow higher stability. Also, older banks were found to be more stable than new banks. Profitability also strongly supported financial stability in Islamic banking. Moreover, public and domestic ownership increased stability, however fixed assets intensity affected the stability badly due to the high expenses of fixed assets. Regarding the macroeconomic factors, Islamic banks could not exploit the growth of economies (GDP and market capitalisation), which resulted in worse financial stability measures in developed economies. In conventional banks, there is a positive and significant relationship between stability and profitability. Furthermore, operating leverage increased the stability significantly. Conventional banks, however, were more stable in countries with better economies (GDP and stock market development). On the contrary, conventional larger sized banks were found to be unstable compared to smaller sized banks. Inflation and GFC badly influence the financial stability of conventional banks. Focusing on socially responsible banks, the main factors were found to decrease the threat of insolvency risk, and raise the stability. In contrast, the variables increasing the probability of failure are total assets, and growth of economies. Regarding the capital ratio measures, the highest capitalised banks are socially responsible banks, and the most unstable banks are conventional banks. Focusing on the determinants of capitalisation, the positive and significant determinants in the Islamic banking sector are lending facilities, fixed assets intensity, and z-score. In addition, economic development (GDP and market capitalisation) allowed banks to maximise their capitals efficiently. On the other side, capital ratios of Islamic banks decreased from age of banks; new banks were more stable than older banks. Regarding conventional banks, capitalisation was affected positively and significantly by loan intensity. Also, profitability strongly enhances capitalisation. Finally, the wealthier countries had more constant banks against crisis. In contrast, the banks in countries with lower stock market rates were found to be steadier than countries with developed stock markets. Finally, socially responsible banks' capitalisation was influenced positively and significantly through size of banks. Moreover, supplying more loans tends to move banks further from bankruptcy. Regarding the ownership, foreign banks were found to be the best capitalised banks compared to domestic and public banks. On the contrary, economy growth

(GDP) threatens the stability of SRBs due to an inverse and significant correlation between capital ratios and GDP.

8.5 Implications

Studying efficiency, profitability, and stability in the banking sector can be helpful for policymakers, managers, and market analysts due to rising competition between banks. Thus, better upper management strategies increase the probability of achieving better efficiency, profitability, and stability in banks. According to clients, banking investors prefer dealing with efficient, profitable, and stable banks that are able to provide better interest rates than other banks. Regarding the determinants of efficiency, profitability, and stability, the effect of internal variables, whether positive or negative, allows banking regulators to apply strategies to raise the efficiency, profitability, and stability. Whereas, the impact of macroeconomic variables makes banks able to invest more by establishing more or fewer branches in any country.

8.6 Limitations of study

The limitations of this thesis are:

- Bank governance (e.g. board size, gender of directors, duality of chair and CEO, duality of shareholders and directors) has not been considered.
- OLS methodology has key weakness points as following:
 1. The OLS model is likely to be a biased approach in some cases.
 2. The OLS does not overcome the problem of multicollinearity.
 3. The OLS is an inconsistent regression in terms of the presence of time invariant characteristics-omitted variable bias problem.
 4. The algorithms for the computation of variance components using OLS are not optimal when data are missing.
- Arab Spring (revolutions period as 2010-2012) has not been included.
- The poor availability of data for Islamic and socially responsible banks, which reduces the number of banks.
- Some results have low R^2 for larger samples.

8.7 Recommendations for future research

Many studies can be conducted based on this thesis and relevant literature review.

However, based on the limitations mentioned above, recommendations for further research can be as follows:

- Bank governance variables can be examined.
- More statistical models can be run, such as the Tobit model for efficiency, generalised least square (GLS), and generalised method of moments (GMM), which may increase the R^2 indicators.
- Arabic revolutions' (Arab Spring) effects can be tested.
- More regions could be considered, such as South American countries.
- An updated period can be covered until 2015.
- Additional efficiency indicators can be employed (for instance, stochastic frontier analysis [SFA]).
- Further profitability ratios (i.e. non-interest income) may be beneficial for further research.
- More stability measures (such as non-performing loans) would be significant.
- Consideration of more country governance variables (accountability, political stability, government effectiveness, regulatory quality and rule of law) would contribute to the literature of efficiency, profitability and stability in banking.

Internet References

N	Organisation	Website
1	Al Rajhi Bank	http://www.alrajhibank.com.sa
2	Al Rayan Bank	http://www.alrayanbank.co.uk
3	Alinma Bank	http://www.alinma.com
4	Arab National Bank	http://www.anb.com.sa
5	Austrian Society for Environment and Technology Organisation	http://www.oikocredit.coop
6	Bangladesh Bank	http://www.bangladesh-bank.org
7	Bank AlBilad	http://www.bankalbilad.com
8	Bank Al-Jazira	http://www.baj.com.sa
9	Bank Al-Maghrib	http://www.bkam.ma
10	Bank Fie	http://www.bancofie.com.bo
11	Bank Nizwa	http://www.banknizwa.om
12	Bank of Algeria	http://www.bank-of-algeria.dz
13	Bank of Canada	http://www.bankofcanada.ca
14	Bank of England	http://www.bankofengland.co.uk
15	Bank of France	http://www.banque-france.fr
16	Bank of Israel	http://www.bankisrael.gov.il
17	Bank of Lebanon	http://www.bdl.gov.lb
18	Bank of Spain	http://www.bde.es
19	Bankscope	http://bankscope2.bvdep.com
20	Banque Saudi Fransi	http://www.alfransi.com.sa
21	BARC Bank	http://www.bracbank.com
22	Banxia Holdings Ltd	http://www.banxia.com
23	Caja Rural De Navara	http://www.cajaruraldenavarra.com
24	Central Bank of Bahrain	http://www.cbb.gov.bh
25	Central Bank of Bolivia	http://www.bcb.gob.bo
26	Central Bank of Egypt	http://www.cbe.org.eg
27	Central Bank of Iran	http://www.cbi.ir
28	Central Bank of Ireland	http://www.bankofireland.com
29	Central Bank of Jordan	http://www.cbj.gov.jo
30	Central Bank of Malta	http://www.centralbankmalta.org
31	Central Bank of Scotland	http://www.bankofscotland.co.uk
32	Central Bank of Syria	http://www.banquecentrale.gov.sy
33	Central Bank of Tunisia	http://www.bct.gov.tn
34	Central Bank of UAE	http://www.centralbank.ae
35	Central Bank of Yemen	http://www.centralbank.gov.ye
36	Charity Bank	http://www.charitybank.org
37	CIA World Factbook	http://www.cia.gov
38	Citizens Bank of Canada	http://www.citizensbank.ca
39	Co-operative Bank	http://www.co-operativebank.co.uk
40	Credit Agricole Banque	http://www.ca-aquitaine.fr
41	Credit Agriculture Bank of Morocco	http://www.credit-agricole.com
42	Crédit Coopératif	http://www.credit-cooperatif.coop

43	Culture Saving Bank	http://www.cultura.no
44	Danemarks National Bank	http://www.nationalbanken.dk
45	Dubai Islamic Bank	http://www.dib.ae
46	Ecology Building Society	http://www.ecology.co.uk
47	Economic Glossary	http://glossary.econguru.com
48	Economics Help Organisation	http://www.economicshelp.org
49	Emirati Government	http://www.government.ae
50	Equator Principles	http://www.equator-principles.com
51	Socially responsible Popular Bank	http://www.bancaetica.it
52	European Central Bank	http://www.ecb.europa.eu
53	European Union	http://europa.eu
54	Federal Reserve	http://www.federalreserve.gov
55	Food and Agriculture Organization of the United Nations	http://www.fao.org
56	General Savings Bank of Netherlands	http://www.asnbank.nl
57	German Central Bank	http://www.bundesbank.de
58	Global Alliance for Banking on Values	http://www.gabv.org
59	Global Economy	http://www.theglobaleconomy.com
60	GLS Gemeinschaftsbank	http://www.gls.de
61	Harrods Bank	http://www.harrodsbank.co.uk
62	ICIC Bank	http://www.icicibank.com
63	International Monetary Fund	http://www.imf.org
64	Investopedia	http://www.investopedia.com
65	Islamic Bank Free Guide to UK Islamic Banking	http://www.islamicbank.co.uk
66	Islamic Bank of Britain	http://www.islamic-bank.com
67	Islamic Development Bank	http://www.isdb.org
68	Keshavarzi Bank	http://www.bki.ir
69	Kuwait Government	http://www.e.gov.kw
70	Mediterranean Corporate Bank	http://www.medcorpbank.com.mt
71	Mongol Bank	http://www.mongolbank.mn
72	National Bank of Austria	http://www.oenb.at
73	National Commercial Bank	http://www.alahli.com
74	Nepal Central Bank	http://www.nrb.org.np
75	Netherlands Bank	http://www.dnb.nl
76	New Horizon Magazine	http://www.islamic-banking.com
77	Norway Bank	http://www.norges-bank.no
78	OPEC Organisation	http://www.opec.org
79	Palestine Monetary Authority	http://www.pma.ps
80	Qatar Central Bank	http://www.qcb.gov.qa
81	Qatari Ministry of Interior	http://www.moi.gov.qa
82	Reserve Bank of Australia	http://www.rba.gov.au
83	Riyad Bank	http://www.riyadbank.com
84	RSF Social Finance	http://www.rsfsocialfinance.org
85	Sainsbury's Bank	http://www.sainsburysbank.co.uk
86	Samba Financial Group	http://www.samba.com
87	Saudi Arabian Monetary Agent	http://www.sama.gov.sa

88	Saudi British Bank	http://www.sabb.com
89	Saudi Holandi Bank	http://www.shb.com.sa
90	Saudi Investment Bank	http://www.saib.com.sa
91	Saudi Stock Market - Tadawul	http://www.tadawul.com.sa
92	Stanford Encyclopaedia of Philosophy	http://plato.stanford.edu
93	Sunrise Bank	http://www.sunrisebank.com.np
94	Swiss National Bank	http://www.snb.ch
95	The Cooperative Bank (New Zealand)	http://www.co-operativebank.co.nz
96	The Co-operative Bank (United Kingdom)	http://www.co-operativebank.co.uk
97	The Economist	http://www.economist.com
98	The Gulf Cooperation Council for the Arab State of the Gulf	http://www.gcc-sg.org
99	The Kingdom of Bahrain Government	http://www.bahrain.bh
100	The Kingdom of Saudi Arabia Government	http://www.saudi.gov.sa
101	Triodos Bank	http://www.triodos.com
102	Unity Trust Bank	http://www.unity.co.uk
103	Volksbank AG	http://www.volksbank.com
104	World Bank	http://www.worldbank.org
105	World Data Atlas	http://knoema.com
106	World Trade Organisation	http://www.wto.org
107	Worldwide Centers of Commerce Index	http://www.mastercard.com
108	Xac Bank	http://www.xacbank.mn
109	XE website	http://www.xe.com

Bibliography

- Abdelsalam, O., Fethi, M.D., Matallín, J.C. & Tortosa-Ausina, E. (2014). On the comparative performance of socially responsible and Islamic mutual funds. *Journal of Economic Behavior & Organization*, 130, 108-128.
- Abdul-Majid, M., Saal, D.S. & Battisti, G. (2010). Efficiency in Islamic and Conventional Banking: An International Comparison. *Journal of Productivity Analysis*, 34(1), 25-43.
- Abdul-Majid, M., Saal, D.S. & Battisti, G. (2011). Efficiency and Total Factor Productivity Change of Malaysian Commercial Banks. *The Service Industries Journal*, 31(13), 2117-2143.
- Agoraki, M.-E.K, Delis, M.D., & Pasiouras, F. (2011). Regulations, competition and bank risk-taking in transition countries. *Journal of Financial Stability*, 7(1), 38-48.
- Abu Alkhail, A.M., Burghof, H., Khan, W.A., 2012. Islamic commercial banking in Europe: a cross country and inter-bank analysis of efficiency performance. *International Business and Economics Research Journal*, 11(6), 647-676.
- Alessandri, P. & Nelson, B.D. (2015). Simple Banking: Profitability and the Yield Curve. *Journal of Money, Credit and Banking*, 47(1), 144-175.
- Alsmadi, I. & Zarour, M. (2015). Building an Islamic financial information system based on policy managements. *Journal of King Saud University-Computer and Information Sciences*, 1-12.
- Aigner, D.J., Lovell, C.A.K. & Schmidt, P. (1977). Formulation and Estimation of Stochastic Frontier Production Function Models. *Journal of Econometrics*, 6(1), 21-37.
- Aikaeli, J. (2006). Commercial Banks Efficiency in Tanzania. *Working Paper, Department of Economics, University of Dar es Salaam*.
- Akhigbe, A. & McNulty, J. (2005). Profit Efficiency Sources and Differences among Small and Large US Commercial Banks. *Journal of Economics and Finance*, 29(3), 289-299.
- Akhmedjonov, A. & Izgi, B.B. (2015). If bank capital matters, then how? The effect of bank capital on profitability of Turkish banks during the recent financial crisis. *Macroeconomics and Finance in Emerging Market Economies*, 8(1-2), 160-166.
- Al Shamsi, F.S., Aly, H.Y. & El-Bassiouni, M.Y. (2009). Measuring and Explaining the Efficiencies of the United Arab Emirates Banking System. *Applied Economics*, 41(27), 3505-3519.

- Al-Sharkas, A.A., Hassan, M.K. & Lawrence, S. (2008). The Impact of Mergers and Acquisitions on the Efficiency of the US Banking Industry: Further Evidence. *Journal of Business Finance & Accounting*, 35(1-2), 50-70.
- Al-Musali, M.A. & Ismail, K.N.I. (2014). Intellectual capital and its effect on financial performance of banks: Evidence from Saudi Arabia. *Procedia - Social and Behavioral Sciences*, 164, 201-207.
- Altunbas, Y. & Marques, D. (2008). Mergers and acquisitions and bank performance in Europe: The role of strategic similarities. *Journal of Economics and Business*, 60 (3), 204-222.
- Andries, A.M., & Căpraru, B. (2014). The nexus between competition and efficiency: The European banking industries experience. *International Business Review*, 23, 566-579.
- Anginer, D., Demirguc-Kunt, A., & Zhu, M. (2014). How does deposit insurance affect bank risk? Evidence from the recent crisis. *Journal of Banking and Finance*, 48, 312-321.
- Apergis, N. (2014). The long-term role of non-traditional banking in profitability and risk profiles: Evidence from a panel of U.S. banking institutions. *Journal of International Money and Finance*, 45, 61-73.
- Ariff, M., & Can, L. (2008). Cost and profit efficiency of Chinese banks: A non-parametric analysis. *China Economic Review*, 19, 260-273.
- Asmild, M., Hougaard, J.L., Kronborg, D. & Kvist, H.K. (2003). Measuring Inefficiency Via Potential Improvements. *Journal of Productivity Analysis*, 19(1), 59-79.
- Asmild, M. & Matthews, K. (2012). Multi-directional Efficiency Analysis of Efficiency Patterns in Chinese Banks 1997–2008. *European Journal of Operational Research*, 219(2), 434-441.
- Assaf, A.G., Barros, C. & Ibiwoye, A. (2012). Performance Assessment of Nigerian Banks Pre and Post Consolidation: Evidence from a Bayesian Approach. *The Service Industries Journal*, 32(2), 215-229.
- Assaf, G.A., Carlos, P.B. & Matousek, R. (2011). Technical Efficiency in Saudi Banks. *Expert Systems with Applications*, 38(5), 5781-5786.
- Ataullah, A., Cockerill, T. & Le, H. (2004). Financial Liberalization and Bank Efficiency: a Comparative Analysis of India and Pakistan. *Applied Economics*, 36(17), 1915-1924.
- Athanasoglou, P.P., Brissimis, S.N., & Delis, M.D. (2008). Bank-specific, industry-specific and macroeconomic determinants of bank profitability. *Journal of International Financial Markets, Institutions & Money*, 18, 121-136.

- Avkiran, N.K. (1999). The evidence on efficiency gains: The role of mergers and the benefits to the public. *Journal of Banking & Finance*, 23, 991-1013.
- Bader, M.K.I., Mohamad, S., Ariff, M. & Hassan, T. (2008). Cost, Revenue, and Profit Efficiency of Islamic Versus Conventional Banks: International Evidence Using Data Envelopment Analysis. *Islamic Economic Studies*, 15(2), 23-76.
- Banker, R.D. (1993). Maximum Likelihood, Consistency and Data Envelopment Analysis: a Statistical Foundation. *Management Science*, 39(10), 1265-1273.
- Banker, R.D., Charnes, A. & Cooper, W.W. (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, 30(9), 1078-1092.
- Barakat, A. & Hussainey, K. (2013). Bank governance, regulation, supervision, and risk reporting: Evidence from operational risk disclosures in European banks. *International Review of Financial Analysis*, 30, 254-273.
- Barry, T.A., Lepetit, L., & Tarazi, A. (2011). Ownership structure and risk in publicly held and privately owned banks. *Journal of Banking & Finance*, 35(5), 1327-1340.
- Baselga-Pascual, L., Trujillo-Ponce, A. & Cardone-Riportella, C. (2015). Factors influencing bank risk in Europe: Evidence from the financial crisis. *North American Journal of Economics and Finance*, 34, 138-166.
- Bashir, A.M. (2003). Determinants of profitability in Islamic banks: some evidence from the Middle East. *Islamic Economic Studies*, 11(1), 31-57.
- Baten, M.A. & Kamil, A.A. (2010). Measuring Online Bank Profit Efficiency: A Stochastic Frontier Analysis. *Working Paper, Universiti Tunku Abdul Rahman, Kuala Lumpur*.
- Beck, T., Cull, R., & Jerome, A. (2005). Bank privatization and performance: Empirical evidence from Nigeria. *Journal of Banking and Finance*, 29, 2355-2379.
- Beck, T., Demircug-Kunt, A., & Merrouche, O. (2013a). Islamic vs. conventional banking: Business model, efficiency and stability. *Journal of Banking and Finance*, 37, 433-447.
- Beck, T., Jonghe, O.D., & Schepens, G. (2013b). Bank competition and stability: Cross-country heterogeneity. *Journal of Financial Intermediation*, 22(2), 218-244.
- Belanes, A., Ftiti, Z., & Regaieg, R. (2015). What can we learn about Islamic banks efficiency under the subprime crisis? Evidence from GCC Region. *Pacific-Basin Finance Journal*, 33, 81-92.

- Bergendahl, G. & Lindblom, T. (2008). Evaluating the Performance of Swedish Savings Banks According to Service Efficiency. *European Journal of Operational Research*, 185(3), 1663-1673.
- Berger, A.N. (1993). "Distribution-Free" Estimates of Efficiency in the U.S. Banking Industry and Tests of the Standard Distributional Assumptions. *Journal of Productivity Analysis*, 4(3), 261-292.
- Berger, A.N. & Humphrey, D.B. (1997). Efficiency of Financial Institutions: International Survey and Directions for Future Research. *European Journal of Operational Research*, 98(2), 175-212.
- Berger, A.N. & Mester, Loretta J. (1997). Inside the Black Box: What Explains Differences in the Efficiencies of Financial Institutions?. *Journal of Banking and Finance*, 21(7), 895-947.
- Berger, A.N. & Di Patti, E.B. (2003). Capital Structure and Firm Performance: a New Approach to Testing Agency Theory and an Application to the Banking Industry. *Federal Reserve System Papers*, 7(12), 1-39.
- Berger, A.N., Klapper, L.F., & Turk-Ariss, R. (2009). Bank Competition and Financial Stability. *Journal of Financial Services Research*, 35, 99-118.
- Bertay, A.C., Demirguc-Kunt, A., & Huizinga, H. (2013). Do we need big banks? Evidence on performance, strategy and market discipline. *Journal of Financial Intermediation*, 22 (4), 532-558.
- Bogetoft, P. & Hougaard, J.L. (1999). Efficiency Evaluations Based on Potential (Non-Proportional) Improvements. *Journal of Productivity Analysis*, 12(3), 233-247.
- Boubakri, N., Cosset, J.-C., & Fischer, K. (2005). Privatization and bank performance in developing countries. *Journal of Banking & Finance*, 29, 2015-2041.
- Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking and Finance*, 13 (1), 65-79.
- Bourkhis, K. & Nabi, M.S. (2013). Islamic and conventional banks' soundness during the 2007–2008 financial crisis. *Review of Financial Economics*, 22, 68-77.
- Boyd, J., Graham, S. & Hewitt, R. (1993). Bank holding company mergers with nonbank financial firms: Effects on the risk of failure. *Journal of Banking and Finance*, 17, 43-63.
- Brighi, P. & Venturelli, V. (2015). How functional and geographic diversification affect bank profitability during the crisis. *Finance Research Letters*, 1-10.

- Brooks, R.M. (2010). *Financial Management: Core Concepts*. Pearson, 4-49.
- Bryman, A. & Bell, E. (2007). *Business Research Methods*. Oxford University Press, Second Edition.
- Bullock, A. & Trombley, S. (1999). The Fontana Dictionary of Modern Thought. London: Harper-Collins, 669-737.
- Canhoto, A. & Dermine, J. (2003). A Note on Banking Efficiency in Portugal, New Vs. Old Banks. *Journal of Banking & Finance*, 27(11), 2087-2098.
- Căpraru, B. & Ihnatov, I. (2014). Banks' Profitability in Selected Central and Eastern European Countries. *Procedia Economics and Finance*, 16, 587-591.
- Carretta, A., Farina, V., Fiordelis, F., Schwizer, P. & Lopes, F.S.S. (2015). Don't Stand So Close to Me: The role of supervisory style in banking stability. *Journal of Banking & Finance*, 52, 180-188.
- Casu, B. & Molyneux, P. (2003). A Comparative Study of Efficiency in European Banking. *Applied Economics*, 35(17), 1865-1876.
- Chalermchatvichien, P., Jumreornvong, S., & Jiraporn, P. (2014). Basel III, capital stability, risk-taking, ownership: Evidence from Asia. *Journal of Multinational Financial Management*, 28, 28-46.
- Chansarn, S. (2008). The Relative Efficiency of Commercial Banks in Thailand: DEA Approach. *International Research Journal of Finance and Economics*, 18(18), 53-68.
- Charnes, A., Cooper, W.W. & Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units. *European Journal of Operational Research*, 2(6), 429-444.
- Chavarín, R. (2015). Profitability in Banks Affiliated to a Business Group: Evidence from Mexico. *Emerging Markets Finance & Trade*, 1-18.
- Chen, Y.-hsiu, Kao, M.-C. & Lin, C.-yang. (2011). Do Efficiency Improvements from Mergers and Acquisitions Occur in Taiwanese Banking Industry? An Application of Data Envelopment Analysis. *International Research Journal of Finance and Economics*, (73), 161-170.
- Chen, M., Jeon, B.N., Wang, R. & Wu, J. (2015). Corruption and bank risk-taking: Evidence from emerging economies. *Emerging Markets Review*, 24, 122-148.
- Chen, Y. & Wang, Y. (2015). The Efficiency of China's Banking Industry and the Determinants. *International Economic Journal*, 29(4), 631-653.

- Čihák, M. & Hesse, H. (2010). Islamic Banks and Financial Stability: An Empirical Analysis. *Journal of Financial Services Research*, 38, 95-113.
- Chiaramonte, L., Croci, E. & Poli, F. (2015). Should we trust the Z-score? Evidence from the European Banking Industry. *Global Finance Journal*, 1-21.
- Chiou, C.-C. (2009). Effects of Financial Holding Company Act on bank efficiency and productivity in Taiwan. *Neurocomputing*, 72, 3490-3506.
- Chitan, G. (2012). Corporate governance and bank performance in the Romanian banking sector. *Procedia Economics and Finance*, 3, 549-554.
- Chiu, Y.-H., Chen, Yu-Chuan & Bai, X.-J. (2011). Efficiency and Risk in Taiwan Banking: SBM super-DEA Estimation. *Applied Economics*, 43(5), 587-602.
- Chong, B.S. & Liu, M.H. (2009). Islamic banking: Interest-free or interest-based? *Pacific-Basin Finance Journal*, 17, 125-144.
- Chortareas, G.E., Girardone, C., & Ventouri, A. (2012). Bank supervision, regulation, and efficiency: Evidence from the European Union. *Journal of Financial Stability*, 8, 292-302.
- Chronopoulos, D.K., Liu, H., McMillan, F.J., & Wilson, J.O.S. (2015). The dynamics of US bank profitability. *The European Journal of Finance*, 21(5), 426-443.
- Claeys, S. & Vennet, R.V. (2008). Determinants of bank interest margins in Central and Eastern Europe: A comparison with the West. *Economic Systems*, 32(2), 197-216.
- Cooper, W.W., Seiford, L.M., & Tone, K. (2006). Introduction To Data Envelopment Analysis And Its Uses. *Springer*.
- Cubillas, E. & González, F. (2014). Financial liberalization and bank risk-taking: International evidence, *Journal of Financial Stability*, 11, 32-8.
- Ćurak, M., Poposki, K. & Pepur, S. (2012). Profitability Determinants of the Macedonian Banking Sector in Changing Environment. *Procedia - Social and Behavioral Sciences*, 44, 406-416.
- Das, A. & Ghosh, S. (2009). Financial Deregulation and Profit Efficiency: A Nonparametric Analysis of Indian Banks. *Journal of Economics and Business*, 61(6), 509-528.
- Das, A., Nag, A. & Ray, S.C. (2004). Liberalization, Ownership and Efficiency in Indian Banking: A Nonparametric Approach. *Working Paper, University of Connecticut, Department of Economics*.

- Das, A., Ray, S.C. & Nag, A. (2009). Labor-use Efficiency in Indian Banking: A Branch-level Analysis. *Omega*, 37(2), 411-425.
- Dedu, V. & Chitan, G. (2013). The influence of internal corporate governance on bank performance - an empirical analysis for Romania. *Procedia - Social and Behavioral Sciences*, 99, 1114-1123.
- Delis, M.D. (2009). Evaluating Cost and Profit Efficiency: A Comparison of Parametric and Non-parametric Methodologies. *Working Paper, Athens University, Economics and Business*.
- Delis, M.D., Tran, K.C., & Tsionas, E.G. (2012). Quantifying and explaining parameter heterogeneity in the capital regulation-bank risk nexus. *Journal of Financial Stability*, 8, 57-68.
- Demirguc, -Kunt, A. & Huizinga, H. (1999). Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence. *The World Bank Economic Review*, 13(2), 379-408.
- DeYoung, R. & Torna, G. (2013). Nontraditional banking activities and bank failures during the financial crisis. *Journal of Financial Intermediation*, 22(3), 397-421.
- Dietrich, A. & Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions & Money*, 21, 307-327.
- Dietrich, A. & Wanzenried, G. (2014). The determinants of commercial banking profitability in low-, middle-, and high-income countries. *The Quarterly Review of Economics and Finance*, 54, 337-345.
- Dietsch, M. & Lozano-vivas, A. (2000). How the Environment Determines Banking Efficiency: A Comparison Between French and Spanish Industries. *Journal of Banking & Finance*, 24(1), 985-1004.
- Dima, B., Dinca, M.S., & Spulbăr, C. (2014). Financial nexus: Efficiency and soundness in banking and capital markets. *Journal of International Money and Finance*, 47, 100-124.
- Diriwachter, R. & Valsiner, J. (2006). Qualitative Developmental Research Methods in Their Historical and Epistemological Contexts. *FQS*, 7(1).
- Dong, Y., Meng, C., Firth, M., & Hou, W. (2014). Ownership structure and risk-taking: Comparative evidence from private and state-controlled banks in China. *International Review of Financial Analysis*, 36, 120-130.
- Doumpos, M., Gaganis, C. & Pasiouras, F. (2015). Central bank independence, financial supervision structure and bank soundness: An empirical analysis around the crisis. *Journal of Banking & Finance*, 1-15.

- Drake, L., Hall, M.J.B. & Simper, R. (2009). Bank Modelling Methodologies: A Comparative Non-parametric Analysis of Efficiency in the Japanese Banking Sector. *Journal of International Financial Markets, Institutions and Money*, 19(1), 1-15.
- Drake, L. & Howcroft, B. (2002). An Insight into the Size Efficiency of a UK Bank Branch Network. *Managerial Finance*, 28(9), 24-36.
- ElBannan, M.A. (2015). Do consolidation and foreign ownership affect bank risk taking in an emerging economy? An empirical investigation. *Managerial Finance*, 41(9), 874-907.
- El-Moussawi, C. & Obeid, H. (2010). Evaluating the productive efficiency of Islamic banking in GCC: a non-parametric approach. *International Research Journal of Finance and Economics*, 53, 178-190.
- Erdem, C. & Erdem, M.S. (2008). Turkish Banking Efficiency and Its Relation to Stock Performance. *Applied Economics Letters*, 15(3), 207-211.
- Ewijk, S.E. & Arnold, I.J. (2014). How bank business models drive interest margins: evidence from US bank-level data. *The European Journal of Finance*, 20(10), 850-873.
- Farrell, M.J. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society*, 120(3), 253-290.
- Faye, I., Triki, T. & Kangoye, T. (2013). The Islamic finance promises: Evidence from Africa. *Review of Development Finance*, 3, 136-151.
- Fazio, D.M., Tabak, B.M. & Cajueiro, D.O. (2015). Inflation targeting: Is IT to blame for banking system instability?. *Journal of Banking & Finance*, 59, 76-97.
- Feng, G. & Serletis, A. (2010). Efficiency, Technical Change, and Returns to Scale in Large US Banks: Panel Data Evidence from an Output Distance Function Satisfying Theoretical Regularity. *Journal of Banking & Finance*, 34(1), 127-138.
- Fixler, D.J. & Zieschang, K.D. (1993). An Index Number Approach to Measuring Bank Efficiency: An Application to Mergers. *Journal of Banking & Finance*, 17(2-3), 437-450.
- Flamini, V., McDonald, C. & Schumacher, L. (2009). The Determinants of Commercial Bank Profitability in Sub-Saharan Africa. *International Monetary Fund*, 1-30.
- Flammer, C. (2015). Does Corporate Social Responsibility Lead to Superior Financial Performance? A Regression Discontinuity Approach. *Management Science*, 1-20.

- Forte, G. & Miglietta, F. (2007). Islamic mutual funds as faith-based funds in a socially responsible context. *Technical Report*, Social Science Research Network.
- Fries, S. & Taci, A. (2005). Cost Efficiency of Banks in Transition: Evidence from 289 Banks in 15 Post-communist Countries. *Journal of Banking & Finance*, 29(1), 55-81.
- Fu, X., Lin, Y. & Molyneux, P. (2014). Bank competition and financial stability in Asia Pacific. *Journal of Banking & Finance*, 38, 64-77.
- Fukuyama, H., & Matousek, R. (2011). Efficiency of Turkish banking: Two-stage network system. Variable returns to scale model. *Journal of International Financial*, 21, 75-91.
- Gaganis, C. & Pasiouras, F. (2009). Efficiency in the Greek Banking Industry: A Comparison of Foreign and Domestic Banks. *International Journal of the Economics of Business*, 16(2), 221-237.
- García-Herrero, A., Gavila, S., & Santabarbara, D. (2009). What explains the low profitability of Chinese banks?. *Journal of Banking & Finance*, 33, 2080-2092.
- García-Kuhnert, Y., Marchica, M.-T. & Mura, R. (2015). Shareholder diversification and bank risk-taking. *Journal of Financial Intermediation*, 1-34.
- Gardener, E., Molyneux, P. & Nguyen-linh, H. (2012). Determinants of Efficiency in South East Asian Banking. *The Service Industries Journal*, 31(16), 2693-2719.
- Garza-García, J.G. (2012). Determinants of Bank Efficiency in Mexico: a Two-stage Analysis. *Applied Economics Letters*, 19(17), 37-41.
- Ghosh, S. (2014). Risk, capital and financial crisis: Evidence for GCC banks. *Borsa Istanbul Review*, 14(3), 145-157.
- Ghosh, S. (2015). Political transition and bank performance: How important was the Arab Spring?. *Journal of Comparative Economics*, Article in Press.
- Given, L.M. (2008). The Sage Encyclopedia of Qualitative Research Methods. *Sage Publications*.
- Grigorian, D.A. & Manole, V. (2002). Determinants of Commercial Bank Performance in Transition: An Application of Data Envelopment Analysis. *Policy Research Working Paper*, No. 2850. Washington DC: World Bank.
- Girardone, C., Molyneux, P. & Gardener, E. (2004). Analysing the determinants of bank efficiency: the case of Italian banks. *Applied Economics*, 36, 215-227.

- Grigoria, D.A. & Manole, V. (2002). Determinants of Commercial Bank Performance in Transition: An Application of Data Envelopment Analysis. *Policy Research Working Paper, World Bank*, 1-38.
- Greene, W.H. (1993). The Econometric Approach to Efficiency Analysis. The Measurement of Productive Efficiency: Techniques and Applications. UK: *Oxford University Press*.
- Greene, W.H. (2003). Fixed and random effects in stochastic frontier model. *Working Paper No. 02-16. Department of Economics, Stern School of Business, New York University*.
- Gropp, R., Gruendl, C. & Guettler, A. (2013). The Impact of Public Guarantees on Bank Risk-Taking: Evidence from a Natural Experiment. *Review of Finance*, 1-32.
- Guillén, J., Rengifo, E. W., & Ozsoz, E. (2014). Relative power and efficiency as a main determinant of banks' profitability in Latin America. *Borsa Istanbul Review*, 14, 119-125.
- Gulamhussen, M. A., Pinheiro, C., & Pozzolo, A. F. (2014). International diversification and risk of multinational banks: Evidence from the pre-crisis period. *Journal of Financial Stability*, 13, 30-43.
- Haan, J.D. & Poghosyan, T. (2012). Bank size, market concentration, and bank earnings volatility in the US. *Journal of International Financial Markets, Institutions & Money*, 22, 35-54.
- Hacking, I. (1981). Scientific Revolutions. *Oxford University Press*.
- Hadad, M.D., Hall, M.J.B., Kenjegalieva, K.A., Santoso, W. & Simper, R. (2012). A New Approach to Dealing with Negative Numbers in Efficiency Analysis: An Application to the Indonesian Banking Sector. *Expert Systems with Applications*, 39(9), 8212-8219.
- Han, Y., Kim, H.M. & Kim, W.-joong. (2012). Determinants of Profit Efficiency: Evidence from Korean Savings Banks. *Applied Financial Economics*, 22(12), 1003-1016.
- Hasan, I. & Marton, K. (2003). Development and Efficiency of the Banking Sector in a Transitional Economy: Hungarian Experience. *Journal of Banking & Finance*, 27(12), 2249-2271.
- Hassan, M. (2006). The X-efficiency of Islamic Banks. *Islamic Economic Studies*, 13(2), 49-78.
- Hassan, M.K. & Hussein, K.A. (2003). Static and Dynamic Efficiency in the Sudanese Banking System. *Review of Islamic Economics*, 14(1), 5-48.

- Havrylchyk, O. (2006). Efficiency of the Polish Banking Industry: Foreign Versus Domestic Banks. *Journal of Banking & Finance*, 30(7), 1975-1996.
- Havrylchyk, O. & Jurzyk, E. (2011). Profitability of foreign banks in Central and Eastern Europe; Does the entry mode matter?. *Economics of Transition*, 19(3), 443-472.
- Heffernan, S.A. & Fu, X. (2010). Determinants of financial performance in Chinese banking. *Applied Financial Economics*, 20(20), 1585-1600.
- Hermes, N. & Nhung, V.T. (2010). The impact of financial liberalization on bank efficiency: evidence from Latin America and Asia. *Applied Economics*, 42(26), 3351-3365.
- Ho, C.-T. & Zhu, D.-S. (2004). Performance Measurement of Taiwan's Commercial Banks. *International Journal of Productivity and Performance Management*, 53(5), 425-434.
- Hoque, H., Andriosopoulos, D., Andriosopoulos, K. & Douady, R. (2015). Bank regulation, risk and return: Evidence from the credit and sovereign debt crises. *Journal of Banking & Finance*, 50, 455-474.
- Horvath, R., Seidler, J. & Weill, L. (2014). Bank Capital and Liquidity Creation: Granger-Causality Evidence. *Journal of Financial Services Research*, 45(3), 341-361.
- Hou, X., Wang, Q. & Zhang, Q. (2014). Market structure, risk taking, and the efficiency of Chinese commercial banks. *Emerging Markets Review*, 20, 75-88.
- Houston, J.F., Lin, C., Lin, P., & Ma, Y. (2010). Creditor rights, information sharing, and bank risk taking. *Journal of Financial Economics*, 96, 485-512.
- Hussain, I. (2014). Banking industry concentration and net interest margins (NIMs) in Pakistan. *Journal of Business Economics and Management*, 15(2), 384-402.
- Iqbal, Z. (1997). Islamic financial system, *Finance and Development*, 34, 42-45.
- Isik, I. and Hassan, M.K. (2003) Efficiency, ownership and market structure, corporate control and governance in the Turkish banking industry. *Journal of Business Finance and Accounting*, 30, 1363-421.
- Jacobs, R. (2000). Alternative Methods to Examine Hospital Efficiency: Data Development Analysis and Stochastic Frontier Analysis. *Working Paper, Centre for Health Economics, University of York*.

- Jeon, J.Q. & Lim, K.K. (2013). Bank competition and financial stability: A comparison of commercial banks and mutual savings banks in Korea. *Pacific-Basin Finance Journal*, 25, 253–272.
- Johnes, J., Izzeldin, M. & Pappas, V. (2009). Efficiency in Islamic and Conventional Banks: A Comparison Based on Financial Ratios and Data Envelopment Analysis. *Working Paper, Lancaster University, Department of Economics*.
- Johnes, J., Izzeldin, M. & Pappas, V. (2014). A comparison of performance of Islamic and conventional banks 2004-2009. *Journal of Economic Behavior & Organization*, 103, 93-107.
- Kanagaretnam, K., Lobo, G.J., Wang, C. & Whalen, D.J. (2015). Religiosity and risk-taking in international banking. *Journal of Behavioral and Experimental Finance*, 7, 42-59.
- Kanas, A., Vasiliou, D., & Eriotis, N. (2012). Revisiting bank profitability: A semi-parametric approach. *Journal of International Financial Markets, Institutions & Money*, 22, 990-1005.
- Kansal, M., Joshi, M., & Batra, G.S. (2014). Determinants of corporate social responsibility disclosures: Evidence from India. *Advances in Accounting*, 30, 217-229.
- Kasman, S. & Kasman, A. (2015). Bank competition, concentration and financial stability in the Turkish banking industry. *Economic Systems*, 39, 502-517.
- Keffala, M.R. (2015). How using derivatives affects bank stability in emerging countries? Evidence from the recent financial crisis. *Research in International Business and Finance*, 35, 75-87.
- Kick, T. & Prieto, E. (2015). Bank Risk and Competition: Evidence from Regional Banking Markets. *Review of Finance*, 19, 1185-1222.
- Kohler, M. (2015). Which banks are more risky? The impact of business models on bank stability. *Journal of Financial Stability*, 16, 195-212.
- Kumar, S. & Gulati, R. (2009). Measuring Efficiency, Effectiveness and Performance of Indian Public Sector Banks. *International Journal of Productivity and Performance Management*, 59(1), 51-74.
- Kutan, A.M., Ozsoz, E., & Rengifo, E.W. (2012). Cross-sectional determinants of bank performance under deposit dollarization in emerging markets. *Emerging Markets Review*, 13, 478-492.
- Lanine, G. & Vennet, R.V. (2007). Microeconomic determinants of acquisition of Eastern European banks by Western European banks. *Economics of Transition*, 15(2), 285-308.

- Lee, T. & Chih, S. (2013). Does financial regulation affect the profit efficiency and risk of banks? Evidence from China's commercial banks. *North American Journal of Economics and Finance*, 26, 705-724.
- Lee, C. & Hsieh, M. (2014). Bank reforms, foreign ownership, and financial stability. *Journal of International Money and Finance*, 40, 204-224.
- Lee, Y.J. & Kim, D. (2013). Bank performance and its determinants in Korea. *Japan and the World Economy*, 27, 83-94.
- Lepetit, L., Nys, E., Rous, P., & Tarazi, A. (2008). Bank income structure and risk: An empirical analysis of European banks. *Journal of Banking and Finance*, 32, 1452-1467.
- Lassoued, N., Sassi, H. & Attia, M.B.R. (2016). The impact of state and foreign ownership on banking risk: Evidence from the MENA countries. *Research in International Business and Finance*, 36, 167-178.
- Liang, H.-Y., Ching, Y.P. & Chan, K.C. (2013). Enhancing bank performance through branches or representative offices? Evidence from European banks. *International Business Review*, 22, 495-508.
- Lim, G.H. & Randhawa, D.S. (2005). Competition, Liberalization and Efficiency: Evidence from a Two-stage Banking Model on Banks in Hong Kong and Singapore. *Managerial Finance*, 31(1), 52-77.
- Lin, X. & Zhang, Y. (2009). Bank ownership reform and bank performance in China. *Journal of Banking & Finance*, 33, 20-29.
- Luo, D., Dong, Y., Armitage, S. & Hou, W. (2015). The impact of foreign bank penetration on the domestic banking sector: new evidence from China. *The European Journal of Finance*, 1-29.
- Mamatzakis, E., Matousek, R. & Vu, A.N. (2015). What is the impact of bankrupt and restructured loans on Japanese bank efficiency? *Journal of Banking and Finance*, Article in Press.
- Manlagnit, M.C.V. (2011). The economic effects of foreign bank presence: Evidence from the Philippines. *Journal of International Money and Finance*, 30, 1180-1194.
- Marinkovića, S. & Radovićb, O. (2015). Bank net interest margin related to risk, ownership and size: an exploratory study of the Serbian banking industry. *Economic Research-Ekonomska Istraživanja*, 27(1), 134-154.
- Mertens, A. & Urga, G. (2001). Efficiency, Scale and Scope Economies in the Ukrainian Banking Sector in 1998. *Emerging Markets Review*, 1-21.
- Mester, L.J. (2003). Applying Efficiency Measurement Techniques To Central Banks. *The Wharton Financial Institutions Center*, 3(25).

- Micco, A., Panizza, U., & Yanez, M. (2007). Bank ownership and performance. Does politics matter?. *Journal of Banking & Finance*, 31, 219-241.
- Mirzaei, A., Moore, T. & Liu, G. (2013). Does market structure matter on banks' profitability and stability? Emerging vs. advanced economies. *Journal of Banking and Finance*, 37, 2920-2937.
- Mohan, T.T.R. & Ray, S.C. (2004). Comparing Performance of Public and Private Sector Banks: A Revenue Maximisation Efficiency Approach. *Economic and Political Weekly*, 39(12), 1271-1276.
- Mokhtar, H.S.A., Abdullah, N. & Alhabshi, S.M. (2007). Technical and Cost Efficiency of Islamic Banking in Malaysia. *Review of Islamic Economics*, 11(1), 5-40.
- Mollah, S & Zaman, M. (2015). Shari'ah supervision, corporate governance and performance: Conventional vs. Islamic banks. *Journal of Banking & Finance*, 58, 418-435.
- Moradi-Motlagh, A. & Babacan, A. (2015). The impact of the global financial crisis on the efficiency of Australian banks. *Economic Modelling*, 46, 397-406.
- Mostafa, M. (2007a). Benchmarking Top Arab Banks' Efficiency Through Efficient Frontier Analysis. *Industrial Management & Data Systems*, 107(6), 802-823.
- Mostafa, M. (2007b). Modeling the Efficiency of GCC Banks: a Data Envelopment Analysis Approach. *International Journal of Productivity and Performance Management*, 56(7), 623-643.
- Nahm, D. & Vu, H.T. (2008). Profit Efficiency and Productivity of Vietnamese Banks : A New Index Approach. *Working Paper, Department of Economics, Macquarie University*.
- Nguyen, T.P. & Nghiem, S.H. (2015). The interrelationships among default risk, capital ratio and efficiency: Evidence from Indian banks. *Managerial Finance*, 41(5), 507-525.
- Nguyen, M. Skully, M. & Perera, S. (2012). Market power, revenue diversification and bank stability: Evidence from selected South Asian countries. *Journal of International Financial Markets, Institutions and Money*, 22, 897-912.
- Noor, M.A.N. & Ahmed, N.H.B. (2011). Relationship Between Islamic Banking Profitability and Determinants of Efficiency. *Journal of Managerial Economics*, 9(3), 43-87.
- Ohsato, S. & Takahashi, M. (2015). Management Efficiency in Japanese Regional Banks: A Network DEA. *Procedia-Social and Behavioral Sciences*, 172, 511-518.

- Olson, D. & Zoubi, T. (2011). Efficiency and Bank Profitability in MENA Countries. *Emerging Markets Review*, 12(2), 94-110.
- Pasiouras, F. (2008). Estimating the Technical and Scale Efficiency of Greek Commercial Banks: The Impact of Credit Risk, Off-balance Sheet Activities, and International Operations. *Research in International Business and Finance*, 22(3), 301-318.
- Pasiouras, F. & Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. *Research in International Business and Finance*, 21, 222-237.
- Percin, S. & Ayan, T.Y. (2006). Measuring Efficiency Of Commercial Banks In A Developing Economy: The Case Of Turkey. *Investment Management and Financial Innovations*, 3(2), 217-231.
- Pervana, M., Pelivanb, I. & Arnerić, J. (2015). Profit persistence and determinants of bank profitability in Croatia. *Economic Research-Ekonomska Istraživanja*, 28(1), 284-298.
- Pessarossi, P. & Weill, L. (2015). Do capital requirements affect cost efficiency? Evidence from China. *Journal of Financial Stability*, 19, 119-127.
- Petria, N., Căpraru, B., & Ihnatov, I. (2015). Determinants of banks' profitability: evidence from EU 27 banking systems. *Procedia Economics and Finance*, 20, 518-524.
- Petrovic-Randelovic, M., Stevanovic, T., & Ivanovic-Dukic, M. (2015). Impact of corporate social responsibility on the competitiveness of multinational corporations. *Procedia Economics and Finance*, 19, 332-341.
- Podpiera, J. & Pruteanu, A. (2005). Deteriorating Cost Efficiency in Commercial Banks Signals Increasing Risk of Failure. *Working Paper, Charles University and Czech National Bank, Czech Republic*.
- Rajhi, W. & Hassairi, S.A. (2013). Islamic banks and financial stability: a comparative empirical analysis between MENA and Southeast Asia countries. *Region et Development*, 37, 149-177.
- Rao, C.R. (1965). The theory of least squares when the parameters are stochastic and its application to the analysis of growth curves. *Biometrika*, 52, 447-458.
- Ray, S.C. & Das, A. (2010). Distribution of Cost and Profit Efficiency: Evidence from Indian Banking. *European Journal of Operational Research*, 201(1), 297-307.
- Řepková, I. (2014). Efficiency of the Czech banking sector employing the DEA window analysis approach. *Procedia Economics and Finance*, 12, 587-596.

- Rogers, K.E. (1998). Nontraditional Activities and the Efficiency of US Commercial Banks. *Journal of Banking & Finance*, 22(4), 467-482.
- Rosman, R., Abd Wahab, N. & Zainol, Z. (2014). Efficiency of Islamic banks during the financial crisis: An analysis of Middle Eastern and Asian countries. *Pacific-Basin Finance Journal*, 28, 76–90.
- Rouissi, B.R. (2010). Cost and Profit Efficiency of French Commercial Banks: Domestic Versus Foreign Banks. *Working Paper, University of Carthage, Tunisia*.
- Rumler, F. & Waschiczek, W. (2014). Have changes in the financial structure affected bank profitability? Evidence for Austria. *The European Journal of Finance*, 1-22.
- Saghi-Zedek, N. & Tarazi, A. (2015). Excess control rights, financial crisis and bank profitability and risk. *Journal of Banking & Finance*, 55, 361-379.
- Sathye, M. (2001). X-efficiency in Australian Banking: An Empirical Investigation. *Journal of Banking and Finance*, 25(1), 613-630.
- Sathye, M. (2003). Efficiency of Banks in a Developing Economy: The Case of India. *European Journal of Operational Research*, 148(3), 662-671.
- Satub, R.B., Souza, G.D.S., & Tabak, B.M. (2010). Evolution of bank efficiency in Brazil: A DEA approach. *European Journal of Operational Research*, 202, 204-213.
- Schaeck, K. & Cihàk, M. (2014). Competition, Efficiency, and Stability in Banking. *Financial Management*, 43 (1), 215-241.
- Sealey, C.W. & Lindley, J.T. (1977). Inputs, Outputs, and a Theory of Production and Cost at Depository Financial Institutions. *Journal of Finance*, 32(4), 1251-1266.
- Semih, Y.H. & Philippatos, G.C. (2007). Efficiency of Banks: Recent Evidence from the Transition Economies of Europe, 1993–2000. *The European Journal of Finance*, 13(2), 123-143.
- Shah, S.Q. & Jan, R. (2014). Analysis of Financial Performance of Private Banks in Pakistan. *Procedia - Social and Behavioral Sciences*, 109, 1021-1025.
- Shahid, H., Rehman, R.U. & Niazi, G.S.K. (2010). Efficiencies Comparison of Islamic and Conventional Banks of Pakistan. *International Research Journal of Finance and Economics*, 49(49), 24-42.
- Shamsuddin, A. & Xiang, D. (2012). Does Bank Efficiency Matter? Market Value Relevance of Bank Efficiency in Australia. *Applied Economics*, 44(27), 3563-3572.

- Shehzad, C.T., De Haan, J. & Scholtens, B. (2013). The relationship between size, growth and profitability of commercial banks. *Applied Economics*, 45, 1751-1765.
- Sherman, H.D. & Gold, F. (1985). Bankbranch Operating Efficiency: Evaluation with Data Envelopment Analysis. *Journal of Banking and Finance*, 9(2), 297–315.
- Short, B.K. (1979). The relation between commercial bank profit rates and banking concentration in Canada, Western Europe, and Japan. *Journal of Banking and Finance*, 3, 209-219.
- Silva Portela, M.C.A., Thanassoulis, E. & Simpson, G. (2004). Negative Data in DEA: a Directional Distance Approach Applied to Bank Branches. *Journal of the Operational Research Society*, 55(7), 1111-1121.
- Smaoui, H. & Salah, I.B. (2012). Profitability of Islamic Banks in the GCC Region. *Global Economy and Finance Journal*, 5(1), 85-102.
- Soedarmono, W., Machrouh, F., & Tarazi, A. (2011). Bank market power, economic growth and financial stability: Evidence from Asian banks. *Journal of Asian Economics*, 22(6), 460-470.
- Sousa, M.D. & Schwengber, S.B. (2006). Efficiency Estimates for Judicial Services in Brazil: Nonparametric FDH (Free Disposal Hull) and the Expected Order-m Efficiency Scores for Rio Grande Do Sul Courts. *Working Paper, University of Brazil, Department of Economics*, 1-18.
- Spulbăr, C. & Nitoi, M. (2014). Determinants of bank cost efficiency in transition economies: evidence for Latin America, Central and Eastern Europe and South-East Asia. *Applied Economics*, 46(16), 1940–1952.
- Srairi, S. (2013). Ownership structure and risk-taking behaviour in conventional and Islamic banks: Evidence for MENA countries. *Borsa Istanbul Review*, 13, 115-127.
- Staub, R.B., Souza, G.S. & Tabak, B.M. (2010). Evolution of Bank Efficiency in Brazil: A DEA Approach. *European Journal of Operational Research*, 202(1), 204-213.
- Stewart, C., Matousek, R. & Nguyen, T.N. (2016). Efficiency in the Vietnamese banking system: A DEA double bootstrap approach. *Research in International Business and Finance*, 36, 96-111.
- Studenmund, A.H. (2005). Using Econometrics: A Practical Guide (5th edition) Boston: *Addison-Wesley*.
- Sturm, J.-E. & Williams, B. (2004). Foreign Bank Entry, Deregulation and Bank Efficiency: Lessons from the Australian Experience. *Journal of Banking and Finance*, 28(7), 1775-1799.

- Sufian, F. (2007). The Efficiency Of Islamic Banking Industry: A Non-Parametric Analysis with Non-Discretionary Input Variable. *Islamic Economic Studies*, 14(1), 53-78.
- Sufian, F. (2007). Trends in the Efficiency of Singapore's Commercial Banking Groups: A Non-stochastic Frontier DEA Window Analysis Approach. *International Journal of Productivity and Performance Management*, 56(2), 99-136.
- Sufian, F. (2009). Determinants of bank efficiency during unstable macroeconomic environment: Empirical evidence from Malaysia. *Research in International Business*, 23, 54-77.
- Sufian, F. (2010). The Impact Of The Asian Financial Crisis On Bank Efficiency: The 1997 Experience Of Malaysia And Thailand. *Journal of International Development*, 22, 866-889.
- Sufian, F. (2011). Benchmarking the Efficiency of the Korean Banking Sector: a DEA Approach. *Benchmarking: An International Journal*, 18(1), 107-127.
- Sufian, F. (2011). Profitability of Korean Banking Sector: Panel Evidence of Bank-Specific and Macroeconomic Determinants. *Journal of Economics and Management*, 7(1), 43-72.
- Sufian, F. & Abdul Majid, M.-zulhibri. (2007). Banks ' Efficiency and Stock Prices in Emerging Markets: Evidence from Malaysia. *Journal of Asia-Pacific Business*, 7(4), 35-53.
- Sufian, F., & Habibullah, M.S. (2009). Asian Financial Crisis and the Evolution of Korean Banks Efficiency: A DEA Approach. *Global Economic Review*, 38(4), 335-369.
- Sufian, F., & Habibullah, M.S. (2009). Determinants of bank profitability in a developing economy: Empirical evidence from Bangladesh. *Journal of Business Economics and Management*, 10(3), 207-217.
- Sufian, F., & Habibullah, M.S. (2010). Does economic freedom fosters banks' performance? Panel evidence from Malaysia. *Journal of Contemporary Accounting & Economics*, 6, 77-91.
- Svitalkova, Z. (2014). Comparison and evaluation of bank efficiency in selected countries in EU. *Procedia Economics and Finance*, 12, 644-653.
- Tabak, B.M., Gomes, G.M.R., & Medeiros, M.D.S. (2015). The impact of market power at bank level in risk-taking: The Brazilian case. *International Review of Financial Analysis*, 40, 154-165.
- Tabak, B.M., Fazio, D.M., & Cajueiro, D.O. (2013). Systemically important banks and financial stability: The case of Latin America. *Journal of Banking & Finance*, 37, 3855-3866.

- Taft, R.W. & Lewis, I.C. (1958). The General Applicability of a Fixed Scale of Inductive Effects. II. Inductive Effects of Dipolar Substituents in the Reactivities of m- and p-Substituted Derivatives of Benzene. *Journal of the American Chemical Society*, 80(10), 2436–2443.
- Tan, Y. (2015). The impacts of risk and competition on bank profitability in China. *Journal of International Financial Markets, Institutions & Money*, 1-26.
- Tan, Y. & Floros, C. (2012). Bank profitability and inflation: the case of China. *Journal of Economic Studies*, 39(6), 675-696.
- Tan, Y. & Floros, C. (2013). Risk, capital and efficiency in Chinese banking. *Journal of International Financial Markets, Institutions & Money*, 26, 378-393.
- Thoraneenitiyan, N. & Avkiran, N.K. (2009). Measuring the Impact of Restructuring and Country-specific Factors on the Efficiency of Post-crisis East Asian Banking Systems: Integrating DEA with SFA. *Socio-Economic Planning Sciences*, 43(4), 240-252.
- Tiao, G.C. & Tan, W.Y. (1965). Bayesian analysis of random-effect models in the analysis of variance. I. Posterior distribution of variance-components. *Biometrika Trust*, 52(1-2), 37-53.
- Tobin, J. (1958). Estimation of Relationships for Limited Dependent Variables. *Econometrica: journal of the Econometric Society*, 26(1), 24-36.
- Tone, K. (2001). A Slacks-based Measure of Efficiency in Data Envelopment Analysis. *European Journal of Operational Research*, 130(3), 498-509.
- Terraza, V. (2015). The effect of bank size on risk ratios: Implications of banks' performance. *Procedia Economics and Finance*, 30, 903-909.
- Tripe, D. (2004). Efficiency in Integrated Banking Markets. *Working Paper, Australia and New Zeland. Massey University, New Zeland*, 2(1).
- Tripe, D. (2003). Trends In New Zeland Bank Efficiency Over Time. *Applied Econometrics and International Development*, 3(1), 1-27.
- Turk A. R. (2008). Financial Liberalization and Bank Efficiency: Evidence from Post-war Lebanon. *Applied Financial Economics*, 18(11), 931-946.
- Usmani, M.T. (2002). An Introduction to Islamic Finance. *Arab and Islamic Law Series. Kluwer Law International*, The Hague.
- Vivas, A. L. (1997). Profit Efficiency for Spanish Savings Banks. *European Journal of Operational Research*, 98(2), 381-394.
- Viverita, B.K. & Skully, M. (2007). Efficiency Analysis of Islamic Banks in Africa, Asia and the Middle East. *Review of Islamic Economics*, 11(2), 5-16.

- Vu, H. & Nahm, D. (2013). The determinants of profit efficiency of banks in Vietnam. *Journal of the Asia Pacific Economy*, 18(4), 615-631.
- Vu, H. & Turnell, S. (2004). Cost and Profit Efficiency of Australian Banks, and the Impact of the Global Financial Crisis. *Working Paper, Department of Economics, Macquarie University, Australia*.
- Wang, K., Huang, W. & Liu, Y. (2014). Efficiency measure of the Chinese commercial banking system using an additive two-stage DEA. *Omega*, 44, 5-20.
- Wang, Z., Chen, J., Wan, Y., Jin, Y. & Mazzanti, J.A. (2015). Information Disclosure and Bank Risk-Taking under a Partially Implicit Deposit Insurance System: Evidence from China. *The Australian Economic Review*, 48(2), 163-176.
- Wanke, P., & Barros, C. (2014). Two-stage DEA: An application to major Brazilian banks. *Expert Systems with Applications*, 41, 2337-2344.
- Wasiuzzaman, S. & Tarmizi, H.A. (2010). Profitability of Islamic banks in Malaysia: an empirical analysis. *Journal of Islamic Economics, Banking and Finance*, 6(4), 53-68.
- Wen, W. (2010) Ownership Structure and Banking Performance: New Evidence in China. *Working Paper, Universitat*.
- Westman, H. (2011). The impact of management and board ownership on profitability in banks with different strategies. *Journal of Banking and Finance*, 35, 3300–3318.
- Wijesiri, M., Viganò, L. & Meoli, M. (2015). Efficiency of microfinance institutions in Sri Lanka: a two-stage double bootstrap DEA approach. *Economic Modelling*, 47, 74-83.
- Xiang, D., Shamsuddin, A. & Worthington, A.C. (2015). The differing efficiency experiences of banks leading up to the global financial crisis: A comparative empirical analysis from Australia, Canada and the UK. *Journal of Economics and Finance*, 39, 327-346.
- Williams, B. (2014). Bank risk and national governance in Asia. *Journal of Banking and Finance*, 49, 10-26.
- Yeh, T.-L. (2011). Capital Structure and Cost Efficiency in the Taiwanese Banking Industry. *The Service Industries Journal*, 31(2), 237-249.
- Yildirim, H.S. & Philippatos, G.C. (2007). Efficiency of Banks: Recent Evidence from the Transition Economies of Europe, 1993–2000. *The European Journal of Finance*, 13(2), 123-143.

- Yudistria, D. (2004). Efficiency in Islamic Banking: An Empirical Analysis of Eighteen Banks. *Islamic Economic Studies*, 12(1), 1-19.
- Zhang, J., Wang, P. & Qu, B. (2012). Bank Risk Taking, Efficiency, and Law Enforcement: Evidence from Chinese City Commercial Banks. *China Economic Review*, 23(2), 284-295.
- Zhang, T. & Matthews, K. (2012). Efficiency Convergence Properties of Indonesian Banks 1992 – 2007. *Applied Financial Economics*, 22(17), 1465-1478.
- Zhang, Z., Xie, L., Lu, X., & Zhang, Z. (2015). Determinants of Financial Distress in Large Financial Institutions: Evidence from U.S. Bank Holding Companies. *Contemporary Economic Police*, 1-18.
- Zhou, K. & Wong, M.C. (2008). The Determinants of Net Interest Margins of Commercial Banks in Mainland China. *Emerging Markets Finance and Trade*, 44(5), 41-53.

Appendix 1: Studies on determinants of efficiency in banking

Study (Efficiency)	Banks	Dependent Variables	Independent Variables
Rosman <i>et al.</i> (2014) 12 Middle Eastern countries (DEA) 2007-2010	Islamic	TE PTE SE	ROA (+), Size (+/-), Capital ratio (+), Credit Risk.
Noor and Ahmed (2012) 25 Countries (DEA) 1992-2009	Islamic	TE PTE SE	ROE, operating expenses/ total assets (+), Capital ratio (+), Size (+), Loan intensity (-), Market power (logarithm of deposits), Bank's market share (+), GDP (+), Inflation (-), Stock market capitalisation, Asian financial crisis (+), Global financial crisis (-).
El-Moussawi and Obeid (2010) GCC countries (DEA and SFA) 2005-2008	Islamic	TE AE CE	GDP (-), Inflation (+), Capital ratio (-), Size (-), Credit risk (-), ROA (+/-).
Hassan (2006) 21 Countries (DEA) 1995-2001	Islamic	CE TE AE PTE SE	Total assets (+), ROA (+), ROE (+), Loans (+).
Yudistira (2004) (DEA) 12 Countries 1997-2000	Islamic	TE PTE SE	Risk taking propensity (+), ROA, Size (+), Market power (-), Location (Middle East dummy) (-), Publicly listed Islamic banks (-).
Stewart <i>et al.</i> (2016) Vietnam (DEA) 1999-2009	Commercial	TE PTE	ROA (+), Cost to assets ratio, City commercial banks (-), Size (+), Non-performing loans, Number of branches (-), Age of banks (-).
Chen and Wang (2015) China (DEA) 1994-2010	Commercial	EE	Size (+), Capital adequacy (+), Loan intensity (+/-), State ownership (-), GDP (+), Inflation (+/-).
Pessarossi and Weill (2015) China (SFA) 2004-2009	Commercial	CE	Capital ratio (+), large state-owned banks, City commercial banks, Joint-stock banks, Foreign banks, Size (+).
Wijesiri <i>et al.</i> (2015) Sri Lanka (DEA) 2010	Commercial	TE	Financial model: Age (+), Capital ratio (-), ROA, Institutional type. Social model: Age (-), Capital ratio, ROA (-), Institutional type (+).
Xiang <i>et al.</i> (2015) Australia, Canada and UK (DEA and SFA) 1988-2008	Commercial	TE CE PE	TE: Intangible assets (-), Loans to deposits ratio (-), Loan intensity (-), Net margin (-), Size (+), Debt to equity ratio (+). CE: Intangible assets, Loans to deposits ratio (-), Loan intensity (-), Net margin (-), Size (-), Debt to equity ratio. PE: Intangible assets (+), Loans to deposits ratio, Loan intensity, Net margin (-), Size (+), Debt to equity ratio.

Mamatzakakis <i>et al.</i> (2015) Japan (DEA) 2000-2012	Commercial	TE	- OLS: Capital ratio (+), Net interest margin (+), Nikkei index (+), Industrial production (+), Herfindahl–Hirschman Index (-), Quantitative easing (+/-), Z-score (-), Bankrupt loans, Restructured loans. - FEM: Capital ratio, Net interest margin (+), Nikkei index (+), Industrial production (+), Herfindahl–Hirschman Index (-), Quantitative easing (-), Z-score, Bankrupt loans (+), Restructured loans (+).
Moradi-Motlagh and Babacan (2015) Australis (DEA) 2006-2012	Commercial	TE PTE SE	Global financial crisis (-).
Wanke and Barros (2014) Brazil (DEA and SFA) 2012 year	Commercial	Productive Efficiency and CE	- Productive efficiency: Mergers and acquisition (-), Size, Ownership (public (+), domestic and foreign). - Cost efficiency: Mergers and acquisition (-), Size (+), Ownership (public, domestic and foreign).
Hou <i>et al.</i> (2014) China (DEA) 2006-2010	Commercial	TE	Herfindahl–Hirschman Index in deposits (+), Capital ratio, Loan loss provisions to total loans (-), Ratio of total loans to deposits (-), Size (-), Ownership: state-owned banks, Time trend, GDP growth (+), ROA (-).
Tan and Floros, (2013) China (DEA) 2003-2009	Commercial	TE PTE SE	Book value of capital to total assets (+), ROA, Size (+), Liquidity ratio (-), Taxation (-), Ratio of off-balance sheet items to total assets, Ratio of gross total revenue to number of employees (-), Concentration (-), Ratio of banking industry assets over GDP, Stock market capitalization to GDP ratio, Inflation, GDP growth (+).
Vu and Nahm (2013) Vietnam (SFA) 2000-2006	Commercial	PE	Capital ratio (-), Size (+), Non-performing loans (-), Loan intensity, Non-interest expense to total assets, Costs to total assets (+), ROE (+), Ownership: state-owned (+) and joint-venture (+) banks, International commitments (-), Reform process, Stock market capitalisation (+), GDP (+), Inflation (-), Difference between lending and deposits rates (+), Loans to deposits.
Lee and Chih (2013) China (SFA) 2004-2011	Commercial	PE	- For large banks: Operating costs to operating income (-), Current ratio (-), Age (-). - For small banks: Operating costs to operating income (-), Loan to deposit ratio (-), Leverage ratio (+), Capital adequacy ratio.
Tabak <i>et al.</i> (2013) 17 Latin American countries (SFA) 2001-2008	Commercial	Profit inefficiency and Cost inefficiency	- Profit inefficiency: Capital ratio (-), Credit risk, ROA, Herfindahl–Hirschman Index, Market share (-), Ownership: foreign (-) and private (+/-) banks. - Profit inefficiency: Capital ratio (+), Credit risk (+/-), ROA (-), Herfindahl–Hirschman Index (+), Market share (-), Ownership: foreign (-) and private (-) banks.
Zhang and Matthews (2012) Indonesia (SFA) 1992-2007	Commercial	CE	Ownership: foreign banks (-), Herfindahl index (+/-), Size (+/-), Diversification = Noninterest income/total assets (-), Efficiency ratio = cost to income (+), GDP growth (+/-).
Zhang <i>et al.</i> (2012) China (SFA) 1999-2008	Commercial	Profit inefficiency	Legal environment (-), Efficiency of the legal system (-), Protection of intellectual property right (-), Loans/GDP (-), GDP (+), GDP growth (-), Selection governance (-), Dynamic governance (+), Capital ratio (-), Non-performing loans ratio (+), Loans to

			deposits (-), Interbank funds/ (interbank funds + deposits) (+), Long-term loans to loans (-), Securities/earning assets (-).
Chortareas <i>et al.</i> (2012) 22 EU countries (DEA) 2000-2008	Commercial	Productive inefficiency	Capital regulatory index (+/-), Official supervisory power (+/-), Activity restrictions (+), Private monitoring (+), Size (-), Loans to deposits, Capital ratio, Z-score (-), Herfindahl index (+), GDP growth (+), Voice and accountability (-), Control of Corruption (-), Ownership: foreign banks (-) and government banks (-), Deposit money bank assets/GDP (-), Financial crisis.
Gardener <i>et al.</i> (2012) 5 East Asian countries (DEA and SFA) 1998-2004	Commercial	TE CE	Size (-), Profit (+/-), Capital (+), Bank private credit (+), Regulation (+/-), Economic growth (+), Inflation, Ownership: state-owned (-), foreign (+) and private banks (-).
Garza García (2012) Mexico (DEA) 2001-2009	Commercial	TE PTE SE	Degree of capitalisation (+/-), Net interest rate margin (-), ROA (+), Credit risk (-), Market share (+/-), Size, Loan intensity (+), GDP (+), Market capitalisation (+/-), Market concentration, Ownership: foreign banks (+), Inflation (-), Market interest rate volatility.
Han <i>et al.</i> (2012) Korea (SFA) 2002-2008	Commercial	PE	Size (-), Interest rate (+), Credit loan ratio (-), Branches, Liquidity ratio, Financial affiliate.
Fukuyama and Matousek (2011) Turkey (DEA and SFA) 1991-2007	Commercial	CE TE	Net interest margin (-), Net non-interest margin (+), Market share on loan market (+), Market share on deposit Market, ROA (+), Number of branches (-), Ownership: foreign and domestic banks, Time trend (analysed year) (-), Age, Capital to total equity.
Fang <i>et al.</i> (2011) South Eastern Europe (SFA) 1998-2008	Commercial	CE PE	- CE: Ownership: foreign (-) and government banks, Market power (lerner index) (+), Privatisation (+), Banking reform, Enterprise re-structuring, Time trend (-), Loan ratio (+), Capital ratio (-), Non-performing loan ratio (-), ROA (-). - PE: Ownership: foreign (+) and government (-) banks, Market power (lerner index) (+), Privatisation (+), Banking reform (+), Enterprise re-structuring (+), Time trend, Loan ratio, Capital ratio, Non-performing loan ratio, ROA (-).
Satub <i>et al.</i> (2010) Brazil (DEA and SFA) 2000-2007	Commercial	CE TE AE	Non-performing loans over total loans (-), Market share (+), Equity (-), Age (+), Specialisation of bank, Size (-), Ownership: foreign, domestic private (+) and state-owned (+) banks.
Sufian (2009) Malaysia (DEA) 1990-1999	Commercial	TE PTE SE	Bank's market share (-), Loan intensity (-), Size (+), Bank's risk (+), Bank's management quality (+), Bank's diversification (-), Leverage intensity (-), ROA (+), GDP (-).
Sufian and Habibullah (2009) Korea (DEA) 1992-2003	Commercial	TE PTE SE	Capital ratio, Loan intensity (+), Market power (-), Size (+), Loan loss provisions to total loans (-), Non-interest expense to total assets (+), Non-interest income to total assets, ROA, Loans to deposits, GDP (-), Inflation (-), Assets concentration, Stock market capitalisation (+/-), Financial crisis (-).
Chiou (2009) Taiwan (DEA) 1999-2004	Commercial	TE PTE SE	Age (+), Size (+/-), Capital ratio (+), Overdue ratio (-), Business Diversification (-), Loan to deposit ratio (+/-), ROE, Business monitoring indicators.

Hermes and Nhung (2010) Latin America and Asia (DEA) 1991-2000	Commercial	TE PTE SE	Liberalisation (+), Capital ratio (-), Density of demand (-), Growth rate of GDP (+), Inflation, Loans to deposits ratio, ROE (+).
Pasiouras (2008) Greece (DEA) 2000-2004	Commercial	PTE SE	Capital ratio (+), ROAA, Loan intensity(+), Market share in terms of total assets (+), ATM, Branches (+), Branch abroad, Subsidiaries abroad (+).
Ariff and Can (2008) China (SFA) 1995-2004	Commercial	CE PE	Ownership: state-owned (-) and stock-joint (+), Size (-), Gross loans to total assets (-), Assets quality = provisions / gross loans (-), Capital ratio (-), Liquidity risk (loans to deposits) (+), ROA, Non-interest income to total income (+), Operating costs (-), AFC, WTO accession (+).
Yildirim and Philippatos (2007) 12 EU Countries (SFA) 1993-2000	Commercial	CE PE	- CE: Size (+), Capital ratio (+), Loan intensity (+), Loan Loss Reserves / Gross Loans (-), GDP growth (+), Foreign ownership (+), Listed banks. - PE: Size, Capital ratio, Loan intensity, Loan Loss Reserves / Gross Loans (-), GDP growth (-), Foreign ownership (-), Listed banks.
Grigorian and Manole (2002) 17 Countries (DEA) 1995-1998	Commercial	TE PTE SE	GDP per capita (+), Inflation, Size of financial sector, Capital ratio (+), Market concentration (+), Age, Foreign ownership (+), Capital adequacy (+), Enterprise re-structuring (+), Market capitalisation (-), Securities market (-), Maximum exposure to a single borrower, Limit on foreign exchange (+), Legal/Institutional quality.
Havrylchyk (2006) Poland (DEA and SFA) 1997-2001	Commercial	TE AE CE	Type of bank (greenfield (+), take over, target (+), state (+) and public listing banks), Location of bank (Germany (+), USA (-), Netherlands (+) and France), Assets growth, Loans loss provisions to loans (-), Loan intensity (+/-), Variance of ROA (+), Size.
Girardone <i>et al.</i> (2004) Italy (SFA) 1993-1996	Commercial	CE	Size (-), Interest margin (-), Number of branches (+), Retail that equals to (customer loans + customer deposits) / total assets (+), Private ownership (-), Performance (+), Capital ratio (-), Area (-), Type of banks (+/-).
Casu and Molyneux (2003) 5 European countries: France, Germany, Italy, Spain, and the UK (DEA) 1993-1997	Commercial	TE PTE	Average capital ratio (-), Return on average equity (-).
Hasan and Marton (2003) Hungary (SFA) 1993-1998	Commercial	CE PE	Current assets to total assets (+), Short-term loan to total assets, Financial investment to total assets (+/-), Loan intensity, Credit risk, Capital ratio (+), Cost inefficiency (+), Size (-), Age, Number of hours of bank service available, Asset owned by foreign banks, Acquisition (-), Foreign involvement (-), Dummy of year.
Johnes <i>et al.</i> (2014) 18 Countries (DEA) 2004-2009	Islamic & Commercial	TE	Assets (-), Loan loss to loans (+), Loan intensity (+), Net loans over assets (-), Herfindahl index (-), Market capitalisation (+), GDP growth (+), Inflation, GDP per capita.

Abul Alkheil <i>et al.</i> (2012) Malaysia, UK, Turkey and GCC (DEA) 2005-2008	Islamic & Commercial	TE PTE SE	ROA (+), Salaries to total assets (-), Liquid asset ratio (+/-), Size (+), Loan intensity, Bank's market share (+), Effect of independency (+/-), Age (+), Financial leverage (-), GDP (+/-), Diversification effect (+), Geographical location (+), Bank's type (+/-).
Assaf <i>et al.</i> (2011) Saudi Arabia (DEA) 1999-2006	Islamic & Commercial	PTE	Size, Liquidity (+), Net profit margin (+), Pay-out ratio, Domestic ownership (-), Time trend (+).

* TE: Technical Efficiency, PTE: Pure Technical Efficiency, SE: Scale Efficiency, AE: Allocative Efficiency, PE: Profit Efficiency, CE: Cost Efficiency, EE: Economic Efficiency.

Appendix 2: Studies on determinants of profitability in banking

Study (Profitability)	Banks	Dependent Variables	Independent Variables
Petria <i>et al.</i> (2015) 27 EU countries 2004-2011	Commercial	ROAA ROAE	Size (+), Capital ratio (+), Credit risk = Impaired loans / Gross loans (-), Efficiency ratio (-), Liquidity risk = Loans / costumer deposits (-), Other operating income to assets ratio (+), Herfindhal-Hirschman Index (market concentration) (-), Inflation, GDP per capita growth (+).
Mamatzakakis <i>et al.</i> (2015) Japan 2000-2012	Commercial	ROA	- OLS: Capital ratio (+), Net interest margin (-), Nikkei index (+/-), Industrial production (+/-), Herfindahl-Hirschman Index (+), Quantitative easing (+/-), Z-score (+), Bankrupt loans (-), Restructured loans. - FEM: Capital ratio (+), Net interest margin (-), Nikkei index (+), Industrial production (+), Herfindahl-Hirschman Index (+), Quantitative easing (+), Z-score (+), Bankrupt loans (-), Restructured loans (-).
Chronopoulos <i>et al.</i> (2015) US 1984-2010	Commercial	ROA ROE	Size (+), Assets growth (+), Capital ratio (-), Net charge off over loans ratio (+), Loan intensity (-), Income diversification (-), Loan Herfindhal-Hirschman Index (-), GDP growth (+), Herfindhal-Hirschman Index (-), Tier 1 capital ratio (-), Total capital ratio (-), Bank competition (+).
Akhmedjonov and Izgi (2015) Turkey 2006-2009	Commercial	ROA	Capital ratio during crisis (+), Capital ratio out of crisis period (+), Liquidity ratio (+), Size, Private banks, State-owned banks (+).
Alessandri and Nelson (2015) UK 1992-2009	Commercial	NIM	Lagged NIM (+), Leverage ratio (debts to assets ratio) (+), Total assets growth (-), GDP (+), Herfindahl index capturing sector concentration (-).
Brighi and Venturelli (2015) Italy 2006-2012	Commercial	ROA	Size (+), Capital adequacy, Loan loss provisions (-), Non-performing loans (-), Financial crisis: 2008-2009 period (-), Sovereign crisis: 2010-2011 period (-).
Chavarín (2015) Mexico 2007-2011	Commercial	ROAA ROAE	Branches (+), Regulatory capital (+/-), Loans to deposits ratio (-), Market share (-), Family ownership, Foreign ownership.
Tan (2015) China 2003-2011	Commercial	ROA ROE NIM	Size (-), Liquidity (+), Taxation (-), Capitalisation (-), Stock market development (+), GDP (+), Inflation (+), Joint-stock banks (-), City commercial banks (-).
Terraza (2015) 1270 European banks 2005-2012	Commercial	ROAA	Large banks: Size, Capital ratio (+), Equity to loans ratio, Loan intensity, Ratio of liquid assets to deposits, loans to deposits ratio (-). Medium banks: Size, Capital ratio (+), Equity to loans ratio, Loan intensity, Ratio of liquid assets to deposits, loans to deposits ratio. Small banks: Size (-), Capital ratio (+), Equity to loans ratio (+), Loan intensity, Ratio of liquid assets to deposits, loans to deposits ratio.
Saghi-Zedek and Tarazi (2015) 17 Western European countries 2002-2010	Commercial	ROA	Size (-), Capital ratio (+), Deposits to assets ratio (+), Loan intensity, Net non-interest income (+), Efficiency ratio (-), GDP (+), Listed banks (+).
Pervan <i>et al.</i> (2015)	Commercial	ROA	Lagged ROA (+), Size (+), Market share, Solvency risk (+), Reserve to loans ratio (-), Loans over liabilities ratio (+),

Croatia 2002-2010			GDP (+), Inflation (-).
Luo <i>et al.</i> (2015) China 2002-2011	Commercial	ROA	Foreign ownership (+), Capital ratio (+), GDP (-), Inflation, WTO entry, Global financial crisis (-).
ElBannan (2015) Egypt 2005-2011	Commercial	ROAA	Reform period (+), Size, Public ownership (-), Efficiency ratio (-), Liquidity ratio, Loan intensity (-), Fixed assets intensity, GDP, Inflation.
Marinkovića and Radovićb (2015) Serbia 2003-2010	Commercial	NIM	Loan loss reserves to loans ratio (-), Capital ratio (+), Liquid assets to deposits ratio (+), Efficiency ratio, Ratio of earning assets to total assets (-), GDP (+), Inflation.
Apergis (2014) US 2000-2013	Commercial Investment	ROA	Insolvency risk index (-), Total non-traditional activities (+), Ratio of loans to assets (+), Capital ratio (+), Ratio of non-performing loans (-), Herfindahl–Hirschman Index (+), Consumer prices (+), Real per capita income (+), Global financial crisis (+).
Căpraru and Ihnatov (2014) 5 CEE countries 2004-2011	Commercial	ROA ROE NIM	- ROA and ROE: Size (-), Capital ratio (+), Credit risk = Impaired loans / Gross loans (-), Efficiency ratio (-), Liquidity risk = Loans / costumer deposits, Other operating income to assets ratio, Herfindhal-Hirschman Index (market concentration), Inflation (+), GDP per capita growth, GFC (-). - NIM: Size (-), Capital ratio (+), Credit risk = Impaired loans / Gross loans, Efficiency ratio (-), Liquidity risk = Loans / costumer deposits, Other operating income to assets ratio (-), Herfindhal-Hirschman Index (market concentration), Inflation, GDP per capita growth, GFC (-).
Guillén <i>et al.</i> (2014) 12 Latin American countries 1989-2005	Commercial	ROE	Powerful banks: largest 3 banks, Technical efficiency (+), GDP (+), Size (+).
Al-Musali and Ismail (2014) Saudi Arabia 2008-2010	Commercial	ROA ROE	Value added intellectual coefficient (+), Efficiency of human capital (+), Efficiency of capital employed (+), Efficiency of structural capital, Size, Global financial crisis (+).
Shah and Jan (2014) Pakistan 2006-2010	Commercial	ROA	Size, Asset management = operational income / total assets (+), Efficiency ratio = total operating expenses / interest income (-).
Rumler and Waschiczek (2014) Austria 1995-2010	Commercial	ROA ROE	Profitability of previous year (+), Loan intensity (+/-), Ownership: government (+) and foreign banks, Foreign lending in total assets, Herfindhal-Hirschman Index (+), GDP growth (+), Interest rate spread (+), Inflation (+), Core capital ratio (-), Size: bank share, foreign currency lending.
Dietrich and Wanzenried (2014) 118 Countries 1998-2012	Commercial	ROAA ROAE NIM	- ROAA: Capital ratio (+), Efficiency ratio (-), Loan loss provisions (-), Deposits growth (+), Large bank, Small bank (-), Interest income share (-), Funding costs, State ownership (-), Foreign ownership (+), Effective tax rate (-), Inflation (+), GDP growth (-), GDP per capita (-), Stock market capitalisation to GDP (-), Bank concentration (-), Financial crisis (-). - ROAE: Capital ratio (-), Efficiency ratio (-), Loan loss provisions (-), Deposits growth (+), Large bank (-), Small

			bank (+), Interest income share (-), Funding costs, State ownership (-), Foreign ownership, Effective tax rate (-), Inflation (-), GDP growth (+), GDP per capita, Stock market capitalisation to GDP (-), Bank concentration (-), Financial crisis (+). - NIM: Capital ratio (+), Efficiency ratio (+), Loan loss provisions, Deposits growth, Large bank (+), Small bank (-), Interest income share (+), Funding costs, State ownership, Foreign ownership, Effective tax rate, Inflation (+), GDP growth (-), GDP per capita (-), Stock market capitalisation to GDP, Bank concentration (-), Financial crisis (-).
Hussain (2014) Pakistan 2001-2010	Commercial	NIM	Size (-), Liquidity (-), Foreign and local ownership, Operating costs (+), Diversification (-), Industry concentration (+), Market share (+), Economic growth, Stock market development (-), Credit market development, real depreciation (+), Inflation (+), Industrial growth (+).
Ewijk and Arnold (2014) US 1992-2010	Commercial	NIM	Intercept (+), Retail deposits to liabilities (+), Loan intensity(+), Interest income to total income, Branches to loans (+), Capital ratio (+), GDP (+), Inflation (+/-), Interest rate level (+), Interest rate volatility (-), Credit risk, Operating costs (+), Concentration (-), Implicit interest payments (+), Managerial efficiency (-), Risk exposure (-), Loans to transactions (-).
Lee and Kim (2013) Korea 2003-2010	Commercial	ROA ROE	Size (+), Risk ratio, Ownership: government (-) and foreign (-) banks, GDP growth (+), Mergers and acquisitions transactions (-).
Shehzad <i>et al.</i> (2013) 148 Countries 1988-2010	Commercial	ROAE	ROE (+), Bank growth (+), Size (+), Capital ratio (-), Efficiency ratio (-), Off balance sheet items over assets ratio (+/-), Liquidity (-), GDP growth (-), Inflation (-), Concentration (-).
Čurak <i>et al.</i> (2012) Macedonia 2005-2010	Commercial	ROA	Size, Capital ratio (-) (Solvency ratio), Liquidity (+), Credit risk (-), Fee income, Operating expense of management (-), Concentration (+), Economic growth (+) (GDP growth).
Dedu and Chitan (2013) Romania 2004-2011	Commercial	ROA ROE	Internal corporate governance index (-), Proportion of independent members (+), Proportion of members of other nationality than Romanian (+), Gender: men, Proportion of members with experience in the banking and insurance sectors (+), Proportion of the non-executive members, Proportion of members holding shares (-), Age, Foreign ownership (-), Shareholder shares, GDP (+).
Liang <i>et al.</i> (2013) 194 European banks 2000-2007	Commercial	ROA ROE NIM	- ROA: Size (-), Loans to deposits ratio, Loan-loss reserve over total assets, Interest payments (-), Credit risk = Loan-loss provisions/loans (-), Non-interest revenues, Off-balance sheet (+), Market share, Other operating income (+), Inflation, GDP (+). - ROE: Size (-), Loans to deposits ratio, Loan-loss reserve over total assets, Interest payments, Credit risk = Loan-loss provisions/loans (-), Non-interest revenues, Off-balance sheet (+), Market share, Other operating income (+), Inflation, GDP (+). - NIM: Size (+), Loans to deposits ratio (+), Loan-loss reserve over total assets, Interest payments (+), Credit risk = Loan-loss provisions/loans (-), Non-interest revenues (+), Off-balance sheet, Market share, Other operating income (+), Inflation (-), GDP (-).
Kutan <i>et al.</i> (2012) 36 Emerging	Commercial	ROA	Intermediation spread = Difference between average lending and borrowing rate in the country (+), Inflation (+), GDP growth (+), Credit risk (-), Capital ratio (+), Institutional

countries (economies) 1991-2006			quality (+), Dollarization.
Kanas <i>et al.</i> (2012) US 1988-2011	Commercial	ROA ROE	Business cycle (+), Monetary policy (+), Inflationary expectations (+), Bank loan portfolio (+/-), Diversification, Credit risk (+/-), Inflation (-), Capital ratio (+), Financial structure: Herfindahl index (-).
Tan and Floros (2012) China 2003-2009	Commercial	ROA NIM	- ROA: Size, Credit risk (-), liquidity, Taxation (-), Capital ratio, Cost efficiency = overhead expenses/total assets (+), Non-traditional activity (-), Labour productivity (+), Concentration (-), Banking sector development (+), Stock market development (+), Inflation (+). - NIM: Size (-), Credit risk (+), liquidity (+), Taxation (-), Capital ratio, Cost efficiency = overhead expenses/total assets (+), Non-traditional activity (-), Labour productivity, Concentration, Banking sector development (+), Stock market development (+), Inflation (+).
Chitan (2012) Romania 2004-2011	Commercial	ROA ROE	Banking regulations: capital (-), guaranty (-), classify (-), provision (+) and liquidity regulations, Capital ratio (+), Loans to deposits ratio (-), Ratio of overdue and doubtful receivables to total assets, Liquidity ratio, Nominal GDP (+).
Delis <i>et al.</i> (2012) 14 Countries 1998-2008	Commercial	ROA	Capital ratio, Other regulations: official supervisory power, activity restrictions and private monitoring (-), Liquidity (-), Market power: lerner index, Efficiency ratio (-), Size, Revenue growth, Concentration (+), GDP growth (-), Inflation (+).
Haan and Poghosyan (2012) US 2004-2009	Commercial Savings Cooperative	ROA ROE	Size (-), Market concentration (+), Interaction: concentration-size (+), Cost to income ratio (+), Financial leverage: total assets over equity (+), Diversification (+), Global financial crisis (-).
Barry <i>et al.</i> (2011) 16 West European countries 1999-2005	Commercial	ROA ROE	Shareholders: managers (+), families, companies and banks holders, Size (-), Capital ratio (+ ROA and - ROE), Deposits to total assets ratio (-), ratio of total operating expenses to total operating income (-), Listed banks.
Manlagnit (2011) Philippines 1990-2006	Commercial	ROA	Foreign banks (-), Foreign shares (-), Capital ratio (+), Loan intensity (-), Customer funding (-), Overhead cost, Market share (+), Loan loss provision (-), Market concentration (-).
Dietrich and Wanzenried (2011) Switzerland 1999-2009	Commercial	ROAA ROAE NIM	- ROAA: Capital ratio (-), Efficiency ratio (-), Loan loss provisions over total loans, Deposits growth (-), Difference between bank and market growth of total loans (+), Size dummy: large and small (+) banks, Interest income share (-), Funding costs (-), Age dummy: Old (+) and new banks (+), Ownership dummy: co-owned (+), foreign (-) and listed (-) banks, Effective tax rate (-), Real GDP growth (+), Term structure of interest rates (+), Herfindahl Index (+). - ROAE: Capital ratio, Efficiency ratio (-), Loan loss provisions over total loans, Deposits growth (+), Difference between bank and market growth of total loans (+), Size dummy: large (+) and small (+) banks, Interest income share (-), Funding costs (-), Age dummy: Old and new (-) banks, Ownership dummy: co-owned, foreign and listed banks, Effective tax rate (-), Real GDP growth (+), Term structure of interest rates, Herfindahl Index. NIM: Capital ratio (+), Efficiency ratio (-), Loan loss provisions over total loans (+), Deposits growth, Difference

			between bank and market growth of total loans (+), Size dummy: large (-) and small (+) banks, Interest income share (-), Funding costs (+), Age dummy: Old (+) and new banks, Ownership dummy: co-owned (+), foreign and listed banks (-), Effective tax rate, Real GDP growth (+), Term structure of interest rates (+), Herfindahl Index.
Westman (2011) 37 European Countries 2003-2006	Commercial Investment	ROA ROE	Bank type (traditional, non-traditional (+) and diversified (+)), Level of management ownership, Size (+), Deposits, Capital ratio (+/-), Investment.
Havrylchyk and Jurzyk (2011) Central and Eastern Europe 1993-2004	Commercial	NIM	Foreign ownership, Efficiency ratio (-), Size (-), HHI index, Exchange rate (+), GDP growth (-), Interest rate,
Sufian and Habibullah (2010) Malaysia 1999-2007	Commercial	ROA ROE	Loans intensity (+), Credit risk (-), diversification = non-interest income to total assets (+), costs ratio = non-interest expenses to total assets (+), Capital ratio (+), GDP (-), Inflation (+), Economic freedom (+), Business freedom (+), Monetary freedom (-), Financial freedom, Corruption freedom (+).
Houston <i>et al.</i> (2010) 69 Countries 2000-2007	Commercial	ROA NIM	- ROA: Diversification (+), Deposit insurance coverage (-), Size (+), Bank growth (+), Herfindahl–Hirschman Index (+), GDP per capita (+), GDP (+), Inflation (-). - NIM: Diversification (-), Deposit insurance coverage (+), Herfindahl–Hirschman Index (+), GDP per capita (-), GDP (+), Inflation (+).
Heffernan and Fu (2010) China 1999-2006	Commercial	NIM	Efficiency ratio (-), Capital ratio (+), Liquidity, Loan loss provisions (+), Loans intensity (+), Other operating income (-), Size (-), Listed banks, Foreign banks (-), Unemployment, GDP growth (+), Inflation, age.
Flamini <i>et al.</i> (2009) 41 Sub-Saharan African countries	Commercial	ROA	Size (+), Capital ratio (+), Loans over deposits and short-term funding (+), Cost management, Net interest revenues to other operating income, Individual bank's loans / country's domestic credit, Ownership: private (-) and foreign banks, GDP per capita (-), GDP growth (+), Inflation (+), Petroleum (fuel) price (-), Non-fuel commodity price (+), Regulatory environment.
Lin and Zhang (2009) China 1997-2004	Commercial	ROA ROE	Foreign ownership (+), Listing banks (+), Size (-), Non-interest revenue in total revenue (+), Loan intensity (+), Deregulation (+).
García-Herrero <i>et al.</i> (2009) China 1997-2004	Commercial	ROA	Loan growth (-), Loan intensity, Deposits to assets (+), Capital ratio (+), Technical inefficiency (-), Foreign capital, Listed banks, Recapitalised, Market share on assets (-), Concentration, Real interest on loans (+), Maximum spread, Real GDP growth, Inflation (+), Volatility of interest rates (-), Type of banks: state-owned commercial banks, joint-stock commercial banks (+), city commercial banks and trust and investment corporations (+), Policy banks (-).
Sufian and Habibullah (2009) Bangladesh 1997-2004	Commercial	NIM	Loan intensity (+), Size (+), Loan loss provisions, Non-interest income, Non-interest expense (+), Capital ratio (+), GDP, Inflation (-).
Altunbas and Marques (2008) EU banking sector 207 Domestic	Commercial	ROE	- Domestic mergers: Relative size (-), Bidder performance level (-), Efficiency ratio (-), Capital ratio (+), Loan intensity (-), Credit risk (-), Diversity of earnings (-), Off-balance sheet activity (+), Loans to deposits ratio (-), Other expenses to total assets ratio (+), Liquidity = liquid assets / total

mergers and 55 Cross-borders mergers 1992-2001			deposits. - Cross-borders mergers: Relative size (+), Bidder performance level (-), Efficiency ratio (-), Capital ratio (-), Loan intensity (+), Credit risk, Diversity of earnings, Off-balance sheet activity (-), Loans to deposits ratio (-), Other expenses to total assets ratio (-), Liquidity = liquid assets / total deposits (-).
Athanasoglou <i>et al.</i> (2008) Greece 1985-2001	Commercial	ROA	Capital ratio (+), Credit risk = loan loss provisions / loans (-), Rate of change in inflation-adjusted gross total revenue/personnel (+), Operating expenses to assets ratio (-), Size, Private ownership (+), Herfindahl-Hirschman index, Inflation, Cyclical output (+).
Zhou and Wong (2008) China 1996-2003	Commercial	NIM	Operating cost (+), Capital ratio (-), Loan intensity, Size of loans (-), Net noninterest expenses (+), Opportunity cost of bank reserves (+), Efficiency ratio (-).
Claeys and Vennet (2008) Central and Eastern Europ 1994-2001	Commercial	NIM	Foreign banks: Concentration (+), Market share (+), X-efficiency (+), Constant returns to scale efficiency (-), Capital ratio (+), Loan intensity (+), Demand and savings deposits to total deposits ratio (+), GDP (-), Inflation (+/-), Interest rate (-), Number of foreign banks (+/-). State-owned banks: Concentration (-), Market share (+), X-efficiency (+), Constant returns to scale efficiency (-), Capital ratio (+), Loan intensity, Demand and savings deposits to total deposits ratio (+), GDP (+), Inflation (+/-), Interest rate (+/-), Number of state-owned banks (+/-).
Micco <i>et al.</i> (2007) 179 Countries 1995-2002	Commercial	ROA	Ownership: public (-) and foreign (+) banks, Non-interest income to total assets (+), Deposits (+), Size (-), Share of bank's total assets over total banking assets in the country.
Pasiouras and Kosmidou (2007) 15 EU Countries 1995-2001	Commercial	ROAA	Capital ratio (+), Efficiency ratio (-), Liquidity = loans to customers and short term funding (+), Size (-), Inflation (+), GDP growth (+), Concentration (+), Assets to GDP ratio (-), Market capitalisation to total assets ratio (+), The ratio of Market capitalisation to GDP (+).
Lanine and Vennet (2007) Central and Eastern Europe 1995-2002	Commercial	NIM	Loan intensity (+), Deposits to assets ratio (-), Size (-), Capital ratio (+), Takeover.
Boubakri <i>et al.</i> (2005) 22 Developing countries 1986-1998	Commercial	ROE	Private ownership, Post-privatisation period (+), Time since privatisation, Privatisation through private sales (-), Privatised banks under government control, Privatised banks under foreign investors control, Privatised banks under industrial group control, ratio of total assets standardized for size of the economy (GDP), Law and order, Financial liberalisation, GDP per capita, Real GDP growth (+), Overall budget deficit of GDP (-).
Beck <i>et al.</i> (2005) Nigeria 1990-2001	Commercial	ROA ROE	Assets (+), Eventually Privatised (-), Privatised (+), Time since Privatisation, State control (-), Age (-), Branches (+), Fee income (+), Government bonds (+), Loans to banks (-), Fixed assets (-), Overhead costs (-).
Demirguc-Kunt and Huizinga (1999) 80 Countries 1988-1995	Commercial	ROA ROA	Capital ratio (+), Loan intensity (-), Non-interest earning assets to total assets (-), Customer and short-term funding over total assets (-), Overhead / total assets (-), Foreign ownership (+), GDP per capita (+), Growth rate, Inflation, Real interest rate (+), Reserves (-), Tax rate (+), Deposit insurance, Banks assets to GDP (financial structure) (-), Stock market capitalization / GDP, Number of banks, Market

			concentration, Total assets, Contract enforcement (-), Law and order index (-), Corruption (-).
Mollah and Zaman (2015) 25 Countries 2005-2011	Islamic & Commercial	ROAA ROAE	- Islamic banks: Shari'ah board size (+), Directors number (-), Independent board (-), The same chair and CEO, The CEO recruited internally, Z-score (+), Capital ratio (-), Loan intensity, Size (-), GDP per capita (+), Muslim population (+), Inflation. - Commercial: Directors number, Independent board, The same chair and CEO, The CEO recruited internally, Z-score (+), Capital ratio (-), Loan intensity, Size, GDP per capita (+), Muslim population, Inflation.
Ghosh (2015) 12 MENA countries 2000-2012	Islamic & Commercial	ROA NIM	- ROA: Arab Spring period (-), Size, Capital ratio (+), Ratio of liquid asset to total asset (-), Diversification. - NIM: Arab Spring period (-), Size, Capital ratio, Ratio of liquid asset to total asset, Diversification.
Beck <i>et al.</i> (2013a) 22 Countries 1995-2009	Islamic & Commercial	ROA ROE	Bank type (Islamic) (+), Size (-), Non-loan earnings assets, Fixed assets (+).
Mirzaei <i>et al.</i> (2013) 40 Countries 1999-2008	Islamic & Commercial	ROA ROE	- Emerging economies: Market share, Concentration (-), Interest rate spread (+), Size (-), Capital ratio (+), Overheads to total assets (-), Off-balance to total assets (+), Loan growth (+), Age (+), Foreign ownership (+), Domestic credit provide by banking (-), Stock turnover ratio (+), Inflation, GDP growth (+), Banking type: Islamic (+), real estate (+), savings (+) and cooperative banks. - Advanced economies: Market share (+), Concentration, Interest rate spread (+), Size (+), Capital ratio (+), Overheads to total assets (-), Off-balance to total assets (-), Loan growth (+), Age (-), Foreign ownership (-), Domestic credit provide by banking (+), Stock turnover ratio (+), Inflation (-), GDP growth (+), Banking type: Islamic, real estate (-), savings (-) and cooperative banks (-).
Bertay <i>et al.</i> (2013) 90 Countries 1991-2011	Islamic & Commercial	ROA ROE	Size (+), Liabilities over GDP (-), Equity (+), Short term debt (+), Investment banks (-), Inflation (+), GDP growth (+), GDP per capita (-).
Olson and Zoubi (2011) 10 Countries in MENA 2000-2008	Islamic & Commercial	ROA ROE	Size, Loans intensity (+), security specialization ratio = other interest bearing assets (non-loans)/total assets, Deposit specialization ratio = total deposits/total liabilities, inefficiency ratio = operating expenses/gross income (-), Ratio of overhead (depreciation plus other expenses) to total assets, Ratio of non-interest bearing assets to total assets, Labour cost to income, Credit risk (+/-), Capital ratio (+/-), Change in GDP, Inflation (+), Concentration ratio = ratio of a bank's total assets to the total assets of all banks, Ownership: foreign and government (-) banks, Bank's type, Location of bank, Trade of stocks (if bank listed in stock market or not).

* ROA: Return on Asset, ROE: Return on Equity, ROAA: Return on Average Assets, ROAE: Return on Average Equity, NIM: Net Interest Margin.

Appendix 3: Studies on determinants of stability in banking

Study (Stability)	Banks	Dependent Variables	Independent Variables
Tabak <i>et al.</i> (2015) Brazil 2001-2011	Commercial	Z-score	Capital ratio (+), Market share (+/-), ROA, Size (+), Efficiency ratio.
Kohler (2015) 15 EU Countries 2002-2011	Cooperative, Savings, Commercial, Investment Banks -Banking corporation Securities houses	Z-score	Non-interest income share (+), Non-deposit funding share, Size (-), Capital ratio (+), Loan intensity (+), Net interest margin (+), Liquid assets to total Assets ratio, GDP growth (+), GDP per capita (+), Inflation (-), Deposit money bank assets to GDP (-), Concentration of market share of the three largest banks over total banking sector assets, Real long-term interest rate (-).
Zhang <i>et al.</i> (2015) USA 2003-2012	Bank holding companies	Z-score	House price index (+), Size (-), ROA, Short-term wholesale funding (-), Non-performing loan ratio (-), Loan loss reserve ratio (+), Institutional shareholding, Net interest income ratio (-).
Nguyen and Nghiem (2015) India 1990-2011	Commercial	Capital ratio	Public banks: Efficiency ratio (+/-), Loans to deposits ratio (+), GDP growth (-), Inflation (-). Private banks: Efficiency ratio (-), Loans to deposits ratio (+), GDP growth, Inflation (+).
Brighi and Venturelli (2015) Italy 2006-2012	Commercial	Z-score	Size (+), Capital adequacy (+), Loan loss provisions (-), Non-performing loans (-), Financial crisis: 2008-2009 period, Sovereign crisis: 2010-2011 period (-).
Carretta <i>et al.</i> (2015) 15 EU countries 1999-2011	Commercial	Z-score	Lagged z-score (+), Non-performing loans, Loan intensity, Size (-), Inefficiency ratio = operation expenses / operating income, Culture values, Market capitalisation (+), Domestic credit, GDP.
Chen <i>et al.</i> (2015) 35 Emerging economies (countries) 2000-2012	Commercial	Z-score	Size (-), Liquidity ratio (+), Efficiency ratio (-), Fee income share (-), Assets growth (-), Capital (+), GDP (+), Inflation (-), Global financial crisis (-), Deposit insurance existence (-).
Chiaramonte <i>et al.</i> (2015) 12 EU Countries 2001-2011	Commercial	Z-score	ROAA (-), Capital ratio (+/-), Impaired loans to gross loans ratio (+), Cost to income ratio, Liquidity ratio = loans to deposits ratio (+).
Saghi-Zedek and Tarazi (2015) 17 Western European countries 2002-2010	Commercial	Z-score	Size (-), Capital ratio (+), Deposits to assets ratio (+), Loan intensity (+), Net non-interest income (-), Efficiency ratio (-), GDP (+), Listed banks (-).
Wang <i>et al.</i> (2015) China 2006-2012	Commercial	Z-score	Government stake, Listed banks (+), Size (-), Loan loss provisions (-), Fixed assets intensity = fixed assets / total assets (+), GDP (-), Changes in monetary policies.
Kick and Prieto (2015) Germany 1994-2010	Commercial	Z-score	Capital ratio (+), Bank reserve, ROE (+), Non-performing loans (-), Off-balance sheet activity, GDP per capita growth, Local market share (-).
Doumpos <i>et al.</i> (2015) 94 Countries 2000-2011	Commercial	Z-score	Supervision unification, Size (-), Efficiency ratio (-), Liquidity ratio (-), Impaired loans to gross loans ratio (-), Global financial crisis (-), GDP (+), Inflation (-), Deregulations (freedom) (+).

García-Kuhnert et al. (2015) All European banks 1999-2008	Commercial	Z-score	Number of owned firms by banks (+), Size (-), Capital ratio (-), Net interest marginal revenues (-), Loan loss provisions (+), Private ownership, Foreign ownership, Financial statements transparency.
Fazio <i>et al.</i> (2015) 70 Countries 1998-2012	Commercial	Z-score & Capital ratio	Size (+), Liquidity ratio (-), The ratio of costs on total assets, Financial freedom, Economic Openness (sum of total exports and total imports), Inflation (-), GDP cycle (+), Domestic credit (-).
ElBannan (2015) Egypt 2005-2011	Commercial	Z-score & Capital ratio	- Z-score: Reform period (+), Size (+), Public ownership (-), Efficiency ratio (-), Liquidity ratio, Loan intensity (-), Fixed assets intensity (-), GDP, Inflation. - Capital ratio: Reform period (+), Size (-), Public ownership, Efficiency ratio (-), Liquidity ratio (-), Loan intensity (-), Fixed assets intensity (+), GDP (-), Inflation (+).
Hoque <i>et al.</i> (2015) 12 EU countries 2000-2012	Commercial	Z-score	Deposit ratio, Loan intensity, Size (-), NIM, GDP per capita (-), Corruptions.
Keffala (2015) 25 Emerging (countries) economies 2003-2011	Commercial	Z-score	Size (+), Loan intensity (+), Capital adequacy (-), Loan loss provisions (-), Efficiency ratio, Net interest income (+), Non-interest income, GDP (+), Inflation (+).
Kasman and Kasman (2015) Turkey 2002-2012	Commercial	Z-score	GDP growth (-), Size (-), Loan intensity (-), foreign ownership (-), public ownership, Global financial crisis (-).
Baselga-Pascual <i>et al.</i> (2015) 14 European countries 2001-2012	Commercial	Z-score	Loan intensity, Capital ratio (+), ROA (+), Efficiency ratio (-), Size (+), GDP growth (+), Inflation (-), Unemployment, Interest rates (+).
Kanagaretnam <i>et al.</i> (2015) 30 Countries 2000-2009	Commercial	Z-score & Capital ratio	Z-score: Size (+), Loan loss provisions (+), Capital ratio, State-owned banks (+), Listed banks, GDP per capita (-), Global financial crisis. Capital ratio: Loan intensity (-), State-owned banks, Listed banks (-), GDP per capita.
Chalermchatvichien <i>et al.</i> (2014) 68 Asian Countries 2005-2009	Commercial	Z-score	Net stable funding ratio (+), Ownership concentration (-), Loan loss provision (-), Tobins Q, Revenue growth (-), Deposits, GDP, GDP per capita.
Williams (2014) 20 Asian Countries 1998-2012	Commercial	Z-score	Capital ratio (+), Franchise value = fixed assets / total assets (+), Size, Loan growth, Non-interest income (+), Government effectiveness, GDP growth (+), Inflation rate, GDP per capita, Deposit rate (+), Revenue concentration, AFC (-), GFC (-).
Fu <i>et al.</i> (2014) 14 Asian Pacific Countries 2003-2010	Commercial	Z-score	Competition efficiency (+), Concentration (fraction of assets held by the three largest banks in each country) (-), Size (-), Loan -loss provision, Net interest margin (+), GDP growth, Financial crisis.
Cubillas and González (2014) 83 Countries 1991-2007	Commercial	Z-score	Bank market power (affects z-score negatively (-)), Location if the bank in developed (+) or developing country, Size (+), Revenue growth, Concentration (the fraction of assets of the three largest banks over assets of all commercial banks in a country), Overhead (personnel expenses and other non-interest expenses to total assets), Non-interest income to total income, GDP (-), GDP growth (-), Inflation (-).

Lee and Hsieh (2014) 27 Asian countries 1995-2009	Commercial	Z-score & Capital ratio	- Z-score: Ownership: foreign banks, Size, Liquidity assets to total assets ratio, non-interest expenses to total assets ratio, GDP growth (+), inflation rate, Private credit by deposit money banks to GDP ratio, Stock market turnover ratio. Capital ratio: Ownership: foreign banks, Size, Liquidity assets to total assets ratio (+), non-interest expenses to total assets ratio (+), GDP growth, inflation rate, Private credit by deposit money banks to GDP ratio (-), Stock market turnover ratio (-).
Anginer <i>et al.</i> (2014) 96 Countries 2004-2009	Commercial	Z-score	Size, Leverage (-), Deposits (+), Provisions (-), ROA (+), GDP per capita, GDP growth volatility, Population (-), Trade to GDP ratio, Stock market capitalisation to GDP ratio, Private credit over GDP (+), GFC (-).
Dong <i>et al.</i> (2014) China 2003-2011	Commercial	Z-score	Size (-), Efficiency ratio (-), Asset diversity, Loans to deposits ratio, GDP growth (-), Foreign strategic investment, Listed banks (+), Post-global, financial crisis (+), State-owned controlled banks (+), Private controlled banks (+), Ownership Herfindahl index (-), Ownership concentration ratio (-), Independent risk committee, Female directors (+).
Dima <i>et al.</i> (2014) 63 Countries 1997-2010	Commercial	Z-score	Bank concentration (+), Stock market capitalization to GDP (+), Loans to deposits (+), Non-interest income (+/-).
Rumler and Waschiczek (2014) Austria 1995-2010	Commercial	Z-score	Z-score of previous year (+), Loan intensity (-), Ownership: government (+) and foreign banks, Foreign lending in total assets (-), Herfindhal-Hirschman Index (+), GDP growth (+), Interest rate spread (+), Inflation (+), Core capital ratio, Size: bank share, foreign currency lending.
Diaconu and Oanea (2014) Romania 2008-2012	Commercial Co-operative	Z-score	Commercial Banks: GDP growth, Interbank offering rate for 3 months, rate of modification of BET index, Inflation. Co-operative Banks: GDP growth (+), Interbank offering rate for 3 months (+), Rate of modification of BET index, Inflation.
Gulamhussen <i>et al.</i> (2014) 56 Countries 2001-2007	Listed Banks	Z-score	International share (+), Size, Deposits to liabilities ratio (-), Employees to assets, Income diversity (-), Tobin's Q (-), International concentration (HHI) (-).
Schaeck and Cihák (2014) 10 European Countries 1995-2005	Commercial	Z-score & Capital ratio	- Z-score: Size (-), Assets growth (+), Diversification index (-), Loan loss provisions (-), HHI index (-), Banking system assets (+), GDP per capita (+), Unemployment, Age (+). - Capital ratio: Size (-), Assets growth, Diversification index (-), Loan loss provisions, HHI index (-), Banking system assets (+), GDP per capita (+), Unemployment, Age (+).
Horvath <i>et al.</i> (2014) Czech Republic 2000-2010	Commercial	Capital ratio	Non-performing loans (-), Credit risk (-), Z-score (+), Earnings volatility (-), Market share, Size (-), Unemployment (-), Inflation (+).
Jeon and Lim (2013) Korea 1999-2011	Commercial Savings	Z-score	Competition (+), Size, Profit ratio (+), Loan to deposit (+), Market volatility (-), Interception (-).
Lee and Chih (2013) China 2004-2011	Commercial	Z-score	- For large banks: Capital adequacy ratio, Operating costs to operating income (-), Loan to deposit ratio, Leverage ratio, Current ratio, Age (+). - For small banks: Capital adequacy ratio (-), Operating costs to operating income, Loan to deposit ratio (-),

			Leverage ratio (+), Current ratio, Age.
Tan and Floros (2013) China 2003-2009	Commercial	Z-score	DEA measures (TE, PTE and SE), Book value of capital to total assets (+), ROA, Size (-), Liquidity ratio, Taxation, Ratio of off-balance sheet items to total assets, Ratio of gross total revenue to number of employees (-), Concentration, Ratio of banking industry assets over GDP (+), Stock market capitalization to GDP ratio, Inflation (+), GDP growth.
Dedu and Chitan (2013) Romania 2004-2011	Commercial	Z-score	Internal corporate governance index (-), Proportion of independent members (+), Proportion of members of other nationality than Romanian (+), Gender: men, Proportion of members with experience in the banking and insurance sectors (+), Proportion of the non-executive members (-), Proportion of members holding shares (+), Age, Foreign ownership, Shareholder shares (-), GDP (+).
Gropp <i>et al.</i> (2013) Germany 1996-2006	Commercial	Z-score	Number of state guarantees (+), Size (-), GDP per capita (+), Direct competition (-), Number of mergers, Risk-free interest rate.
DeYound and Torna (2013) US 2007-2010	Commercial	Z-score & Capital ratio	- Z-score: Stakeholder (+), Stakeholder distressed, Liquidity (+), Loan concentration, Cost inefficiency, ROA, Non-performing loans, Equity (+), Size, Age, Brokered deposits (+), Core deposits, Goodwill (+). - Capital ratio: Stakeholder (+), Stakeholder distressed (+), Liquidity (+), Loan concentration, Cost inefficiency, ROA, Non-performing loans (+), Equity (+), Size, Age, Brokered deposits (+), Core deposits, Goodwill (+).
Beck <i>et al.</i> (2013b) USA 1994-2009	Commercial	Z-score	Lerner index (+), Share of wholesale funding, Loan intensity (-), Non-interest revenue share (-), Size (+), Loan loss provisions to interest income (-), Total assets growth (-).
Barakat and Hussainey (2013) 20 EU Countries 2008-2010	Commercial Savings Investment Co-operative Banks & Bank holding companies	Z-score	Efficiency ratio (-), Cash to deposits ratio, GDP per capita, Inflation (+), Political stability, Size, Concentration (-), Outside board, Government ownership (-), Executive ownership.
Tabak <i>et al.</i> (2013) 17 Latin American countries 2001-2008	Commercial	Z-score inefficiency	Capital ratio (-), Credit risk (+), Herfindahl–Hirschman Index (+), Market share (+), Ownership: foreign (+) and private (+) banks.
Nguyen <i>et al.</i> (2012) 4 South Asian Countries 1998-2008	Commercial	Z-score	Total non-interest income (+), Size (+), Efficiency ratio, Loan loss provisions divided by net loans ratio (ex-post credit losses) (-), Interest margin (Net interest income to total earning assets), Capital ratio (+), Ownership, Islamic banking activities, Listed banks, Concentration (market share of 3 largest banks) (-), Banking freedom, Restrictions, GDP Growth Rate (business cycle) (+), Financial development (market capitalisation to GDP) (+), AFC, GFC.
Zhang <i>et al.</i> (2012) China 1999-2008	Commercial	Z-score	Legal environment (-), Efficiency of the legal system, Protection of intellectual property right (-), Loans/GDP (-), GDP, GDP growth (+), Operating income growth rate (-), Non-interest income to operating income ratio (+), Capital ratio (+), Non-performing loans ratio (-), Interbank funds /

			(interbank funds + deposits) (-), Securities /earning assets (+).
Delis <i>et al.</i> (2012) 14 Countries 1998-2008	Commercial	Z-score	Capital ratio, Other regulations: official supervisory power, activity restrictions and private monitoring (+), Liquidity, Market power: lerner index (+), Efficiency ratio (+), Size (+), Revenue growth, Concentration, GDP growth (+), Inflation (-).
Soedarmono <i>et al.</i> (2011) 12 Asian countries 2001-2007	Commercial	Z-score & Capital ratio	- Z-score: Lerner index (-), GDP growth (-), Inflation, Loans to deposits ratio (+), Ratio of loss reserves to total loans (-), Annual loan growth rate (-), Operating expenses to total assets ratio (-), Size (+). - Capital ratio: Lerner index (+), GDP growth, Inflation, Loans to deposits ratio (+), Ratio of loss reserves to total loans (-), Annual loan growth rate (-), Operating expenses to total assets ratio, Size.
Agoraki <i>et al.</i> (2011) 13 EU Transition countries 1998-2005	Commercial	Z-score	Lagged Z-score (+), Market power (-), Non-interest expenses to total revenue, Size (-), GDP growth (-), Nominal interest rate (-), Foreign ownership (-), Public ownership (+), Market discipline index (-).
Barry <i>et al.</i> (2011) 16 West European countries 1999-2005	Commercial	Z-score	Shareholders: managers (-), families (+), companies and banks (+), Size (-), Capital ratio, Deposits to total assets ratio, ratio of total operating expenses to total operating income, Listed banks.
Houston <i>et al.</i> (2010) 69 Countries 2000-2007	Commercial	Z-score	Diversification (+), Deposit insurance coverage (-), Size (+), Bank growth, Herfindahl–Hirschman Index (-), GDP per capita (+), GDP (+), Inflation (-).
Berger <i>et al.</i> (2009) 23 Countries 1999-2005	Commercial	Z-score & Capital ratio	- Z-score: Degree of market power (+), Loan intensity (-), Fixed assets to total assets (-), Size (+), Foreign ownership (-), Legal rights, GDP per capita (+). Capital ratio: Degree of market power (+), Loan intensity (-), Fixed assets to total assets (+), Size (-), Foreign ownership (+), Legal rights (-), GDP per capita (+).
Ghosh (2015) 12 MENA countries 2000-2012	Islamic & Commercial	Z-score	Arab Spring period (-), Size (+), Capital ratio (+), Ratio of liquid asset to total asset, Diversification.
Mirzaei <i>et al.</i> (2013) Middle East and Eastern Europe 1999-2008	Islamic Real estate Savings Cooperative	Z-score	- Emerging economies: Market share (+), Concentration, Interest rate spread (+), Bank size (-), Capital ratio (+), Overheads to total assets (+), Off-balance sheet to total assets, Market growth (loan growth), Bank age, Foreign ownership (+), Stock turnover ratio, Inflation (-), GDP growth, Banking type: Islamic, real estate, savings and cooperative banks. - Advanced economies: Market share (+), Concentration (-), Interest rate spread (+), Bank size, Capital ratio (+), Overheads to total assets (+), Off-balance sheet to total assets (+), Market growth (loan growth) (+), Bank age (+), Foreign ownership (+), Stock turnover ratio, Inflation (-), GDP growth (+), Banking type: Islamic, real estate (-), savings and cooperative banks.
Ghosh (2014) GCC Countries 1996-2011	Islamic & Commercial	Z-score & Capital ratio	- Z-score: Size, ROA, Loan intensity, Funding (+), Efficiency ratio, Income diversification (-), Regulatory, Listing banks (+), GFC. - Capital ratio: Size (-), ROA (+), Loan intensity, Funding, Efficiency ratio, Income diversification, Regulatory (-), Listing banks (-), GFC.
Bourkhis and Nabi (2013)	Islamic & Commercial	Z-score	Size (-), Loan intensity (-), Efficiency ratio (-), Income diversity, Inflation (+), GDP growth, GFC.

16 Countries 1993-2009			
Srairi (2013) 10 MENA Countries 2005-2009	Islamic & Commercial	Z-score	Ownership (+), Size (+), Efficiency ratio (-), Operating leverage = fixed assets to total assets (+), ROA, Diversification = non-interest income to total operating income, Assets growth (assets - assets _{t-1} /assets _{t-1}), Loan growth, Capital ratio, GDP per capita, Inflation, Deposit insurance system, Shareholders rights (+), Banking sector development = credit to private sector/GDP (+), Bank concentration (+), Interest (3 months interbank) rate.
Beck <i>et al.</i> (2013a) 22 Countries 1995-2009	Islamic & Commercial	Z-score & Capital ratio	- Z-score: Size (-), Non-loan earnings assets (+), Fixed assets (+). - Capital ratio: Size (-), Non-loan earnings assets, Fixed assets (+).
Bertay <i>et al.</i> (2013) 90 Countries 1991-2011	Islamic & Commercial	Z-score & Capital ratio	- Z-score: Size, Liabilities over GDP, Equity (+), Short term debt (+), Investment banks (-), Inflation (+), GDP growth (+), GDP per capita. - Capital ratio: Size (-), Liabilities over GDP (-), Short term debt, Investment banks (+), Inflation, GDP growth, GDP per capita.

Appendix 4: Other efficiency measures

1. Stochastic Frontier Analysis (SFA)

Stochastic Frontier Analysis (SFA) is a parametric or econometric measure that can analyse the efficiency of the decision making unit (the DMU, e.g. banks or schools), in particular cost and profit efficiency (Fang *et al.* 2011). SFA was first employed by Aigner *et al.* (1977) to estimate the technical efficiency, and was first used on saving banks by Sherman and Gold (1985). The main measures of SFA are cost efficiency, profit efficiency and revenue efficiency as follows:

1.1 Cost Efficiency (CE)

Cost efficiency measures the level of how bank managing costs, low costs and high profits indicate that a firm attains high cost efficiency. However, the objective of cost efficiency is to reduce the amount of inputs and the model of cost efficiency that Wanke and Barros (2014) applied in the Brazilian banking sector assumed minimising the cost.

The minimum cost of output in terms of producing is:

$$C(w'y^0) = \min w'x: (x, y^0) \in T$$

$$C^* = \min w'x$$

$$\text{s.t.} \quad \sum_{j=1}^n \lambda_j y^j \geq y;$$

$$\sum_{j=1}^n \lambda_j x^j \leq x;$$

$$\sum_{j=1}^n \lambda_j = 1$$

$$\lambda_j \geq 0; \quad (j = 1, 2, \dots, N);$$

The final cost efficiency of firm model can be as follows:

$$\gamma = \frac{C^*}{C^0} \leq 1$$

$$\text{Actual cost: } C^0 = w'x^0$$

$$C^* = \min w'x$$

Where x, y : inputs

y^0 : output

1.2 Profit Efficiency (PE)

Profit efficiency measures the level of efficiency of how a bank uses their financial inputs (such as gained interests) to generate the financial profits (such as

investment earnings); high profits and low costs mean that the profit efficiency is high like the study of Vu and Nahm (2013) that assumed maximising profits in Vietnamese commercial banks as follows:

The maximum profit can be as follows:

$$\pi(w, p) = \max p' y - w' x: (x, y) \in T$$

$$\pi^* = \max p' y - w' x$$

$$\text{s.t.} \quad \sum_{j=1}^n \lambda_j y^j \geq y;$$

$$\sum_{j=1}^n \lambda_j x^j \leq x;$$

$$\sum_{j=1}^n \lambda_j = 1$$

$$\lambda_j \geq 0; \quad (j = 1, 2, \dots, N);$$

The final profit efficiency of firm model can be as follows:

$$\delta = \frac{\pi^*}{\pi_0} = 1$$

Where w, x: inputs

p: output

1.3 Revenue Efficiency (RE)

Revenue efficiency calculates the level of efficiency including the gross profit. However, the objective of revenue efficiency is to maximise the amount of outputs and the model of revenue efficiency Mohan and Ray (2004) applied to Indian banks assumed maximising the revenue as follows:

The attainable revenue:

$$R(p, x^0) = \max p' y: (x^0, y) \in T$$

$$R^* = \max p' y$$

$$\text{s.t.} \quad \sum_{j=1}^n \lambda_j y^j \geq y;$$

$$\sum_{j=1}^n \lambda_j x^j \leq x^0;$$

$$\sum_{j=1}^n \lambda_j = 1$$

$$\lambda_j \geq 0; \quad (j = 1, 2, \dots, N);$$

The final revenue efficiency of firm model can be as follows:

$$\rho = \frac{R^*}{R_0} \leq 1$$

Where p, x: inputs

x^0 : output

Based on the literature review, there are some studies used both approaches of DEA and SFA (such as Gardener *et al.*, 2012; Satub *et al.*, 2010; Havrylchyk, 2006; Hassan & Hussein, 2003).

1.3 The correlation between the cost and profit efficiencies

Berger and Mester (1997) found in their study that there is not always a positively significant relationship between the cost and profit efficiency scores, and found that the relationship between the cost and revenue inefficiency scores can be negatively correlated.

2. Distribution-Free Approach (DFA)

Berger (1993) used DFA on the American banking industry from 1980-1989 and he defined DFA as a measure that estimates the cost inefficiency for each bank during a determined period following a Trans log system of costs. In DFA, the efficiency of banks was assumed to be stable during the period. One of the disadvantages of DFA is that the time is invariant in terms of cost efficiency. In addition, DFA could not break down into allocative and technical efficiencies.

3. Thick Frontier Approach (TFA)

TFA can use a panel data and cross sectional data easily. There are two shared characteristics of TFA and DFA, both measures could not decompose into their allocative and technical efficiencies, and both of them are based on a Trans log system of costs. Referring to the literature review in chapter 2, only one study used TFA, on Spanish savings banks (Dietsch & Lozano-vivas, 2000). The advantage of TFA is that there is no need for independent assumptions and restrictive distributional error terms.

4. Free Disposal Hull (FDH)

FDH has rarely been used to find efficiency and is defined as a measure that compares inputs with outputs to find the dominant points and is distributed as frontier of production for FDH (Sousa & Schwengber, 2006). However, FDH has been used by Sousa and Schwengber (2006) to measure the efficiency of courts in Brazil using three inputs and six outputs. The inputs were post of judge, office staff and stock of cases; whereas, the outputs were civil cases, criminal cases, civil minor offenses, criminal minor offenses, children and youth cases and

criminal executions. The FDH measure varied from 0 which indicates non-efficiency to 1 which shows a maximum efficiency.

Appendix 5: Efficiency measures of Islamic banks

N	Islamic Banks	Year	TE	PTE	SE	N	Islamic Banks	Year	TE	PTE	SE
1	Al Rajhi Bank Saudi Arabia	2005	1.00	1.00	1.00	23	Kuwait International Bank Kuwait	2005	1.00	1.00	1.00
		2006	0.66	0.77	0.85			2006	1.00	1.00	1.00
		2007	0.68	0.79	0.86			2007	1.00	1.00	1.00
		2008	0.67	1.00	0.67			2008	1.00	1.00	1.00
		2009	0.69	0.80	0.86			2009	0.83	0.84	0.99
		2010	1.00	1.00	1.00			2010	0.77	0.78	0.98
		2011	1.00	1.00	1.00			2011	0.82	1.00	0.82
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
2	Alinma Bank Saudi Arabia	2005	n.a.	n.a.	n.a.	24	European Islamic Investment Bank UK	2005	n.a.	n.a.	n.a.
		2006	n.a.	n.a.	n.a.			2006	0.39	0.57	0.68
		2007	n.a.	n.a.	n.a.			2007	1.00	1.00	1.00
		2008	0.94	1	0.96			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	0.97	0.99	0.98			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
3	Bank AlBilad Saudi Arabia	2005	1.00	1.00	1.00	25	Qatar Islamic Bank UK	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	0.74	0.89	0.83
		2008	1.00	1.00	1.00			2008	0.51	1.00	0.51
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	0.96	1.00	0.96			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
4	Albaraka Banking Group Bahrain	2005	1.00	1.00	1.00	26	Alrayan Bank UK	2005	1.00	1.00	1.00
		2006	0.85	0.90	0.94			2006	0.89	0.92	0.97
		2007	1.00	1.00	1.00			2007	0.84	0.89	0.94
		2008	0.89	0.90	0.99			2008	1.00	1.00	1.00
		2009	0.95	0.96	0.99			2009	0.92	0.92	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.81	1.00	0.81
		2012	0.97	1.00	0.97			2012	0.87	0.87	1.00
5	Arcapita Bank Bahrain	2005	1.00	1.00	1.00	27	Banque Al Baraka Algeria	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.85	1.00	0.85
		2007	1.00	1.00	1.00			2007	0.94	0.95	0.99
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.71	0.71	0.99
		2010	1.00	1.00	1.00			2010	0.62	0.73	0.84

6	Al-Salam Bank Bahrain	2011	1.00	1.00	1.00	28	Faisal Islamic Bank of Egypt Egypt	2011	0.67	0.77	0.87
		2012	n.a.	n.a.	n.a.			2012	0.72	0.85	0.84
		2005	n.a.	n.a.	n.a.			2005	0.87	0.92	0.94
		2006	n.a.	n.a.	n.a.			2006	1.00	1.00	1.00
		2007	n.a.	n.a.	n.a.			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	0.82	1.00	0.82
		2009	1.00	1.00	1.00			2009	0.89	1.00	0.89
		2010	0.98	1.00	0.98			2010	0.65	0.66	0.98
		2011	0.95	1.00	0.95			2011	0.95	0.97	0.98
		2012	0.82	1.00	0.82			2012	1.00	1.00	1.00
7	Khaleeji Bank Bahrain	2005	n.a.	n.a.	n.a.	29	Al Baraka Bank Egypt	2005	0.57	0.87	0.66
		2006	n.a.	n.a.	n.a.			2006	0.75	0.98	0.76
		2007	1.00	1.00	1.00			2007	0.64	0.78	0.82
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	0.90	0.90	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
8	ABC Islamic Bank Bahrain	2005	n.a.	n.a.	n.a.	30	Islamic International Arab Bank Jordan	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.92	1.00	0.92
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.81	1.00	0.81			2008	0.85	0.87	0.97
		2009	0.88	1.00	0.88			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.97	1.00	0.97
		2012	1.00	1.00	1.00			2012	0.81	0.88	0.93
9	Bank Alkhair Bahrain	2005	n.a.	n.a.	n.a.	31	Karafarin Bank Iran	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.84	1.00	0.84			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.72	1.00	0.72
		2012	1.00	1.00	1.00			2012	0.63	1.00	0.63
10	Venture Capital Bank Bahrain	2005	n.a.	n.a.	n.a.	32	Bank of Industry and Mine Iran	2005	1.00	1.00	1.00
		2006	n.a.	n.a.	n.a.			2006	0.88	0.96	0.92
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	0.77	1.00	0.77			2009	0.74	0.80	0.92
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00

11	Capinvest Bahrain	2012	1.00	1.00	1.00	33	Bank Sepah Iran	2012	1.00	1.00	1.00
		2005	n.a.	n.a.	n.a.			2005	0.28	0.40	0.69
		2006	1.00	1.00	1.00			2006	0.43	0.51	0.85
		2007	0.46	0.59	0.77			2007	0.59	0.64	0.93
		2008	0.24	0.25	0.97			2008	0.51	0.59	0.88
		2009	0.48	0.71	0.67			2009	0.51	0.62	0.82
		2010	0.97	1.00	0.97			2010	0.51	0.63	0.80
		2011	1.00	1.00	1.00			2011	0.73	0.86	0.85
12	Investors Bank Bahrain	2012	1.00	1.00	1.00	34	Export Development Bank of Iran Iran	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	0.84	1.00	0.84
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	0.92	1.00	0.92			2007	0.62	0.78	0.79
		2008	0.58	1.00	0.58			2008	1.00	1.00	1.00
		2009	0.61	0.96	0.63			2009	0.51	0.52	0.98
		2010	0.64	1.00	0.64			2010	0.68	0.71	0.97
		2011	0.61	1.00	0.61			2011	0.82	0.83	0.99
13	Dubai Islamic Bank UAE	2012	1.00	1.00	1.00	35	Bank Tejarat Iran	2012	0.46	0.58	0.80
		2005	0.98	1.00	0.98			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.45	0.51	0.88
		2007	1.00	1.00	1.00			2007	0.71	0.71	0.99
		2008	0.94	1.00	0.94			2008	0.64	0.66	0.97
		2009	1.00	1.00	1.00			2009	0.60	0.61	0.99
		2010	1.00	1.00	1.00			2010	0.72	0.72	0.99
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
14	Abu Dhabi Islamic Bank UAE	2012	1.00	1.00	1.00	36	Bank Mellat Iran	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.72	0.74	0.98
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	0.69	0.69	1.00
		2009	0.98	1.00	0.98			2009	0.78	0.79	0.99
		2010	1.00	1.00	1.00			2010	0.99	1.00	0.99
		2011	1.00	1.00	1.00			2011	0.70	0.70	0.99
15	Al Hilal Bank UAE	2012	1.00	1.00	1.00	37	Bank Maskan Iran	2012	1.00	1.00	1.00
		2005	n.a.	n.a.	n.a.			2005	n.a.	n.a.	n.a.
		2006	n.a.	n.a.	n.a.			2006	1.00	1.00	1.00
		2007	n.a.	n.a.	n.a.			2007	0.91	0.93	0.98
		2008	0.49	1.00	0.49			2008	0.70	0.77	0.91
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	0.72	1.00	0.72
		2011	1.00	1.00	1.00			2011	0.57	1.00	0.57
16	Emirates Islamic Bank	2012	1.00	1.00	1.00	38	Arab Islamic Bank	2012	n.a.	n.a.	n.a.
		2005	0.64	1.00	0.64			2005	1.00	1.00	1.00

	UAE	2006	0.77	0.95	0.81	Palestine	2006	1.00	1.00	1.00			
		2007	1.00	1.00	1.00		2007	1.00	1.00	1.00			
		2008	1.00	1.00	1.00		2008	1.00	1.00	1.00			
		2009	1.00	1.00	1.00		2009	1.00	1.00	1.00			
		2010	0.82	1.00	0.82		2010	1.00	1.00	1.00			
		2011	0.71	1.00	0.71		2011	0.69	0.71	0.97			
		2012	1.00	1.00	1.00		2012	0.81	0.90	0.90			
17	Sharjah Islamic Bank	2005	1.00	1.00	1.00	39	Albaraka Bank Tunisia	2005	0.69	1.00	0.69		
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00		
		2007	0.94	1.00	0.94			2007	1.00	1.00	1.00		
		2008	0.92	1.00	0.92			2008	1.00	1.00	1.00		
		2009	0.85	0.91	0.93			2009	1.00	1.00	1.00		
		2010	0.90	0.97	0.93			2010	1.00	1.00	1.00		
		2011	0.92	1.00	0.92			2011	0.90	1.00	0.90		
	UAE	2012	1.00	1.00	1.00		Tunisia	2012	0.96	1.00	0.96		
		2005	n.a.	n.a.	n.a.			40	Shamil Bank of Yemen and Bahrain	2005	0.63	1.00	0.63
		2006	n.a.	n.a.	n.a.					2006	0.45	0.92	0.49
		2007	n.a.	n.a.	n.a.					2007	0.38	0.62	0.61
		2008	1.00	1.00	1.00					2008	0.63	0.77	0.82
		2009	1.00	1.00	1.00					2009	0.51	0.62	0.83
		2010	1.00	1.00	1.00					2010	0.49	0.55	0.90
2011	1.00	1.00	1.00	2011	0.26	0.34	0.74						
	UAE	2012	1.00	1.00	1.00		Yemen	2012	0.36	0.53	0.68		
		2005	1.00	1.00	1.00			41	Saba Islamic Bank	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00					2006	0.80	0.83	0.97
		2007	0.95	1.00	0.95					2007	0.79	0.81	0.98
		2008	0.81	0.84	0.97					2008	0.70	0.70	1.00
		2009	1.00	1.00	1.00					2009	0.70	0.70	1.00
		2010	1.00	1.00	1.00					2010	1.00	1.00	1.00
2011	1.00	1.00	1.00	2011	0.41	0.41	0.99						
	Qatar	2012	1.00	1.00	1.00		Yemen	2012	0.42	0.42	0.99		
		2005	n.a.	n.a.	n.a.			42	Tadhamon International Islamic Bank	2005	n.a.	n.a.	n.a.
		2006	n.a.	n.a.	n.a.					2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00					2007	n.a.	n.a.	n.a.
		2008	1.00	1.00	1.00					2008	0.86	1.00	0.86
		2009	0.83	0.97	0.86					2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00					2010	1.00	1.00	1.00
2011	1.00	1.00	1.00	2011	0.50	0.50	0.99						
	Qatar	2012	1.00	1.00	1.00		Yemen	2012	0.87	1.00	0.87		
		2005	1.00	1.00	1.00			43	Islamic Bank of Yemen for Finance and Investment	2005	0.74	1.00	0.74
		2006	1.00	1.00	1.00					2006	1.00	1.00	1.00
		2007	0.93	1.00	0.93					2007	1.00	1.00	1.00

22	Qatar	2008	0.83	1.00	0.83	Yemen	2008	0.84	1.00	0.84
		2009	0.67	0.79	0.85		2009	0.72	1.00	0.72
		2010	0.97	1.00	0.97		2010	0.86	1.00	0.86
		2011	1.00	1.00	1.00		2011	0.87	1.00	0.87
		2012	1.00	1.00	1.00		2012	0.66	1.00	0.66
	Boubyan Bank Kuwait	2005	0.67	0.91	0.74					
		2006	1.00	1.00	1.00					
		2007	1.00	1.00	1.00					
		2008	1.00	1.00	1.00					
		2009	1.00	1.00	1.00					
		2010	1.00	1.00	1.00					
		2011	1.00	1.00	1.00					
		2012	1.00	1.00	1.00					

Appendix 6: Efficiency measures of conventional banks

N	Commercial Banks	Year	TE	PTE	SE	N	Commercial Banks	Year	TE	PTE	SE
1	National Commercial Bank Saudi	2005	1.00	1.00	1.00	122	Tungsten Bank, formerly FIBI Bank UK	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.89	0.96	0.93			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	0.88	0.91	0.97
		2011	1.00	1.00	1.00			2011	0.95	0.95	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
2	Samba Financial Group Saudi	2005	1.00	1.00	1.00	123	DB UK Bank Limited UK	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	0.67	0.86	0.78
		2008	0.92	0.93	0.99			2008	1.00	1.00	1.00
		2009	0.97	1.00	0.97			2009	0.78	1.00	0.78
		2010	0.76	0.80	0.95			2010	0.76	1.00	0.76
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
3	Riyad Bank Saudi	2005	0.97	1.00	0.97	124	Aldermore Bank UK	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.84	0.93	0.90
		2007	0.98	1.00	0.98			2007	0.30	1.00	0.30
		2008	0.97	0.98	0.99			2008	0.61	1.00	0.61
		2009	1.00	1.00	1.00			2009	0.70	0.85	0.82
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
4	Banque Saudi Fransi Saudi	2005	1.00	1.00	1.00	125	EFG Private Bank Limited UK	2005	1.00	1.00	1.00
		2006	0.96	0.98	0.98			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.95	0.96	0.99			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	0.88	0.93	0.94
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
5	Saudi British Bank Saudi	2005	1.00	1.00	1.00	126	Isle of Man Bank Limited UK	2005	0.81	0.84	0.96
		2006	1.00	1.00	1.00			2006	0.94	1.00	0.94
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00

		2008	0.90	0.93	0.97			2008	0.92	1.00	0.92
		2009	0.90	0.98	0.92			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
6	Arab National Bank Saudi	2005	1.00	1.00	1.00	127	Bank of New York Mellon UK	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.97	1.00	0.97
		2007	0.95	1.00	0.95			2007	1.00	1.00	1.00
		2008	0.74	0.77	0.96			2008	1.00	1.00	1.00
		2009	0.70	1.00	0.70			2009	1.00	1.00	1.00
		2010	0.70	1.00	0.70			2010	1.00	1.00	1.00
		2011	0.77	1.00	0.77			2011	0.88	0.94	0.93
7	Saudi Holandi Bank Saudi	2012	1.00	1.00	1.00	128	Bank of London and The Middle East UK	2012	n.a.	n.a.	n.a.
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.96	0.96	1.00			2008	0.73	1.00	0.73
		2009	0.95	1.00	0.95			2009	0.86	0.94	0.91
		2010	0.92	1.00	0.92			2010	1.00	1.00	1.00
8	Saudi Investment Bank Saudi	2011	1.00	1.00	1.00	129	Bank of China UK	2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	n.a.	n.a.	n.a.
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
9	Bank Al-Jazira Saudi	2010	0.89	1.00	0.89	130	HFC Bank Limited UK	2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.80	1.00	0.80
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.81	0.84	0.97
		2007	1.00	1.00	1.00			2007	0.88	1.00	0.88
		2008	0.57	0.85	0.68			2008	0.70	0.97	0.71
10	Bank Muscat Oman	2009	0.68	0.93	0.72	131	Weatherbys Bank Limited UK	2009	0.71	0.94	0.75
		2010	1.00	1.00	1.00			2010	0.86	1.00	0.86
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	0.87	0.94	0.93
		2006	0.97	1.00	0.97			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.95	1.00	0.95			2008	0.85	0.99	0.86
		2009	0.95	0.96	0.99			2009	0.95	1.00	0.95

		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
11	National Bank of Oman Oman	2005	1.00	1.00	1.00	132	Union Bank UK	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	0.80	0.98	0.81
		2009	1.00	1.00	1.00			2009	0.90	1.00	0.90
		2010	0.99	1.00	0.99			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
12	Bank Dhofar Oman	2005	1.00	1.00	1.00	133	Jordan International Bank UK	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	0.87	1.00	0.87			2009	0.68	1.00	0.68
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	0.93	1.00	0.93			2012	1.00	1.00	1.00
13	Bank Sohar Oman	2005	n.a.	n.a.	n.a.	134	Kexim Bank UK	2005	1.00	1.00	1.00
		2006	n.a.	n.a.	n.a.			2006	0.94	1.00	0.94
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.88	0.88	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
14	HSBC Bank Oman Oman	2005	1.00	1.00	1.00	135	Trust Bank Algeria	2005	0.47	1.00	0.47
		2006	1.00	1.00	1.00			2006	0.28	1.00	0.28
		2007	1.00	1.00	1.00			2007	0.61	0.80	0.76
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	0.93	1.00	0.93			2009	0.37	0.38	0.98
		2010	0.92	1.00	0.92			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.40	1.00	0.40
		2012	1.00	1.00	1.00			2012	0.30	0.30	1.00
15	Oman Arab Bank Oman	2005	1.00	1.00	1.00	136	BNP Paribas Algeria	2005	0.30	0.33	0.90
		2006	0.93	1.00	0.94			2006	0.40	0.46	0.88
		2007	1.00	1.00	1.00			2007	0.54	0.56	0.96
		2008	0.92	0.94	0.97			2008	0.39	0.42	0.93
		2009	0.92	0.92	1.00			2009	0.33	0.36	0.91
		2010	1.00	1.00	1.00			2010	0.35	0.38	0.93
		2011	0.99	1.00	0.99			2011	0.37	0.38	0.97

16	Alahli Bank Oman	2012	1.00	1.00	1.00	137	Housing Bank for Trade and Finance Algeria	2012	0.32	0.34	0.94
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	0.08	1.00	0.08
		2007	0.69	0.72	0.97			2007	0.11	0.25	0.46
		2008	0.75	0.78	0.96			2008	0.45	1.00	0.45
		2009	1.00	1.00	1.00			2009	0.06	0.27	0.23
		2010	1.00	1.00	1.00			2010	0.10	0.26	0.37
		2011	0.90	1.00	0.90			2011	0.48	0.58	0.83
17	Qatar National Bank Qatar	2012	1.00	1.00	1.00	138	Natixis Algerie Algeria	2012	0.54	0.63	0.86
		2005	1.00	1.00	1.00			2005	0.13	0.14	0.94
		2006	0.84	0.90	0.93			2006	0.25	0.29	0.88
		2007	1.00	1.00	1.00			2007	0.18	0.21	0.86
		2008	1.00	1.00	1.00			2008	0.27	0.29	0.92
		2009	1.00	1.00	1.00			2009	0.44	0.45	0.98
		2010	1.00	1.00	1.00			2010	0.56	0.77	0.74
		2011	1.00	1.00	1.00			2011	0.39	0.39	1.00
18	Commercial Bank of Qatar Qatar	2012	1.00	1.00	1.00	139	Banque Extérieure Algeria	2012	0.47	0.52	0.89
		2005	0.88	1.00	0.88			2005	0.51	0.54	0.93
		2006	1.00	1.00	1.00			2006	0.53	0.56	0.95
		2007	0.86	1.00	0.86			2007	0.31	0.44	0.72
		2008	1.00	1.00	1.00			2008	0.30	0.33	0.89
		2009	0.98	0.99	0.99			2009	0.30	0.52	0.58
		2010	1.00	1.00	1.00			2010	0.24	0.26	0.90
		2011	1.00	1.00	1.00			2011	0.28	0.42	0.67
19	Doha Bank Qatar	2012	1.00	1.00	1.00	140	Gulf Bank Algeria	2012	0.28	0.56	0.49
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	0.92	1.00	0.92			2007	0.39	0.48	0.82
		2008	0.84	0.93	0.90			2008	1.00	1.00	1.00
		2009	0.87	0.93	0.94			2009	0.43	0.44	0.99
		2010	0.92	0.97	0.95			2010	0.41	0.42	0.99
		2011	1.00	1.00	1.00			2011	0.66	0.80	0.82
20	International Bank of Qatar Qatar	2012	1.00	1.00	1.00	141	Banque Nationale Algeria	2012	0.77	1.00	0.77
		2005	1.00	1.00	1.00			2005	0.76	0.94	0.81
		2006	1.00	1.00	1.00			2006	0.81	0.97	0.83
		2007	1.00	1.00	1.00			2007	0.60	0.80	0.75
		2008	0.91	0.93	0.98			2008	0.58	0.74	0.79
		2009	1.00	1.00	1.00			2009	0.52	1.00	0.52
		2010	1.00	1.00	1.00			2010	0.39	1.00	0.39
		2011	1.00	1.00	1.00			2011	0.39	0.81	0.48
21	Ahli Bank	2012	0.69	1.00	0.69	142	ABC Bank	2012	0.41	0.64	0.64
		2005	0.95	1.00	0.95			2005	0.21	0.21	1.00

	Qatar	2006	1.00	1.00	1.00		Algeria	2006	0.17	0.25	0.69
		2007	1.00	1.00	1.00			2007	0.31	0.31	1.00
		2008	1.00	1.00	1.00			2008	0.21	0.21	1.00
		2009	1.00	1.00	1.00			2009	0.13	0.20	0.67
		2010	1.00	1.00	1.00			2010	0.17	0.25	0.69
		2011	1.00	1.00	1.00			2011	0.12	0.20	0.62
		2012	0.87	1.00	0.87			2012	0.24	0.31	0.76
22	Qatar Development Bank	2005	0.99	1.00	0.99	143	Banque Cr�dit Populaire	2005	0.39	0.40	0.98
		2006	0.47	1.00	0.47			2006	0.35	0.35	1.00
		2007	1.00	1.00	1.00			2007	0.19	0.25	0.78
	Qatar	2008	0.92	1.00	0.92			2008	0.23	0.29	0.78
		2009	0.97	0.97	1.00			2009	0.24	0.28	0.86
		2010	0.90	0.90	1.00			2010	0.28	0.31	0.90
		2011	1.00	1.00	1.00			2011	0.32	0.34	0.93
2012	1.00	1.00	1.00	2012	0.35	0.38	0.91				
23	Emirates National Bank of Dubai	2005	n.a.	n.a.	n.a.	144	Suez Canal Bank	2005	0.82	0.86	0.95
		2006	1.00	1.00	1.00			2006	0.49	0.49	1.00
		2007	0.87	1.00	0.87			2007	0.40	0.40	1.00
	UAE	2008	1.00	1.00	1.00			2008	0.49	0.49	1.00
		2009	1.00	1.00	1.00			2009	0.29	0.29	0.99
		2010	0.76	0.89	0.86			2010	0.36	0.36	1.00
		2011	0.75	0.85	0.88			2011	0.24	0.27	0.90
2012	0.78	1.00	0.78	2012	0.29	0.32	0.92				
24	National Bank of Abu Dhabi	2005	1.00	1.00	1.00	145	Arab African International Bank	2012	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2011	0.95	0.95	1.00
		2007	1.00	1.00	1.00			2010	0.96	1.00	0.96
	UAE	2008	0.84	0.98	0.85			2009	0.86	1.00	0.86
		2009	1.00	1.00	1.00			2008	0.99	1.00	0.99
		2010	1.00	1.00	1.00			2007	0.81	0.81	1.00
		2011	1.00	1.00	1.00			2006	0.60	0.60	1.00
2012	1.00	1.00	1.00	2005	0.50	0.50	0.99				
25	Abu Dhabi Commercial Bank	2005	1.00	1.00	1.00	146	Bank Audi	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.20	0.39	0.52
		2007	1.00	1.00	1.00			2007	0.15	0.15	0.99
	UAE	2008	1.00	1.00	1.00			2008	0.24	0.25	0.94
		2009	0.95	1.00	0.95			2009	0.26	0.28	0.92
		2010	1.00	1.00	1.00			2010	0.36	0.39	0.92
		2011	1.00	1.00	1.00			2011	0.42	0.44	0.95
2012	1.00	1.00	1.00	2012	0.41	0.44	0.94				
26	First Gulf Bank	2005	1.00	1.00	1.00	147	BLOM Bank	2005	0.29	0.30	0.97
		2006	1.00	1.00	1.00			2006	0.39	0.40	0.98
	UAE	2007	1.00	1.00	1.00			Egypt	2007	0.31	0.35

		2008	1.00	1.00	1.00			2008	0.25	0.28	0.89
		2009	1.00	1.00	1.00			2009	0.20	0.23	0.89
		2010	1.00	1.00	1.00			2010	0.21	0.22	0.94
		2011	1.00	1.00	1.00			2011	0.26	0.26	0.98
		2012	1.00	1.00	1.00			2012	0.24	0.26	0.92
27	Union National Bank UAE	2005	0.89	1.00	0.89	148	Société Arabe Internationale de Banque Egypt	2005	0.35	0.47	0.75
		2006	0.95	0.99	0.96			2006	0.37	0.48	0.77
		2007	1.00	1.00	1.00			2007	0.37	0.43	0.85
		2008	1.00	1.00	1.00			2008	0.54	0.56	0.96
		2009	1.00	1.00	1.00			2009	0.47	0.48	0.98
		2010	1.00	1.00	1.00			2010	0.76	0.79	0.96
		2011	1.00	1.00	1.00			2011	0.76	0.78	0.98
28	Mashreq Bank UAE	2012	1.00	1.00	1.00	149	HSBC Bank Egypt Egypt	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	0.50	0.51	1.00
		2006	0.98	1.00	0.98			2006	0.37	0.38	0.99
		2007	1.00	1.00	1.00			2007	0.70	0.73	0.96
		2008	0.78	0.84	0.94			2008	0.63	0.69	0.92
		2009	0.65	0.74	0.87			2009	0.43	0.48	0.90
		2010	0.57	0.69	0.83			2010	0.48	0.51	0.94
29	Commercial Bank of Dubai UAE	2011	0.60	0.67	0.89	150	Ahli United Bank Egypt	2011	0.50	0.52	0.97
		2012	1.00	1.00	1.00			2012	0.54	0.55	0.97
		2005	1.00	1.00	1.00			2005	0.61	0.83	0.74
		2006	1.00	1.00	1.00			2006	0.29	0.42	0.68
		2007	1.00	1.00	1.00			2007	0.33	0.36	0.93
		2008	1.00	1.00	1.00			2008	0.41	0.42	0.98
		2009	0.81	0.88	0.93			2009	0.37	0.38	0.96
30	National Bank of Ras Al- Khaimah UAE	2010	1.00	1.00	1.00	151	Egyptian Gulf Bank Egypt	2010	0.40	0.44	0.89
		2011	1.00	1.00	1.00			2011	0.42	0.46	0.93
		2012	1.00	1.00	1.00			2012	0.37	0.42	0.89
		2005	1.00	1.00	1.00			2005	0.23	0.33	0.69
		2006	1.00	1.00	1.00			2006	0.26	0.33	0.79
		2007	1.00	1.00	1.00			2007	0.26	0.31	0.85
		2008	0.91	1.00	0.91			2008	0.33	0.34	0.97
31	Bank of Sharjah UAE	2009	0.88	1.00	0.88	152	Barclays Bank Egypt	2009	0.27	0.28	0.95
		2010	0.84	1.00	0.84			2010	0.37	0.42	0.87
		2011	1.00	1.00	1.00			2011	0.33	0.38	0.86
		2012	0.97	1.00	0.97			2012	0.70	0.76	0.93
		2005	1.00	1.00	1.00			2005	0.59	0.68	0.87
		2006	1.00	1.00	1.00			2006	0.61	0.62	0.99
		2007	1.00	1.00	1.00			2007	0.49	0.49	0.99
		2008	1.00	1.00	1.00			2008	0.34	0.38	0.91
		2009	0.98	1.00	0.98			2009	0.35	0.35	0.98

		2010	1.00	1.00	1.00			2010	0.52	0.52	1.00
		2011	1.00	1.00	1.00			2011	0.37	0.37	0.98
		2012	1.00	1.00	1.00			2012	0.51	0.52	0.99
32	National Bank of Fujairah UAE	2005	1.00	1.00	1.00	153	Banque du Caire Egypt	2005	0.62	0.64	0.96
		2006	1.00	1.00	1.00			2006	0.64	0.64	1.00
		2007	1.00	1.00	1.00			2007	0.53	0.53	1.00
		2008	1.00	1.00	1.00			2008	0.66	0.66	1.00
		2009	0.92	0.97	0.95			2009	0.61	0.61	1.00
		2010	1.00	1.00	1.00			2010	0.55	0.55	1.00
		2011	1.00	1.00	1.00			2011	0.77	0.77	0.99
		2012	1.00	1.00	1.00			2012	0.82	0.83	0.99
		2005	1.00	1.00	1.00			2005	0.61	0.62	0.99
		2006	1.00	1.00	1.00			2006	0.45	0.46	0.99
33	Al Masraf Bank UAE	2007	1.00	1.00	1.00	154	The National Bank of Kuwait Egypt	2007	0.39	0.39	1.00
		2008	1.00	1.00	1.00			2008	0.38	0.38	1.00
		2009	0.94	1.00	0.94			2009	0.48	0.48	0.99
		2010	0.98	1.00	0.98			2010	0.47	0.47	1.00
		2011	0.87	0.99	0.88			2011	0.43	0.43	1.00
		2012	1.00	1.00	1.00			2012	0.48	0.48	0.99
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	0.44	0.49	0.91
34	National Bank of Umm Al-Qaiwain UAE	2007	1.00	1.00	1.00	155	Commercial International Bank Egypt	2007	0.42	0.44	0.95
		2008	1.00	1.00	1.00			2008	0.44	0.47	0.93
		2009	0.97	1.00	0.97			2009	0.43	0.48	0.89
		2010	1.00	1.00	1.00			2010	0.45	0.66	0.68
		2011	1.00	1.00	1.00			2011	0.48	0.71	0.68
		2012	1.00	1.00	1.00			2012	0.51	0.88	0.58
		2005	0.92	1.00	0.92			2005	0.34	0.38	0.90
		2006	1.00	1.00	1.00			2006	0.24	0.24	1.00
35	Commercial Bank International UAE	2007	1.00	1.00	1.00	156	Union National Bank Egypt	2007	0.15	0.18	0.82
		2008	1.00	1.00	1.00			2011	0.18	0.19	0.91
		2009	0.83	0.84	0.99			2008	0.22	0.22	0.99
		2010	0.91	0.91	1.00			2010	0.14	0.15	0.91
		2011	1.00	1.00	1.00			2009	0.15	0.16	0.91
		2012	1.00	1.00	1.00			2012	0.27	0.28	0.98
		2005	1.00	1.00	1.00			2005	0.65	0.70	0.93
		2006	0.91	0.93	0.99			2006	0.80	0.89	0.89
36	United Arab Bank UAE	2007	1.00	1.00	1.00	157	Arab International Bank Egypt	2007	0.79	0.90	0.87
		2008	1.00	1.00	1.00			2008	0.79	0.88	0.90
		2009	1.00	1.00	1.00			2009	0.62	0.66	0.95
		2010	0.88	1.00	0.88			2010	0.23	0.24	0.96
		2011	1.00	1.00	1.00			2011	0.22	0.23	0.97

37	Invest Bank UAE	2012	1.00	1.00	1.00	158	Arab Banking Corporation (ABC Bank) Egypt	2012	0.33	0.33	0.98
		2005	0.82	1.00	0.82			2005	0.16	0.21	0.75
		2006	0.90	0.95	0.95			2006	0.16	0.23	0.68
		2007	0.93	0.98	0.95			2007	0.19	0.24	0.81
		2008	1.00	1.00	1.00			2008	0.27	0.28	0.95
		2009	1.00	1.00	1.00			2009	0.20	0.22	0.94
		2010	1.00	1.00	1.00			2010	0.15	0.16	0.94
		2011	1.00	1.00	1.00			2011	0.24	0.27	0.90
		2012	1.00	1.00	1.00			2012	0.28	0.31	0.92
38	Emirates Investment Bank UAE	2005	1.00	1.00	1.00	159	Bank of Alexandria Egypt	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.69	0.69	1.00
		2007	1.00	1.00	1.00			2007	0.58	0.59	1.00
		2008	0.79	1.00	0.79			2008	0.61	0.61	1.00
		2009	0.94	1.00	0.94			2009	0.62	0.67	0.92
		2010	1.00	1.00	1.00			2010	0.66	0.69	0.95
		2011	1.00	1.00	1.00			2011	0.69	0.78	0.89
		2012	1.00	1.00	1.00			2012	0.45	0.47	0.96
		2005	n.a.	n.a.	n.a.			2005	0.30	0.32	0.94
39	Credit Europe Bank UAE	2006	n.a.	n.a.	n.a.	160	Piraeus Bank Egypt	2006	0.38	0.39	0.95
		2007	n.a.	n.a.	n.a.			2007	0.36	0.40	0.91
		2008	1.00	1.00	1.00			2008	0.41	0.44	0.93
		2009	0.89	1.00	0.89			2009	0.28	0.36	0.78
		2010	1.00	1.00	1.00			2010	0.24	0.29	0.81
		2011	1.00	1.00	1.00			2011	0.28	0.36	0.77
		2012	1.00	1.00	1.00			2012	0.26	0.32	0.82
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
40	National Bank of Kuwait Kuwait	2007	1.00	1.00	1.00	161	The United Bank Egypt	2007	0.39	0.39	1.00
		2008	1.00	1.00	1.00			2008	0.65	0.75	0.86
		2009	1.00	1.00	1.00			2009	0.57	1.00	0.57
		2010	1.00	1.00	1.00			2010	0.46	0.56	0.83
		2011	1.00	1.00	1.00			2011	0.89	1.00	0.89
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
		2005	0.99	1.00	0.99			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.88	0.92	0.95
		2007	1.00	1.00	1.00			2007	0.80	0.86	0.93
41	Gulf Bank Kuwait	2008	1.00	1.00	1.00	162	Banque Misr Egypt	2008	0.95	1.00	0.95
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	0.99	0.99	1.00			2011	0.89	0.91	0.98
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
		2005	n.a.	n.a.	n.a.			2005	n.a.	n.a.	n.a.
		2006	n.a.	n.a.	n.a.			2006	n.a.	n.a.	n.a.
		2007	n.a.	n.a.	n.a.			2007	n.a.	n.a.	n.a.
		2008	n.a.	n.a.	n.a.			2008	n.a.	n.a.	n.a.
42	Burgan Bank	2005	n.a.	n.a.	n.a.	163	Emirates National Bank of	2005	n.a.	n.a.	n.a.

	Kuwait	2006	n.a.	n.a.	n.a.	Dubai	2006	n.a.	n.a.	n.a.	
		2007	1.00	1.00	1.00		2007	n.a.	n.a.	n.a.	
		2008	1.00	1.00	1.00		Egypt	2008	0.22	0.22	0.98
		2009	1.00	1.00	1.00			2009	0.23	0.25	0.95
		2010	1.00	1.00	1.00			2010	0.19	0.22	0.85
		2011	1.00	1.00	1.00			2011	0.20	0.27	0.75
		2012	1.00	1.00	1.00			2012	0.20	0.26	0.79
		43	Commercial Bank of Kuwait	2005	1.00			1.00	1.00	164	National Bank of Egypt
2006	1.00			1.00	1.00	2006	0.92	1.00	0.92		
2007	1.00			1.00	1.00	2007	0.89	0.99	0.90		
2008	1.00			1.00	1.00	2008	0.95	0.97	0.97		
Kuwait	2009		1.00	1.00	1.00	Egypt	2009	0.93	1.00		0.93
	2010		1.00	1.00	1.00		2010	0.95	1.00		0.95
	2011		0.97	0.99	0.98		2011	1.00	1.00		1.00
	2012		1.00	1.00	1.00		2012	1.00	1.00		1.00
44	Al Aahli Bank of Kuwait	2005	n.a.	n.a.	n.a.	165	Union Bank of Israel	2005	0.74	0.91	0.80
		2006	1.00	1.00	1.00			2006	0.72	0.86	0.83
		2007	1.00	1.00	1.00			2007	0.73	0.85	0.86
		2008	1.00	1.00	1.00			2008	0.72	0.87	0.83
	Kuwait	2009	0.92	0.94	0.98		Israel	2009	0.62	0.72	0.86
		2010	1.00	1.00	1.00			2010	0.66	0.77	0.86
		2011	1.00	1.00	1.00			2011	0.70	0.83	0.84
		2012	1.00	1.00	1.00			2012	0.66	0.77	0.86
45	Ahli United Bank	2005	1.00	1.00	1.00	166	Bank Hapoalim	2005	0.80	1.00	0.80
		2006	0.97	1.00	0.97			2006	0.64	1.00	0.64
		2007	1.00	1.00	1.00			2007	0.62	0.95	0.65
		2008	1.00	1.00	1.00			2008	0.69	1.00	0.69
	Kuwait	2009	0.99	1.00	0.99		Israel	2009	0.59	0.86	0.69
		2010	1.00	1.00	1.00			2010	0.72	1.00	0.72
		2011	1.00	1.00	1.00			2011	0.70	1.00	0.70
		2012	n.a.	n.a.	n.a.			2012	0.62	1.00	0.62
46	Ahli United Bank	2005	1.00	1.00	1.00	167	Mercantile Discount Bank	2005	0.77	0.80	0.95
		2006	1.00	1.00	1.00			2006	0.66	0.71	0.93
		2007	1.00	1.00	1.00			2007	0.64	0.68	0.94
		2008	1.00	1.00	1.00			2008	0.61	0.65	0.93
	Bahrain	2009	0.96	0.96	1.00		Israel	2009	0.50	0.58	0.85
		2010	1.00	1.00	1.00			2010	0.51	0.60	0.85
		2011	1.00	1.00	1.00			2011	0.53	0.64	0.83
		2012	1.00	1.00	1.00			2012	0.53	0.64	0.83
47	Arab Banking Corporation	2005	1.00	1.00	1.00	168	Israel Discount Bank	2005	0.70	0.98	0.71
		2006	1.00	1.00	1.00			2006	0.61	0.85	0.72
	Bahrain	2007	1.00	1.00	1.00		Israel	2007	0.67	0.85	0.79

		2008	1.00	1.00	1.00			2008	0.79	1.00	0.79
		2009	0.96	0.98	0.97			2009	0.72	0.97	0.74
		2010	1.00	1.00	1.00			2010	0.71	1.00	0.71
		2011	1.00	1.00	1.00			2011	0.63	0.89	0.70
		2012	0.79	1.00	0.79			2012	0.67	0.94	0.71
48	Gulf International Bank Bahrain	2005	1.00	1.00	1.00	169	Ubank Israel	2005	0.71	0.75	0.94
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	0.92	0.93	0.99
		2009	1.00	1.00	1.00			2009	0.81	0.81	1.00
		2010	0.82	0.99	0.84			2010	0.91	0.94	0.97
		2011	0.76	0.82	0.92			2011	1.00	1.00	1.00
49	BBK Bank Bahrain	2012	1.00	1.00	1.00	170	Bank Leumi Israel	2012	0.69	0.75	0.92
		2005	1.00	1.00	1.00			2005	0.73	0.99	0.74
		2006	1.00	1.00	1.00			2006	0.72	1.00	0.72
		2007	1.00	1.00	1.00			2007	0.70	1.00	0.70
		2008	0.98	0.98	1.00			2008	0.70	1.00	0.70
		2009	1.00	1.00	1.00			2009	0.61	0.90	0.68
		2010	1.00	1.00	1.00			2010	0.64	1.00	0.64
50	Ithmaar Bank Bahrain	2011	1.00	1.00	1.00	171	Mizrahi Tefahot Bank Israel	2011	0.66	1.00	0.66
		2012	1.00	1.00	1.00			2012	0.64	1.00	0.64
		2005	1.00	1.00	1.00			2005	0.87	0.94	0.93
		2006	0.87	1.00	0.87			2006	0.90	0.93	0.96
		2007	1.00	1.00	1.00			2007	0.92	0.93	0.99
		2008	0.85	0.89	0.96			2008	0.91	0.94	0.97
		2009	0.98	1.00	0.98			2009	0.94	0.94	1.00
51	National Bank of Bahrain Bahrain	2010	1.00	1.00	1.00	172	Bank of Jerusalem Israel	2010	0.97	1.00	0.97
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	0.95	1.00	0.95
		2005	1.00	1.00	1.00			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.98	0.98	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
52	Investcorp Bank Bahrain	2009	0.97	1.00	0.97	173	Arab Bank Jordan	2009	0.88	0.89	0.99
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	0.81	1.00	0.81			2011	0.96	0.97	0.99
		2012	n.a.	n.a.	n.a.			2012	1.00	1.00	1.00
		2005	0.97	1.00	0.97			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.81	0.84	0.96
		2007	1.00	1.00	1.00			2007	0.89	0.95	0.94
		2008	0.91	1.00	0.91			2008	0.98	1.00	0.98
		2009	1.00	1.00	1.00			2009	0.88	1.00	0.88

		2010	1.00	1.00	1.00			2010	0.84	0.95	0.88
		2011	1.00	1.00	1.00			2011	0.87	1.00	0.87
		2012	1.00	1.00	1.00			2012	0.87	1.00	0.87
53	United Gulf Bank Bahrain	2005	1.00	1.00	1.00	174	Housing Bank for Trade and Finance Jordan	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.75	1.00	0.75
		2007	1.00	1.00	1.00			2007	0.75	1.00	0.75
		2008	1.00	1.00	1.00			2008	0.79	0.84	0.95
		2009	1.00	1.00	1.00			2009	0.70	0.80	0.88
		2010	1.00	1.00	1.00			2010	0.75	0.83	0.91
		2011	1.00	1.00	1.00			2011	0.90	0.96	0.93
		2012	0.95	1.00	0.95			2012	0.96	1.00	0.96
54	BMI Bank Bahrain	2005	1.00	1.00	1.00	175	Bank of Jordan Jordan	2005	0.99	1.00	0.99
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	0.41	1.00	0.41			2007	1.00	1.00	1.00
		2008	0.36	0.69	0.52			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.99	1.00	0.99
		2010	0.77	0.82	0.94			2010	0.89	1.00	0.89
		2011	0.82	1.00	0.82			2011	0.86	1.00	0.86
		2012	1.00	1.00	1.00			2012	0.83	0.86	0.97
55	Future Bank Bahrain	2005	n.a.	n.a.	n.a.	176	ABC Bank Jordan	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.91	0.98	0.93
		2007	0.99	1.00	0.99			2007	0.83	0.90	0.92
		2008	1.00	1.00	1.00			2008	0.82	0.88	0.93
		2009	0.93	0.94	0.99			2009	0.81	0.86	0.94
		2010	1.00	1.00	1.00			2010	0.89	0.92	0.97
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
56	Alubaf Arab International Bank Bahrain	2005	n.a.	n.a.	n.a.	177	Capital Bank of Jordan Jordan	2005	1.00	1.00	1.00
		2006	n.a.	n.a.	n.a.			2006	1.00	1.00	1.00
		2007	n.a.	n.a.	n.a.			2007	1.00	1.00	1.00
		2008	0.83	1.00	0.83			2008	1.00	1.00	1.00
		2009	0.76	1.00	0.76			2009	0.62	0.75	0.82
		2010	0.72	0.77	0.94			2010	0.72	0.93	0.78
		2011	1.00	1.00	1.00			2011	0.79	0.84	0.94
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
57	Bahraini Saudi Bank Bahrain Merged with Al-Salam Bank-Bahrain in 2011	2005	1.00	1.00	1.00	178	Société générale de Banque Jordan	2005	0.87	1.00	0.87
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	0.89	1.00	0.89			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00

58	Bahrain Development Bank Bahrain	2012	1.00	1.00	1.00	179	Jordan Commercial Bank Jordan	2012	0.72	0.87	0.82
		2005	1.00	1.00	1.00			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.93	0.94	0.99
		2007	1.00	1.00	1.00			2007	0.98	1.00	0.98
		2008	0.89	0.92	0.97			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.91	0.92	0.98
		2010	0.93	1.00	0.93			2010	1.00	1.00	1.00
		2011	0.84	1.00	0.84			2011	1.00	1.00	1.00
59	Taib Bank Bahrain	2012	1.00	1.00	1.00	180	IBL Bank Lebanon	2012	0.92	0.92	1.00
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	0.85	0.87	0.98
		2008	0.98	1.00	0.98			2008	0.82	0.82	1.00
		2009	1.00	1.00	1.00			2009	0.76	0.79	0.97
		2010	1.00	1.00	1.00			2010	0.83	0.86	0.97
		2011	1.00	1.00	1.00			2011	0.86	0.92	0.94
60	BMB Investment Bank- Bahrain Middle East Bank Bahrain	2012	n.a.	n.a.	n.a.	181	Banque BEMO Lebanon	2012	0.91	0.97	0.93
		2005	1.00	1.00	1.00			2005	0.87	0.95	0.92
		2006	1.00	1.00	1.00			2006	0.78	0.79	0.99
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	0.98	0.99	0.98
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	0.97	1.00	0.97
		2011	1.00	1.00	1.00			2011	0.86	0.88	0.98
61	Barclays Bank UK	2012	1.00	1.00	1.00	182	MEAB Bank Lebanon	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	0.51	0.61	0.84
		2006	1.00	1.00	1.00			2006	0.47	0.57	0.82
		2007	1.00	1.00	1.00			2007	0.56	0.63	0.88
		2008	1.00	1.00	1.00			2008	0.74	0.81	0.91
		2009	0.65	0.65	1.00			2009	0.89	0.92	0.97
		2010	0.61	0.62	0.99			2010	1.00	1.00	1.00
		2011	0.98	0.98	1.00			2011	0.87	0.88	1.00
62	Royal Bank of Scotland UK	2012	1.00	1.00	1.00	183	Banque Misr Liban Lebanon	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.77	0.77	1.00			2008	0.63	0.71	0.89
		2009	1.00	1.00	1.00			2009	0.58	0.65	0.90
		2010	1.00	1.00	1.00			2010	0.52	0.53	0.97
		2011	1.00	1.00	1.00			2011	0.46	0.48	0.96
63	Lloyds TSP Bank	2012	1.00	1.00	1.00	184	Fransabank	2012	0.43	0.44	0.97
		2005	1.00	1.00	1.00			2005	0.65	0.83	0.78

	UK	2006	1.00	1.00	1.00	Lebanon	2006	0.65	0.81	0.81			
		2007	1.00	1.00	1.00		2007	0.67	1.00	0.67			
		2008	0.73	0.83	0.88		2008	0.63	0.95	0.67			
		2009	1.00	1.00	1.00		2009	0.59	1.00	0.59			
		2010	1.00	1.00	1.00		2010	0.64	1.00	0.64			
		2011	0.94	0.96	0.97		2011	0.73	1.00	0.73			
		2012	0.94	1.00	0.94		2012	0.66	1.00	0.66			
64	HSBC Bank UK	2005	1.00	1.00	1.00	185	Byblos Bank Lebanon	2005	0.49	0.62	0.79		
		2006	1.00	1.00	1.00			2006	0.52	0.65	0.80		
		2007	1.00	1.00	1.00			2007	0.64	0.78	0.82		
		2008	0.85	0.92	0.92			2008	0.62	0.92	0.68		
		2009	1.00	1.00	1.00			2009	0.62	1.00	0.62		
		2010	1.00	1.00	1.00			2010	0.63	1.00	0.63		
		2011	1.00	1.00	1.00			2011	0.61	1.00	0.61		
		2012	1.00	1.00	1.00			2012	0.63	1.00	0.63		
		65	Goldman Sachs International UK	2005	1.00	1.00	1.00	186	Bank Audi Lebanon	2005	0.72	0.72	0.99
				2006	1.00	1.00	1.00			2006	0.62	0.63	1.00
				2007	1.00	1.00	1.00			2007	0.73	0.74	0.99
				2008	1.00	1.00	1.00			2008	0.80	0.82	0.97
				2009	1.00	1.00	1.00			2009	0.98	1.00	0.98
				2010	0.91	0.91	0.99			2010	1.00	1.00	1.00
2011	0.45			0.49	0.92	2011	1.00			1.00	1.00		
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00		
		66	Bank of Scotland UK	2005	1.00	1.00	1.00	187	Federal Bank of Lebanon Lebanon	2005	n.a.	n.a.	n.a.
				2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
				2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
				2008	0.48	0.48	1.00			2008	0.92	0.94	0.98
				2009	0.49	0.55	0.90			2009	0.96	1.00	0.96
				2010	0.50	0.60	0.83			2010	1.00	1.00	1.00
2011	0.47			0.59	0.79	2011	0.86			0.97	0.89		
		2012	1.00	1.00	1.00			2012	0.65	0.69	0.94		
		67	Credit Suisse International UK	2005	1.00	1.00	1.00	188	Bank of Beirut Lebanon	2005	0.66	0.73	0.89
				2006	1.00	1.00	1.00			2006	0.74	0.81	0.91
				2007	1.00	1.00	1.00			2007	0.72	0.83	0.86
				2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
				2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
				2010	0.86	1.00	0.86			2010	0.94	1.00	0.94
2011	0.89			1.00	0.89	2011	0.89			1.00	0.89		
		2012	1.00	1.00	1.00			2012	0.90	1.00	0.90		
		68	Standard Chartered Bank	2005	1.00	1.00	1.00	189	Lebanon and Gulf Bank Lebanon	2005	0.67	0.69	0.96
				2006	1.00	1.00	1.00			2006	0.54	0.55	0.99
2007	1.00			1.00	1.00	2007	0.47			0.47	0.99		

	UK	2008	0.89	0.93	0.95			2008	0.60	0.60	1.00
		2009	0.93	1.00	0.93			2009	1.00	1.00	1.00
		2010	0.95	1.00	0.95			2010	1.00	1.00	1.00
		2011	0.86	1.00	0.86			2011	0.78	0.82	0.95
		2012	1.00	1.00	1.00			2012	0.77	0.84	0.92
69	National Westminster Bank	2005	1.00	1.00	1.00	190	BBAC Bank	2005	0.68	0.68	1.00
		2006	1.00	1.00	1.00			2006	0.57	0.58	0.98
		2007	1.00	1.00	1.00			2007	0.64	0.66	0.96
		2008	0.78	0.91	0.86			2008	0.71	0.80	0.89
		2009	0.88	0.95	0.92			2009	0.74	0.83	0.89
		2010	1.00	1.00	1.00			2010	0.74	0.82	0.90
		2011	0.71	0.81	0.87			2011	0.74	0.85	0.88
	UK	2012	1.00	1.00	1.00		Lebanon	2012	0.70	0.79	0.89
		2005	1.00	1.00	1.00			2005	0.34	0.50	0.68
		2006	1.00	1.00	1.00			2006	0.41	0.76	0.55
		2007	0.88	1.00	0.88			2007	0.49	0.75	0.65
		2008	1.00	1.00	1.00			2008	0.71	0.99	0.72
		2009	1.00	1.00	1.00			2009	0.61	0.83	0.73
		2010	0.52	1.00	0.52			2010	0.71	1.00	0.71
70	Santander Bank	2011	0.49	0.66	0.75	191	Bankmed	2011	0.80	1.00	0.80
		2012	1.00	1.00	1.00			2012	0.63	1.00	0.63
		2005	n.a.	n.a.	n.a.			2005	0.41	0.49	0.83
		2006	1.00	1.00	1.00			2006	0.32	0.47	0.69
		2007	1.00	1.00	1.00			2007	0.36	0.44	0.83
		2008	1.00	1.00	1.00			2008	0.37	0.47	0.79
		2009	0.81	1.00	0.81			2009	0.35	0.43	0.81
	UK	2010	0.83	0.92	0.90	192	Banque Pharaon and Chiha	2010	0.72	1.00	0.72
		2011	0.78	1.00	0.78			2011	0.74	0.83	0.90
		2012	0.70	1.00	0.70			2012	0.74	1.00	0.74
		2005	n.a.	n.a.	n.a.			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	0.98	1.00	0.98
		2007	1.00	1.00	1.00			2007	0.62	0.74	0.84
		2008	1.00	1.00	1.00			2008	0.80	0.80	0.99
71	Ulster Bank Limited	2009	1.00	1.00	1.00	193	Société Générale de Banque	2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	0.92	1.00	0.92
		2011	1.00	1.00	1.00			2011	0.70	1.00	0.70
		2012	0.89	1.00	0.89			2012	0.82	1.00	0.82
		2005	0.76	1.00	0.76			2005	0.64	0.77	0.84
		2006	1.00	1.00	1.00			2006	0.72	0.84	0.85
		2007	0.98	1.00	0.98			2007	0.80	0.95	0.84
72	Clydesdale Bank	2008	1.00	1.00	1.00	194	Banque Libano-Francaise	2008	0.91	1.00	0.91
		2009	1.00	1.00	1.00			2009	0.74	0.88	0.83
		2005	0.76	1.00	0.76			2005	0.64	0.77	0.84
		2006	1.00	1.00	1.00			2006	0.72	0.84	0.85
73	RBC Europe Bank	2007	0.98	1.00	0.98			2007	0.80	0.95	0.84
		2008	1.00	1.00	1.00			2008	0.91	1.00	0.91
		2009	1.00	1.00	1.00			2009	0.74	0.88	0.83
		2005	0.76	1.00	0.76			2005	0.64	0.77	0.84
	UK	2006	1.00	1.00	1.00			2006	0.72	0.84	0.85
		2007	0.98	1.00	0.98			2007	0.80	0.95	0.84
		2008	1.00	1.00	1.00			2008	0.91	1.00	0.91
		2009	1.00	1.00	1.00			2009	0.74	0.88	0.83

		2010	1.00	1.00	1.00			2010	0.79	0.97	0.81
		2011	1.00	1.00	1.00			2011	0.81	1.00	0.81
		2012	1.00	1.00	1.00			2012	0.85	1.00	0.85
74	Mizuho International UK	2005	1.00	1.00	1.00	195	B.L.C. Bank Lebanon	2005	1.00	1.00	1.00
		2006	0.66	1.00	0.66			2006	1.00	1.00	1.00
		2007	0.49	0.54	0.89			2007	0.66	0.66	1.00
		2008	0.70	1.00	0.70			2008	0.82	0.84	0.97
		2009	1.00	1.00	1.00			2009	0.82	0.83	0.98
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	0.81	0.89	0.90			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	0.93	1.00	0.93
75	Couetts Bank UK	2005	0.91	0.91	0.99	196	First National Bank Lebanon	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	0.67	0.67	1.00
		2008	0.95	1.00	0.95			2008	0.74	0.75	1.00
		2009	1.00	1.00	1.00			2009	0.66	0.68	0.97
		2010	1.00	1.00	1.00			2010	0.77	0.83	0.92
		2011	1.00	1.00	1.00			2011	0.90	1.00	0.90
		2012	0.99	1.00	0.99			2012	0.77	0.87	0.89
76	Allied Irish Bank UK	2005	1.00	1.00	1.00	197	Crédit Libanais Bank Lebanon	2005	0.36	0.40	0.90
		2006	1.00	1.00	1.00			2006	0.35	0.38	0.94
		2007	1.00	1.00	1.00			2007	0.47	0.52	0.91
		2008	0.80	0.86	0.93			2008	0.71	0.80	0.89
		2009	1.00	1.00	1.00			2009	0.64	0.81	0.79
		2010	1.00	1.00	1.00			2010	0.89	1.00	0.89
		2011	1.00	1.00	1.00			2011	0.83	1.00	0.83
		2012	1.00	1.00	1.00			2012	0.71	0.92	0.77
77	Investec Bank UK	2005	n.a.	n.a.	n.a.	198	Near East Commercial Bank Lebanon	2005	0.08	1.00	0.08
		2006	n.a.	n.a.	n.a.			2006	0.08	0.65	0.12
		2007	1.00	1.00	1.00			2007	0.07	0.61	0.12
		2008	1.00	1.00	1.00			2008	0.35	0.70	0.49
		2009	1.00	1.00	1.00			2009	0.43	0.60	0.71
		2010	1.00	1.00	1.00			2010	0.48	0.58	0.82
		2011	1.00	1.00	1.00			2011	0.45	0.63	0.72
		2012	1.00	1.00	1.00			2012	0.57	0.72	0.80
78	Standard Bank UK	2005	0.96	1.00	0.96	199	Emirates Lebanon Bank Lebanon	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	0.79	1.00	0.79
		2009	0.68	0.71	0.97			2009	0.87	1.00	0.87
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.96	1.00	0.96

		2012	1.00	1.00	1.00			2012	0.79	0.79	1.00
79	Citibank International UK	2005	n.a.	n.a.	n.a.	200	Ahli International Bank Lebanon	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	0.49	0.69	0.72
		2007	1.00	1.00	1.00			2007	0.48	0.75	0.64
		2008	0.95	1.00	0.95			2008	0.50	0.56	0.90
		2009	1.00	1.00	1.00			2009	0.43	0.48	0.91
		2010	1.00	1.00	1.00			2010	0.74	0.75	0.98
		2011	1.00	1.00	1.00			2011	0.48	0.51	0.94
		2012	1.00	1.00	1.00			2012	0.60	0.62	0.97
80	MBNA Europe Bank UK	2005	n.a.	n.a.	n.a.	201	National Bank of Kuwait Lebanon	2005	0.14	0.38	0.36
		2006	1.00	1.00	1.00			2006	0.10	0.37	0.26
		2007	1.00	1.00	1.00			2007	0.11	0.36	0.30
		2008	1.00	1.00	1.00			2008	0.12	0.35	0.35
		2009	1.00	1.00	1.00			2009	0.34	0.35	0.99
		2010	0.97	0.97	1.00			2010	0.39	0.39	0.98
		2011	1.00	1.00	1.00			2011	0.26	0.28	0.93
		2012	n.a.	n.a.	n.a.			2012	0.21	0.29	0.75
81	Sainsbury's Bank UK	2005	n.a.	n.a.	n.a.	202	Société Nouvelle de la Banque de Syrie et du Liban Lebanon	2005	n.a.	n.a.	n.a.
		2006	n.a.	n.a.	n.a.			2006	n.a.	n.a.	n.a.
		2007	0.86	1.00	0.86			2007	0.36	0.40	0.90
		2008	1.00	1.00	1.00			2008	0.38	0.41	0.92
		2009	1.00	1.00	1.00			2009	0.44	0.47	0.94
		2010	1.00	1.00	1.00			2010	0.33	0.34	0.95
		2011	1.00	1.00	1.00			2011	0.31	0.32	0.98
		2012	1.00	1.00	1.00			2012	0.33	0.34	0.98
82	ABC International Bank UK	2005	1.00	1.00	1.00	203	Jammal Trust Bank Lebanon	2005	0.16	0.28	0.59
		2006	1.00	1.00	1.00			2006	0.16	0.27	0.57
		2007	1.00	1.00	1.00			2007	0.35	0.35	0.99
		2008	1.00	1.00	1.00			2008	0.41	0.43	0.96
		2009	0.88	0.90	0.97			2009	0.39	0.42	0.93
		2010	1.00	1.00	1.00			2010	0.26	0.28	0.94
		2011	1.00	1.00	1.00			2011	0.53	0.55	0.96
		2012	0.82	1.00	0.82			2012	0.46	0.49	0.94
83	Gulf International Bank UK	2005	1.00	1.00	1.00	204	Audi Saradar Private Bank Lebanon	2005	0.43	0.47	0.91
		2006	0.75	1.00	0.75			2006	0.33	0.35	0.94
		2007	0.04	1.00	0.04			2007	0.44	0.44	0.99
		2008	0.22	1.00	0.22			2008	0.57	0.57	1.00
		2009	0.38	1.00	0.38			2009	0.74	0.74	1.00
		2010	0.81	1.00	0.81			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.78	0.78	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
84	Ahli United Bank	2005	0.90	1.00	0.90	205	Banque de l'Industrie et du	2005	0.29	0.46	0.62

	UK	2006	0.84	1.00	0.84		Travail Lebanon	2006	0.28	0.40	0.71
		2007	0.79	1.00	0.79			2007	0.32	0.40	0.82
		2008	1.00	1.00	1.00			2008	0.31	0.38	0.83
		2009	1.00	1.00	1.00			2009	0.31	0.36	0.86
		2010	1.00	1.00	1.00			2010	0.38	0.41	0.93
		2011	1.00	1.00	1.00			2011	0.36	0.39	0.94
		2012	0.65	0.97	0.67			2012	0.42	0.44	0.95
85	British Arab Commercial Bank UK	2005	0.80	0.82	0.97	206	BLOM Bank Lebanon	2005	0.82	1.00	0.82
		2006	1.00	1.00	1.00			2006	0.98	1.00	0.98
		2007	1.00	1.00	1.00			2007	0.98	1.00	0.98
		2008	1.00	1.00	1.00			2008	0.99	1.00	0.99
		2009	0.91	0.98	0.93			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	0.68	1.00	0.68			2011	1.00	1.00	1.00
86	EFG Private Bank Limited UK	2012	1.00	1.00	1.00			2012	0.98	1.00	0.98
		2005	1.00	1.00	1.00	207	Lebanese Swiss Bank Lebanon	2005	0.71	0.71	1.00
		2006	1.00	1.00	1.00			2006	0.61	0.61	1.00
		2007	1.00	1.00	1.00			2007	0.61	0.61	0.99
		2008	1.00	1.00	1.00			2008	0.84	0.88	0.95
		2009	1.00	1.00	1.00			2009	0.99	1.00	0.99
		2010	1.00	1.00	1.00			2010	0.94	0.96	0.98
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
87	Bank Leumi UK	2012	0.88	0.93	0.94			2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00	208	Bank of Baghdad Iraq	2005	0.48	1.00	0.48
		2006	1.00	1.00	1.00			2006	0.34	0.38	0.91
		2007	1.00	1.00	1.00			2007	0.81	1.00	0.81
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.68	0.80	0.85
		2010	1.00	1.00	1.00			2010	0.72	1.00	0.72
		2011	0.88	1.00	0.88			2011	0.74	1.00	0.74
88	SG Hambros Bank UK	2012	1.00	1.00	1.00			2012	0.51	1.00	0.51
		2005	1.00	1.00	1.00	209	Investment Bank of Iraq Iraq	2005	1.00	1.00	1.00
		2006	0.15	0.33	0.46			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.33	0.42	0.80
		2010	0.77	0.96	0.80			2010	0.86	1.00	0.86
		2011	1.00	1.00	1.00			2011	0.80	1.00	0.80
89	Standard Bank Jersey UK	2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00	210	Libyan Foreign Bank Libya	2005	1.00	1.00	1.00
		2006	0.79	0.86	0.91			2006	1.00	1.00	1.00
		2007	0.43	0.99	0.43			2007	1.00	1.00	1.00

		2008	1.00	1.00	1.00			2008	0.43	0.43	1.00
		2009	0.50	0.51	0.97			2009	0.33	0.33	1.00
		2010	0.66	1.00	0.66			2010	0.29	0.29	0.99
		2011	1.00	1.00	1.00			2011	0.31	0.32	0.99
		2012	1.00	1.00	1.00			2012	0.63	1.00	0.63
90	National Bank of Kuwait UK	2005	1.00	1.00	1.00	211	Bank of Commerce and Development Libya	2005	0.76	0.79	0.96
		2006	0.85	1.00	0.85			2006	0.63	0.64	0.98
		2007	0.77	1.00	0.77			2007	0.17	0.18	0.99
		2008	0.72	1.00	0.72			2008	0.58	0.58	1.00
		2009	0.83	1.00	0.83			2009	0.97	0.97	1.00
		2010	1.00	1.00	1.00			2010	0.55	0.62	0.89
		2011	1.00	1.00	1.00			2011	0.45	0.54	0.83
		2012	1.00	1.00	1.00			2012	0.17	0.22	0.77
91	National Bank of Egypt UK	2005	1.00	1.00	1.00	212	National Commercial Bank Libya	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	0.66	0.67	0.99
		2007	1.00	1.00	1.00			2007	0.72	0.74	0.98
		2008	1.00	1.00	1.00			2008	0.97	0.98	0.99
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	0.94	0.95	1.00			2010	0.33	0.60	0.55
		2011	1.00	1.00	1.00			2011	0.46	0.51	0.90
		2012	0.84	1.00	0.84			2012	0.57	0.66	0.86
92	Punjab National Bank UK	2005	n.a.	n.a.	n.a.	213	Sahara Bank Libya	2005	0.35	0.36	0.99
		2006	n.a.	n.a.	n.a.			2006	0.35	0.35	1.00
		2007	1.00	1.00	1.00			2007	0.50	0.58	0.87
		2008	0.87	1.00	0.87			2008	0.51	0.59	0.87
		2009	0.87	0.93	0.94			2009	0.37	0.62	0.59
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.81	0.82	0.98
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
93	Butterfield Bank UK	2005	0.98	1.00	0.98	214	Wahda Bank Libya	2005	0.32	0.34	0.95
		2006	1.00	1.00	1.00			2006	0.45	0.46	0.98
		2007	1.00	1.00	1.00			2007	0.42	0.45	0.93
		2008	1.00	1.00	1.00			2008	0.55	0.59	0.93
		2009	0.93	1.00	0.93			2009	0.37	0.53	0.70
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.18	0.33	0.56
		2012	0.70	1.00	0.70			2012	0.19	0.38	0.50
94	Crown Agents Bank UK	2005	n.a.	n.a.	n.a.	215	Banque Centrale Populaire Morocco	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.95	1.00	0.95
		2007	1.00	1.00	1.00			2007	0.92	1.00	0.92
		2008	1.00	1.00	1.00			2008	0.74	0.80	0.92
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00

		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.68	0.73	0.93
		2012	1.00	1.00	1.00			2012	0.56	0.63	0.88
95	Julian Hodge Bank UK	2005	n.a.	n.a.	n.a.	216	Crédit du Maroc Morocco	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	0.93	0.94	1.00
		2008	0.95	1.00	0.95			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	0.94	1.00	0.94			2010	0.88	0.89	0.99
		2011	0.94	1.00	0.94			2011	0.90	0.90	0.99
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
96	Rothschild Bank International UK	2005	n.a.	n.a.	n.a.	217	Citibank-Maghreb Morocco	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	n.a.	n.a.	n.a.
		2008	1.00	1.00	1.00			2008	0.83	1.00	0.83
		2009	1.00	1.00	1.00			2009	0.91	0.93	0.98
		2010	0.70	1.00	0.70			2010	1.00	1.00	1.00
		2011	0.79	1.00	0.79			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	0.92	1.00	0.92
97	Alpha Bank London UK	2005	n.a.	n.a.	n.a.	218	Banque Marocaine du Commerce Extérieur Morocco	2005	n.a.	n.a.	n.a.
		2006	0.79	0.83	0.96			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	0.69	0.81	0.86
		2008	1.00	1.00	1.00			2008	0.90	1.00	0.90
		2009	1.00	1.00	1.00			2009	0.91	1.00	0.91
		2010	1.00	1.00	1.00			2010	0.66	0.76	0.87
		2011	1.00	1.00	1.00			2011	0.72	0.87	0.82
		2012	1.00	1.00	1.00			2012	0.73	1.00	0.73
98	Unity Trust Bank UK	2005	n.a.	n.a.	n.a.	219	Banque Marocaine pour le Commerce et l'Industrie Morocco	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	0.81	0.82	1.00
		2009	1.00	1.00	1.00			2009	0.93	0.94	1.00
		2010	1.00	1.00	1.00			2010	0.92	0.92	1.00
		2011	1.00	1.00	1.00			2011	0.96	0.97	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
99	Ghana International Bank UK	2005	n.a.	n.a.	n.a.	220	Attijariwafa Bank Morocco	2005	0.78	0.79	0.99
		2006	0.74	1.00	0.74			2006	0.74	0.76	0.98
		2007	0.83	1.00	0.83			2007	0.78	0.82	0.95
		2008	1.00	1.00	1.00			2008	0.92	0.95	0.96
		2009	0.93	0.96	0.96			2009	1.00	1.00	1.00
		2010	0.68	0.73	0.92			2010	0.96	1.00	0.96
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00

100	Danske Bank, formerly Northern Bank UK	2012	1.00	1.00	1.00	221	Société Générale Marocaine de Banques Morocco	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.98	1.00	0.98			2008	0.90	0.90	1.00
		2009	0.96	0.98	0.99			2009	0.90	0.94	0.96
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	0.81	1.00	0.81			2011	1.00	1.00	1.00
101	Morgan Stanley Bank International UK	2012	1.00	1.00	1.00	222	Chaabi International Bank Morocco	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	0.42	1.00	0.42
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
102	Europe Arab Bank UK	2012	1.00	1.00	1.00	223	BAWAG Malta Bank Malta	2012	1.00	1.00	1.00
		2005	n.a.	n.a.	n.a.			2005	0.77	0.84	0.91
		2006	1.00	1.00	1.00			2006	0.85	1.00	0.85
		2007	1.00	1.00	1.00			2007	0.82	1.00	0.82
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
103	Kleinwort Benson Bank UK	2012	1.00	1.00	1.00	224	Lombard Bank Malta	2012	1.00	1.00	1.00
		2005	0.75	0.82	0.91			2005	n.a.	n.a.	n.a.
		2006	0.86	0.91	0.95			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	n.a.	n.a.	n.a.
		2008	1.00	1.00	1.00			2008	0.74	1.00	0.74
		2009	1.00	1.00	1.00			2009	0.57	0.76	0.75
		2010	1.00	1.00	1.00			2010	0.52	0.63	0.83
		2011	0.64	0.81	0.79			2011	0.45	0.51	0.88
104	United National Bank UK	2012	1.00	1.00	1.00	225	APS Bank Malta	2012	0.38	0.42	0.92
		2005	1.00	1.00	1.00			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.98	0.98	0.99
		2007	0.71	1.00	0.71			2007	0.99	0.99	1.00
		2008	0.71	1.00	0.71			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.89	0.89	0.99
		2010	1.00	1.00	1.00			2010	0.93	0.95	0.98
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
105	Bank of Beirut	2012	0.80	1.00	0.80	226	HSBC Bank	2012	0.86	0.88	0.98
		2005	n.a.	n.a.	n.a.			2005	0.98	0.99	0.99

	UK	2006	0.78	1.00	0.78	Malta	2006	0.93	0.94	1.00	
		2007	1.00	1.00	1.00		2007	1.00	1.00	1.00	
		2008	1.00	1.00	1.00		2008	1.00	1.00	1.00	
		2009	0.69	1.00	0.69		2009	1.00	1.00	1.00	
		2010	0.68	0.73	0.93		2010	0.99	1.00	0.99	
		2011	1.00	1.00	1.00		2011	1.00	1.00	1.00	
		2012	1.00	1.00	1.00		2012	1.00	1.00	1.00	
106	Melli Bank UK	2005	1.00	1.00	1.00	227	Palestine Commercial Bank Palestine	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	n.a.	n.a.	n.a.
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	0.44	1.00	0.44			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.59	0.95	0.62
2012	0.65	0.91	0.72	2012	0.71	1.00	0.71				
107	Habibsons Bank UK	2005	0.93	0.93	0.99	228	Bank of Palestine Palestine	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.87	0.88	0.98
		2007	1.00	1.00	1.00			2007	0.84	0.91	0.92
		2008	1.00	1.00	1.00			2008	0.96	1.00	0.96
		2009	0.97	1.00	0.97			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
2012	1.00	1.00	1.00	2012	1.00	1.00	1.00				
108	BMCE Bank International UK	2005	n.a.	n.a.	n.a.	229	Syria Gulf Bank Syria	2005	n.a.	n.a.	n.a.
		2006	n.a.	n.a.	n.a.			2006	n.a.	n.a.	n.a.
		2007	0.88	1.00	0.88			2007	n.a.	n.a.	n.a.
		2008	0.68	0.91	0.75			2008	1.00	1.00	1.00
		2009	0.77	1.00	0.77			2009	0.24	0.48	0.50
		2010	1.00	1.00	1.00			2010	0.41	0.59	0.70
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
2012	1.00	1.00	1.00	2012	1.00	1.00	1.00				
109	Kookmin Bank International UK	2005	1.00	1.00	1.00	230	Banque Bemo Saudi Fransi Syria	2005	0.69	0.94	0.73
		2006	0.73	1.00	0.73			2006	0.89	0.98	0.91
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.89	0.90	0.99
		2010	0.57	0.77	0.74			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.68	0.75	0.90
2012	0.93	1.00	0.93	2012	0.61	0.64	0.95				
110	Bank Saderat UK	2005	1.00	1.00	1.00	231	Bank of Syria and Overseas Syria	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	n.a.	n.a.	n.a.

		2008	0.90	0.93	0.97			2008	0.71	0.71	1.00
		2009	1.00	1.00	1.00			2009	0.82	0.83	0.99
		2010	0.59	1.00	0.59			2010	1.00	1.00	1.00
		2011	0.27	1.00	0.27			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	0.65	0.75	0.86
111	United Trust Bank UK	2005	1.00	1.00	1.00	232	Byblos Bank Syria Syria	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	0.34	0.78	0.44
		2007	1.00	1.00	1.00			2007	0.62	0.86	0.72
		2008	1.00	1.00	1.00			2008	0.74	0.79	0.94
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	0.97	0.97	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
112	Reliance Bank UK	2012	1.00	1.00	1.00	233	Bank Audi Syria	2012	0.62	0.71	0.88
		2005	0.87	0.98	0.89			2005	0.22	1.00	0.22
		2006	0.77	0.83	0.93			2006	0.44	0.61	0.72
		2007	0.97	1.00	0.97			2007	0.73	0.82	0.89
		2008	1.00	1.00	1.00			2008	0.89	0.89	1.00
		2009	0.99	1.00	0.99			2009	0.84	0.85	0.99
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
113	Persia International Bank UK	2011	1.00	1.00	1.00	234	Attijari Bank Tunisia	2011	0.95	0.97	0.97
		2012	0.53	1.00	0.53			2012	0.69	0.76	0.91
		2005	n.a.	n.a.	n.a.			2005	0.88	0.88	1.00
		2006	1.00	1.00	1.00			2006	0.85	0.86	1.00
		2007	1.00	1.00	1.00			2007	0.81	0.88	0.92
		2008	1.00	1.00	1.00			2008	0.65	0.83	0.78
		2009	0.79	0.84	0.94			2009	0.42	0.55	0.76
114	Anglo-Romanian Bank UK	2010	0.50	0.66	0.75	235	Arab Tunisian Bank Tunisia	2010	0.46	0.70	0.66
		2011	0.37	0.84	0.44			2011	0.36	0.55	0.66
		2012	0.29	1.00	0.29			2012	0.42	0.66	0.64
		2005	1.00	1.00	1.00			2005	0.87	0.97	0.89
		2006	0.94	1.00	0.94			2006	0.84	0.98	0.86
		2007	1.00	1.00	1.00			2007	0.81	1.00	0.81
		2008	1.00	1.00	1.00			2008	0.74	0.77	0.96
115	Airdrie Savings Bank UK	2009	1.00	1.00	1.00	236	Banque Internationale Arabe de Tunisie Tunisia	2009	0.93	1.00	0.93
		2010	1.00	1.00	1.00			2010	0.93	1.00	0.93
		2011	n.a.	n.a.	n.a.			2011	1.00	1.00	1.00
		2012	n.a.	n.a.	n.a.			2012	1.00	1.00	1.00
		2005	n.a.	n.a.	n.a.			2005	0.44	0.53	0.84
		2006	0.95	1.00	0.95			2006	0.44	0.48	0.93
		2007	1.00	1.00	1.00			2007	0.50	0.68	0.74
		2008	1.00	1.00	1.00			2008	0.40	0.55	0.72
		2009	1.00	1.00	1.00			2009	0.45	1.00	0.45

		2010	1.00	1.00	1.00			2010	0.39	0.65	0.60
		2011	1.00	1.00	1.00			2011	0.43	1.00	0.43
		2012	1.00	1.00	1.00			2012	0.55	1.00	0.55
116	Turkish Bank UK	2005	n.a.	n.a.	n.a.	237	Amen Bank Tunisia	2005	0.52	0.52	1.00
		2006	1.00	1.00	1.00			2006	0.53	0.58	0.92
		2007	0.84	1.00	0.84			2007	0.55	0.68	0.81
		2008	1.00	1.00	1.00			2008	0.69	0.82	0.84
		2009	1.00	1.00	1.00			2009	0.62	0.88	0.71
		2010	1.00	1.00	1.00			2010	0.81	1.00	0.81
		2011	1.00	1.00	1.00			2011	0.75	1.00	0.75
		2012	1.00	1.00	1.00			2012	0.87	1.00	0.87
117	Bank Mandiri UK	2005	n.a.	n.a.	n.a.	238	Union Internationale de Banques Tunisia	2005	0.66	0.67	0.99
		2006	1.00	1.00	1.00			2006	0.81	0.84	0.97
		2007	0.95	0.98	0.97			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	0.97	1.00	0.97			2009	0.73	0.75	0.97
		2010	1.00	1.00	1.00			2010	0.90	0.93	0.96
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	0.58	1.00	0.58			2012	1.00	1.00	1.00
118	Harrods Bank UK	2005	n.a.	n.a.	n.a.	239	Banque de Tunisie Tunisia	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	0.91	0.93	0.98			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	0.87	0.89	0.98			2011	1.00	1.00	1.00
		2012	0.81	0.82	0.98			2012	0.65	0.83	0.78
119	Consolidated Credits Bank UK	2005	n.a.	n.a.	n.a.	240	ABC Bank Tunisia	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.59	1.00	0.59
		2007	1.00	1.00	1.00			2007	0.67	0.91	0.74
		2008	1.00	1.00	1.00			2008	0.37	0.99	0.38
		2009	0.85	1.00	0.85			2009	0.14	0.56	0.24
		2010	0.74	0.99	0.75			2010	0.45	1.00	0.45
		2011	1.00	1.00	1.00			2011	0.22	0.61	0.37
		2012	1.00	1.00	1.00			2012	0.60	1.00	0.60
120	Diamond Bank UK	2005	n.a.	n.a.	n.a.	241	Banque de l'Habitat Tunisia	2005	1.00	1.00	1.00
		2006	n.a.	n.a.	n.a.			2006	0.96	1.00	0.96
		2007	n.a.	n.a.	n.a.			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	0.95	0.95	1.00			2009	0.71	1.00	0.71
		2010	0.69	0.69	1.00			2010	0.66	1.00	0.66
		2011	1.00	1.00	1.00			2011	0.59	1.00	0.59

121	Bank of St. Helena UK	2012	1.00	1.00	1.00	242	National Bank of Yemen Yemen	2012	0.52	1.00	0.52
		2005	n.a.	n.a.	n.a.			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.88	0.88	0.99
		2010	1.00	1.00	1.00			2010	0.88	0.89	0.99
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00

Appendix 7: Efficiency measures of socially responsible banks

N	Socially responsible Banks	Year	TE	PTE	SE	N	Socially responsible Banks	Year	TE	PTE	SE
1	Andelskassen OIKOS Denmark	2005	n.a.	n.a.	n.a.	20	Caja Rural de Navarra Sociedad Cooperativa de Crédito Spain	2005	1.00	1.00	1.00
		2006	n.a.	n.a.	n.a.			2006	1.00	1.00	1.00
		2007	n.a.	n.a.	n.a.			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	0.96	1.00	0.96			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
2	Merkur Bank Denmark	2005	1.00	1.00	1.00	21	RSF Social Finance USA	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	n.a.	n.a.	n.a.
		2008	0.71	1.00	0.71			2008	1.00	1.00	1.00
		2009	0.77	1.00	0.77			2009	1.00	1.00	1.00
		2010	0.86	1.00	0.86			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	0.91	1.00	0.91
3	Dragsholm Sparekasse Denmark	2005	1.00	1.00	1.00	22	Citizens Bank of Canada Canda	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	n.a.	n.a.	n.a.
		2012	1.00	1.00	1.00			2012	n.a.	n.a.	n.a.
4	Arbejdernes Landsbank Denmark	2005	1.00	1.00	1.00	23	The Co-operative Bank Limited New Zealand	2005	n.a.	n.a.	n.a.
		2006	1.00	1.00	1.00			2006	n.a.	n.a.	n.a.
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	0.90	0.90	1.00
		2011	1.00	1.00	1.00			2011	0.95	0.96	0.99
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
5	Folkesparekassen Denmark	2005	1.00	1.00	1.00	24	Bendigo and Adelaide Bank Limited Australia	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00

		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
6	GLS Gemeinschaftsbank Germany	2005	1.00	1.00	1.00	25	BRAC Bank Bangladesh	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.81	0.84	0.97
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.73	1.00	0.73
7	UmweltBank Germany	2012	1.00	1.00	1.00	26	XacBank Mongolia	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	0.78	1.00	0.78
		2006	1.00	1.00	1.00			2006	0.47	0.85	0.55
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.75	0.87	0.86
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
8	Vereinigte Volksbank Germany	2011	1.00	1.00	1.00	27	Sunrise Bank Nepal	2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
		2005	n.a.	n.a.	n.a.			2005	n.a.	n.a.	n.a.
		2006	n.a.	n.a.	n.a.			2006	n.a.	n.a.	n.a.
		2007	0.72	0.82	0.87			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	0.93	0.97	0.95
		2009	0.91	0.95	0.96			2009	1.00	1.00	1.00
9	Charity Bank Limited UK	2010	1.00	1.00	1.00	28	Banco FIE Bolivia	2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	0.73	0.75	0.98
		2012	0.89	0.89	1.00			2012	1.00	1.00	1.00
		2005	n.a.	n.a.	n.a.			2005	n.a.	n.a.	n.a.
		2006	n.a.	n.a.	n.a.			2006	n.a.	n.a.	n.a.
		2007	n.a.	n.a.	n.a.			2007	n.a.	n.a.	n.a.
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
10	Co-operative Bank Plc UK	2009	1.00	1.00	1.00	29	Banco Solidario Bolivia	2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	0.59	1.00	0.59
		2006	1.00	1.00	1.00			2006	0.59	1.00	0.59
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	1.00	1.00	1.00

		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	0.85	0.85	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	1.00	1.00	1.00
11	Reliance Bank Limited UK	2005	0.87	0.98	0.89	30	Société Générale Algeria	2005	0.82	1.00	0.82
		2006	0.77	0.83	0.93			2006	0.87	1.00	0.87
		2007	0.97	1.00	0.97			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	0.99	1.00	0.99			2009	0.70	0.70	0.99
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	0.53	1.00	0.53			2012	1.00	1.00	1.00
12	Unity Trust Bank UK	2005	1.00	1.00	1.00	31	Banque de l'Agriculture et du Développement Rural Algeria	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	0.83	1.00	0.83
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	0.77	0.98	0.79
		2009	1.00	1.00	1.00			2009	0.76	1.00	0.76
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	1.00	1.00	1.00			2012	0.85	1.00	0.85
13	Ecology Building Society UK	2005	0.92	0.92	1.00	32	Banque de Développement Local Algeria	2005	0.95	1.00	0.95
		2006	1.00	1.00	1.00			2006	0.81	1.00	0.81
		2007	0.98	1.00	0.98			2007	0.30	0.45	0.67
		2008	0.98	0.99	0.99			2008	0.21	0.28	0.75
		2009	1.00	1.00	1.00			2009	0.24	0.32	0.77
		2010	1.00	1.00	1.00			2010	0.90	1.00	0.90
		2011	1.00	1.00	1.00			2011	0.35	0.45	0.78
		2012	0.99	1.00	0.99			2012	0.52	0.58	0.90
14	ICIC Bank UK	2005	1.00	1.00	1.00	33	Bank Keshavarzi-Agricultural Bank of Iran Iran	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	0.93	0.94	0.99
		2008	1.00	1.00	1.00			2008	0.95	0.95	1.00
		2009	1.00	1.00	1.00			2009	0.96	0.96	1.00
		2010	1.00	1.00	1.00			2010	0.71	0.76	0.93
		2011	1.00	1.00	1.00			2011	0.80	0.87	0.92
		2012	0.76	1.00	0.76			2012	1.00	1.00	1.00
15	Cultura Sparebank Norway	2005	1.00	1.00	1.00	34	Crédit Agricole du Maroc Morocco	2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	0.79	0.83	0.95			2009	1.00	1.00	1.00
		2010	1.00	1.00	1.00			2010	0.96	0.97	0.99
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00

16	Crédit Coopératif France	2012	0.94	1.00	0.94	35	Volksbank Malta	2012	0.89	1.00	0.89
		2005	1.00	1.00	1.00			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	0.99	0.99	1.00			2007	1.00	1.00	1.00
		2008	0.91	0.92	0.99			2008	0.96	1.00	0.96
		2009	0.86	0.98	0.88			2009	0.88	0.90	0.99
		2010	1.00	1.00	1.00			2010	0.80	0.88	0.91
		2011	1.00	1.00	1.00			2011	0.90	0.99	0.91
17	Alternative Bank Schweiz ABC Switzerland	2012	1.00	1.00	1.00	36	Oesterreichische Volksbanken Austria	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	1.00	1.00	1.00
		2006	1.00	1.00	1.00			2006	1.00	1.00	1.00
		2007	1.00	1.00	1.00			2007	1.00	1.00	1.00
		2008	0.94	0.97	0.97			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.98	1.00	0.98
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
18	Algemene Spaarbank voor Netherlands	2012	0.99	1.00	0.99	37	Société Tunisienne de Banque Tunisia	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	0.87	1.00	0.87
		2006	1.00	1.00	1.00			2006	0.87	1.00	0.87
		2007	1.00	1.00	1.00			2007	0.83	0.89	0.93
		2008	1.00	1.00	1.00			2008	0.96	1.00	0.96
		2009	1.00	1.00	1.00			2009	0.99	1.00	0.99
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	0.09	1.00	0.09			2011	1.00	1.00	1.00
19	Triodos Bank Netherlands	2012	1.00	1.00	1.00	38	Banque Nationale Agricole Tunisia	2012	1.00	1.00	1.00
		2005	1.00	1.00	1.00			2005	0.72	1.00	0.72
		2006	1.00	1.00	1.00			2006	0.73	1.00	0.73
		2007	1.00	1.00	1.00			2007	0.87	0.98	0.89
		2008	1.00	1.00	1.00			2008	1.00	1.00	1.00
		2009	1.00	1.00	1.00			2009	0.89	1.00	0.89
		2010	1.00	1.00	1.00			2010	1.00	1.00	1.00
		2011	1.00	1.00	1.00			2011	1.00	1.00	1.00
		2012	0.97	1.00	0.97			2012	1.00	1.00	1.00

Appendix 8: Averages TE, PTE and SE for IB, CB, SRB and all banks

Average Efficiencies												
Type	Islamic Banks			Conventional Banks			Socially responsible Banks			Mean All Banks		
DEA	TE	PTE	SE	TE	PTE	SE	TE	PTE	SE	TE	PTE	SE
2005	0.890	0.968	0.912	0.835	0.883	0.936	0.952	0.997	0.955	0.892	0.949	0.934
2006	0.873	0.926	0.936	0.815	0.872	0.923	0.934	0.990	0.941	0.874	0.929	0.933
2007	0.895	0.931	0.954	0.819	0.876	0.926	0.958	0.973	0.980	0.891	0.927	0.953
2008	0.854	0.930	0.920	0.828	0.882	0.935	0.956	0.975	0.976	0.879	0.929	0.944
2009	0.863	0.912	0.943	0.810	0.868	0.924	0.927	0.956	0.966	0.867	0.912	0.944
2010	0.909	0.945	0.960	0.825	0.885	0.927	0.977	0.987	0.989	0.904	0.939	0.959
2011	0.874	0.933	0.936	0.826	0.886	0.925	0.930	0.969	0.956	0.877	0.929	0.939
2012	0.911	0.952	0.952	0.833	0.897	0.924	0.952	0.986	0.965	0.899	0.945	0.947
Mean	0.883	0.936	0.940	0.823	0.881	0.927	0.948	0.978	0.966	0.884	0.932	0.944

Appendix 9: Target of reduction (amount) of inputs to be fully efficient

Target of Reduction (amount) of inputs to be fully efficient												
Type	Islamic Banks			Conventional Banks			Socially responsible Banks			Mean All Banks		
DEA	TE	PTE	SE	TE	PTE	SE	TE	PTE	SE	TE	PTE	SE
2005	0.110	0.032	0.088	0.165	0.117	0.064	0.048	0.003	0.045	0.108	0.051	0.066
2006	0.127	0.074	0.064	0.185	0.128	0.077	0.066	0.010	0.059	0.126	0.071	0.067
2007	0.105	0.069	0.046	0.181	0.124	0.074	0.042	0.027	0.020	0.109	0.073	0.047
2008	0.146	0.070	0.080	0.172	0.118	0.065	0.044	0.025	0.024	0.121	0.071	0.056
2009	0.137	0.088	0.057	0.190	0.132	0.076	0.073	0.044	0.034	0.133	0.088	0.056
2010	0.091	0.055	0.040	0.175	0.115	0.073	0.023	0.013	0.011	0.096	0.061	0.041
2011	0.126	0.067	0.064	0.174	0.114	0.075	0.070	0.031	0.044	0.123	0.071	0.061
2012	0.089	0.048	0.048	0.167	0.103	0.076	0.048	0.014	0.035	0.101	0.055	0.053
Mean	0.117	0.064	0.060	0.177	0.119	0.073	0.052	0.022	0.034	0.116	0.068	0.056

Appendix 10: Correlation between the independent variables for Islamic banks

N	Independent Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Size	1																	
2	Capital ratio	-0.481	1																
3	Loan intensity	0.397	-0.001	1															
4	Credit risk	-0.067	0.145	-0.070	1														
5	Financial leverage	0.415	-0.486	0.200	-0.076	1													
6	Deposit ratio	0.153	-0.035	0.527	-0.159	0.374	1												
7	ROA	0.103	-0.259	-0.163	-0.066	0.001	-0.176	1											
8	Operating leverage	-0.153	0.623	0.317	0.047	-0.080	0.327	-0.291	1										
9	Age	0.511	-0.382	0.371	-0.084	0.496	0.210	0.031	-0.048	1									
10	Z-score	0.351	-0.189	0.320	-0.075	0.130	0.127	0.220	-0.009	0.530	1								
11	Foreign banks	-0.419	0.271	-0.333	0.088	-0.148	-0.117	-0.020	0.033	-0.256	-0.311	1							
12	Domestic banks	-0.061	-0.097	0.078	-0.047	-0.214	0.007	0.014	-0.183	-0.204	0.019	-0.592	1						
13	Government banks	0.519	-0.180	0.269	-0.041	0.403	0.117	0.005	0.173	0.507	0.312	-0.400	-0.502	1					
14	Listing	0.477	-0.231	0.241	-0.049	0.111	0.176	0.059	-0.149	0.183	0.121	-0.336	0.233	0.096	1				
15	GDP	0.339	0.000	0.222	-0.067	0.135	0.252	0.052	0.081	0.027	-0.035	-0.127	-0.140	0.296	0.198	1			
16	Inflation	0.041	0.019	-0.079	0.247	0.115	-0.114	-0.166	0.112	0.145	0.024	0.008	-0.145	0.156	-0.169	-0.217	1		
17	Market capitalisation	-0.195	0.289	-0.184	0.042	-0.299	-0.197	0.018	-0.055	-0.295	-0.337	0.244	0.087	-0.361	-0.036	-0.064	-0.098	1	
18	Financial crisis	-0.026	0.090	0.026	-0.031	-0.016	-0.029	-0.043	0.046	-0.025	-0.014	0.018	0.015	-0.036	-0.011	-0.009	0.019	0.020	1
19	Corruption control	-0.040	0.244	-0.028	0.036	-0.401	-0.130	0.027	-0.033	-0.348	-0.400	0.193	0.022	-0.232	0.127	0.294	-0.319	0.553	0.050

Appendix 11: Correlation between the independent variables for conventional banks

N	Independent Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Size	1																	
2	Capital ratio	-0.236	1																
3	Loan intensity	0.163	0.440	1															
4	Credit risk	-0.011	0.139	0.010	1														
5	Financial leverage	0.358	-0.316	-0.161	-0.028	1													
6	Deposit ratio	-0.029	0.408	0.696	-0.054	-0.075	1												
7	ROA	0.021	0.557	0.496	0.013	-0.148	0.505	1											
8	Operating leverage	-0.292	0.249	0.242	-0.002	-0.209	0.234	0.112	1										
9	Age	0.361	-0.178	0.063	-0.033	0.221	0.083	0.005	-0.116	1									
10	Z-score	-0.111	0.070	-0.003	0.048	-0.272	0.025	0.179	0.077	-0.015	1								
11	Foreign banks	-0.198	0.035	-0.092	-0.028	-0.087	-0.078	-0.065	0.066	-0.259	-0.065	1							
12	Domestic banks	0.093	-0.151	-0.032	-0.025	0.146	-0.010	-0.050	-0.067	0.277	0.065	-0.765	1						
13	Government banks	0.153	0.161	0.177	0.076	-0.082	0.129	0.160	0.000	-0.022	-0.019	-0.373	-0.299	1					
14	Listing	0.222	0.049	0.282	-0.017	-0.129	0.062	0.172	0.092	0.050	0.016	-0.079	0.016	0.106	1				
15	GDP	0.183	-0.054	0.000	-0.004	0.186	-0.005	-0.098	-0.277	0.100	-0.167	0.033	0.021	-0.079	-0.331	1			
16	Inflation	-0.136	0.026	-0.004	-0.012	-0.092	-0.023	-0.004	0.027	-0.078	-0.097	-0.025	-0.014	0.063	0.034	-0.141	1		
17	Market capitalisation	-0.049	-0.002	0.049	0.001	0.001	-0.001	-0.021	-0.120	0.067	-0.073	-0.045	0.101	-0.081	-0.084	0.209	0.579	1	
18	Financial crisis	-0.008	-0.032	-0.015	-0.013	0.034	-0.001	-0.051	-0.004	-0.009	-0.021	0.025	-0.010	-0.023	-0.013	0.004	0.041	-0.007	1
19	Corruption control	0.207	0.059	0.110	0.030	0.074	-0.097	-0.062	-0.299	0.050	-0.148	-0.018	0.072	-0.090	-0.093	0.677	-0.134	0.248	0.005

Appendix 12: Correlation between the independent variables for socially responsible banks

N	Independent Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Size	1																	
2	Capital ratio	0.287	1																
3	Loan intensity	-0.217	-0.722	1															
4	Credit risk	0.159	0.261	0.163	1														
5	Financial leverage	0.131	-0.044	-0.119	-0.306	1													
6	Deposit ratio	-0.237	-0.110	0.276	-0.419	0.085	1												
7	ROA	0.076	0.152	-0.188	0.119	-0.325	-0.152	1											
8	Operating leverage	-0.102	0.371	-0.296	0.211	0.009	-0.090	0.109	1										
9	Age	0.333	-0.210	0.129	-0.112	0.209	0.005	-0.166	-0.069	1									
10	Z-score	0.109	0.594	-0.434	0.257	-0.193	-0.040	0.173	0.308	-0.202	1								
11	Foreign banks	0.288	0.460	-0.284	0.085	0.067	-0.089	0.087	-0.076	-0.172	0.246	1							
12	Domestic banks	-0.266	-0.590	0.420	-0.174	0.025	0.136	-0.078	-0.102	0.070	-0.417	-0.729	1						
13	Government banks	0.104	0.451	-0.357	0.202	0.028	-0.195	-0.103	0.198	0.158	0.282	0.126	-0.644	1					
14	Listing	0.166	0.240	-0.077	0.273	-0.081	-0.015	0.175	-0.033	-0.192	0.255	0.027	-0.178	0.082	1				
15	GDP	-0.006	-0.720	0.542	-0.297	0.115	0.125	-0.221	-0.450	0.398	-0.516	-0.263	0.391	-0.369	-0.304	1			
16	Inflation	-0.331	-0.170	0.176	-0.163	-0.188	0.184	-0.024	0.004	0.099	-0.222	-0.017	-0.247	0.236	-0.171	-0.032	1		
17	Market capitalisation	0.008	-0.395	0.288	-0.090	0.128	0.022	-0.078	-0.309	0.139	-0.308	-0.231	0.436	-0.286	-0.222	0.488	-0.352	1	
18	Financial crisis	-0.008	-0.003	0.006	0.007	0.022	-0.033	-0.068	0.058	0.002	-0.007	-0.013	0.019	-0.014	0.002	0.003	-0.007	-0.050	1
19	Corruption control	-0.217	-0.706	0.570	-0.220	0.016	0.160	-0.228	-0.509	0.357	-0.444	-0.209	0.270	-0.115	-0.367	0.666	0.302	0.436	-0.001

Appendix 13: Averages ROA, ROE and NIM for IB, CB, SRB and all banks

Average Profitability Ratios												
Type	IB			CB			SRB			All Banks		
Ratio	ROA	ROE	NIM	ROA	ROE	NIM	ROA	ROE	NIM	ROA	ROE	MIM
2005	0.1107	0.0241	7.3536	0.0163	0.0141	2.7421	0.0048	0.0177	3.6107	0.0439	0.0186	4.5688
2006	0.0215	0.0223	4.3743	0.0157	0.0132	2.7259	0.0069	0.0163	3.7643	0.0147	0.0173	3.6215
2007	0.0016	0.0301	5.5172	0.0136	0.0129	2.8255	0.0060	0.0170	3.4822	0.0071	0.0200	3.9416
2008	0.0108	0.0214	3.3844	0.0069	0.0135	2.8835	0.0015	0.0133	3.7603	0.0064	0.0161	3.3427
2009	-0.008	0.0220	3.5844	0.0046	0.0137	2.8881	0.0048	0.0124	3.3440	0.0002	0.0161	3.2722
2010	-0.028	0.0216	2.7095	0.0085	0.0135	2.7464	0.0060	0.0115	3.3637	-0.004	0.0155	2.9399
2011	-0.002	0.0226	2.4285	0.0082	0.0141	2.7193	0.0052	0.0105	3.3070	0.0037	0.0157	2.8183
2012	0.0070	0.0187	3.4642	0.0119	0.0127	2.7621	0.0047	0.0100	3.3062	0.0079	0.0138	3.1775
Mean	0.009	0.058	3.862	0.010	0.070	2.789	0.005	0.025	3.484	0.008	0.051	2.994

Appendix 14: Averages stability ratios for IB, CB, SRB and all banks

Averages stability ratios								
Type	Islamic Banks		Conventional Banks		SRBs		Mean All Banks	
Ratio	Log (z)	Capital R.	Log (z)	Capital R.	Log (z)	Capital R.	Log (z)	Capital R.
2005	3.068	0.210	2.912	0.145	3.846	0.282	3.275	0.212
2006	2.803	0.240	2.935	0.131	3.843	0.285	3.194	0.218
2007	2.706	0.353	2.991	0.133	3.922	0.302	3.206	0.262
2008	2.621	0.256	2.904	0.127	3.844	0.300	3.123	0.227
2009	2.501	0.248	2.973	0.138	3.900	0.310	3.125	0.232
2010	2.482	0.229	3.022	0.140	3.894	0.313	3.133	0.227
2011	2.509	0.229	3.027	0.141	3.941	0.317	3.159	0.229
2012	2.490	0.219	3.087	0.163	3.979	0.326	3.185	0.236
Mean	2.622	0.249	2.985	0.140	3.898	0.305	3.045	0.231

Appendix 15: Summary of efficiency, profitability and stability measures for Islamic, conventional and socially responsible banks

Banking	Islamic Banks							
Indicator	Efficiency			Profitability			Stability	
Measure	TE	PTE	SE	ROA	ROE	NIM	Z-score	Capital
Mean	0.883	0.936	0.940	0.009	0.058	3.862	2.648	0.249
Highest	2012	2005	2010	2005	2007	2005	2005	2007
	0.911	0.968	0.960	0.111	0.03	7.353	3.068	0.353
Lowest	2008	2009	2005	2010	2012	2011	2010	2005
	0.854	0.912	0.912	-0.029	0.019	2.428	2.483	0.210
Banking	Conventional Banks							
Indicator	Efficiency			Profitability			Stability	
Measure	TE	PTE	SE	ROA	ROE	NIM	Z-score	Capital
Mean	0.823	0.881	0.927	0.01	0.07	2.789	2.982	0.140
Highest	2005	2012	2005	2006	2005/11	2009	2012	2012
	0.835	0.897	0.936	0.016	0.014	2.888	3.088	0.163
Lowest	2009	2009	2006	2009	2012	2011	2008	2008
	0.810	0.868	0.923	0.005	0.013	2.719	2.905	0.127
Banking	Socially Responsible Banks							
Indicator	Efficiency			Profitability			Stability	
Measure	TE	PTE	SE	ROA	ROE	NIM	Z-score	Capital
Mean	0.948	0.978	0.966	0.005	0.025	3.484	3.897	0.305
Highest	2010	2005	2010	2006	2005	2006	2012	2012
	0.977	0.997	0.989	0.007	0.018	3.764	3.979	0.326
Lowest	2009	2009	2006	2008	2012	2012	2006	2005
	0.927	0.956	0.941	0.002	0.01	3.306	3.843	0.282

Notes: 1. TE: Technical Efficiency, PTE: Pure Technical Efficiency, SE: Scale Efficiency, ROA: Return on Assets, ROE: Return on Equity.

2. Red highlight: the minimum measures, Green highlight: the maximum measures.

Appendix 16: The significant variables that impact efficiency, profitability and stability (UK and MENA for IB and CB, across the world for SRBs)

Significance	Efficiency									Profitability									Stability					
Banking Type	IB			CB			SRB			IB			CB			SRB			IB		CB		SRB	
Indicators	TE	PTE	SE	TE	PTE	SE	TE	PTE	SE	ROA	ROE	NIM	ROA	ROE	NIM	ROA	ROE	NIM	Z	Cap	Z	Cap	Z	Cap
Bank-specific variables																								
LTA	+	-	+	+	+	+				+	+	+	+	+	-			-	+/-	-	-	-	-	+
EQTA		-		+	+	-	+	+		-	-	+	+				-	+	+		-/+		+	
LOANSTA	+	+		+	+	+				-			+		+				+/-	+	-	+		-/+
LOANSDEPO								+				-	-					+		+	+	+	+	+/-
TAEQ	+	+	+	+	+	+	+	+	+															
DEPOSITSTA										-	+		+		-									
ROA	+		+	+	+	+													+	-	+	+	+	-
FATA																			-		+	+		
LAGE	-		-	-	-														+	-		-		
LOGZ										+	+	+	+	+	+	+	+	+		+		+/-		+
FORE				-	-												-	-			-		-	+
DOM				-	-											-	-	-	+	-	-		-	
GOV				-	-				+							-		-	+		-		-	
Macroeconomic variables																								
LGDP				+	+	+	+	+	+	+/-	-	-	-		-	-		-	-	+	-/+	+	-/+	+
INFLATION				-	-		+	+		-	-				-						-		-	
MCAP	+	+	+	+	+		+	+				-	-	+	-	+	+	+	-	+	+	-		
GFC					-			-							+						-			

Notes: 1. IB: Islamic Banks, CB: Conventional Banks, SRB: Socially Responsible Banks.

2. TE: Technical Efficiency, PTE: Pure Technical Efficiency, SE: Scale Efficiency, ROA: Return on Assets, ROE: Return on Equity, NIM: Net Interest Margin, Z: Z-score, Cap: Capital ratio.

3. LTA: bank size, EQTA: capital ratio, LOANSTA: loans intensity, LOANSDEPO: credit risk, TAEQ: financial leverage, DEPOSITSTA: deposit ratio, ROA: returns on assets, FATA: operating leverage, LAGE: bank age, LOGZ: z-score, FORE: dummies for foreign banks, DOM: domestic banks, GOV: government banks, LGDP: gross domestic production, INFLATION: inflation rate, MCAP: market capitalisation to GDP, GFC: Global financial crisis.

4. (+): Positive and significant variable, (-): Negative and significant variable, (+/-): Positive (OLS) and negative (significant) variable (FEM), (-/+): Negative (OLS) and positive (FEM).

5. : Islamic banking : Conventional banking : Socially responsible banking.