

# **SAMA Working Paper:**

## **A Comparative Study between Islamic and Conventional Banks-The case of Saudi Arabia: A Binary Logistic Regression Approach**

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# **A Comparative Study between Islamic and Conventional Banks-The case of Saudi Arabia: A Binary Logistic Regression Approach**

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## **ABSTRACT**

The aim of this study is to examine, at bank level performance, the differences between Islamic and conventional banks in Saudi Arabia. Six factors are examined in this study; five of which are internal factors and one of which is an external factor. The data are from Saudi Arabia and consist of panel data for the period 1988 to 2016 from 12 local banks: four Islamic banks (Al Rajhi Bank, Alinma Bank, Bank Aljazira<sup>2</sup>, and Bank Albilad) and eight conventional banks. The study shows a noticeable difference between conventional and Islamic banks in Saudi Arabia in terms of profitability, credit risk, capitalization, efficiency, liquidity, and contribution to economic growth.

**Keywords:** Bank Level Performance, Gross Domestic Product, Saudi Arabia, Binary Logistic Regression, Conventional Banks, Islamic Banks

**JEL classification codes:** C58, G1, G21, Z21

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<sup>2</sup> Bank Aljazira has been treated in this study as a conventional bank until 2006.

## **1. Introduction**

The 2008 global financial crisis, which was triggered in late 2007 in the United States (US), had an adverse impact on the financial and operational output of worldwide banks. A number of banks have since reported significant losses in their financial statements. More than 120 banks across the US, including American giant Lehman Brothers<sup>3</sup>, were forced to file for bankruptcy. The Islamic corporate governance mechanisms are fortunate and have certain advantages over conventional banks; as a result, they have reported less financial damage in the aftermath of the crisis. A number of subject experts and economists have corroborated these findings at a global level. Conceptual research studies put the Islamic financial system forward as an alternative solution for the current crisis. According to the findings of these studies, the public interest is greater in Islamic banks because the financial crisis is less likely to affect them. Both Muslim and non-Muslim countries have plethora of branches of Islamic banks. Saudi Arabia, Kuwait, Malaysia, and the United Arab Emirates (UAE) have the most Islamic banks. Consequently, Saudi Arabia is promoting Islamic finance mainly in the GCC region and worldwide. Moreover, Saudi Arabia has played a key role in the development of Islamic finance and banking. Between 1990 and 2010, a remarkable cumulative increase of over 90 percent was generated by the mutual assets of developed Islamic banks across Saudi Arabia. Despite this boom, a handful of studies have examined its significance. Analyzing the added value of Islamic banking system

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<sup>3</sup> it was the fourth-largest U.S. investment bank at the time of its collapse (2008)

in comparison to conventional banking would be an interesting matter, given its significance in Saudi Arabia.

This study aims to investigate the productivity of the Islamic banking industry. It also aims to improve and uplift the existing literature on economic and financial output, specifically on Saudi Islamic banking. This study expands on the work of Abu Hanifa Md. Noman, Sajeda Pervin, Nazneen Jahan Chowdhury, Md. Amzad Hossain, and Hasanul Banna (2015) who looked at productivity in the Islamic banking industry.

There are six major sections in this study. The literature review and theoretical model are discussed in sections two and three. The research methodology and data analysis are explained in section four. The results and discussion of the study are covered in section five. Section six lays out the conclusion and policy implication.

## **2. Literature Review**

Focusing on banks performance in Saudi Arabia, this study aims to explore the differences between conventional banks and Islamic banks. To date, comparative analysis of the two types of banks with respect to bank level performance, specifically efficiency and profitability, has been investigated by a handful of studies using different samples and methodologies. Metwally (1997) examined 15 conventional banks and 15 Islamic banks in 1992-1994. Using Logit model, probit model, and discriminant analysis, he found resemblances in efficiency and profitability, but differences in credit risk, liquidity, and leverage, between the two types of banks. Although he employed interesting modeling techniques in examining the comparisons between the two types of banks, the time horizon used in his study is undoubtedly too short to

explain the actual comparisons. Iqbal (2001) used mean testing to study 12 Islamic and 12 conventional banks. According to his findings, Islamic banks had better profits and capitals than their conventional counterparts from 1990 to 1998. Olson and Zoubi (2008) applied mean test, neural network, and Logit model to 28 conventional banks and 16 Islamic banks of GCC countries during 2000 to 2005. Their findings revealed that the Islamic banks were less efficient but highly profitable. It was further claimed that the two types of banks can be best differentiated by the accounting ratios. Srairi (2010) employed probabilistic stochastic frontier analysis besides the equality of mean test. He also revealed that conventional banks were more efficient than Islamic ones in conclusion to a study of 48 traditional and 23 Islamic banks from 1999 to 2007 in the GCC region. Although he employed an extensive list of banking ratios throughout his study, he failed to consider extremal factors, such as the economic growth.

In another study, Belanes and Hassiki (2012) examined 19 conventional and 13 Islamic banks in the Middle East and North Africa (MENA) region during 2006 to 2009. They found that efficiency was insignificant and concluded that there was no differences between Islamic and conventional banks. Beck et al. (2013) explored the business model, effectiveness, and stability of more than 500 conventional and Islamic banks in more than 20 countries from 1995 to 2009. They found considerable differences between Islamic and conventional banks in terms of business models. The former had better profitability, capitalization, and assets quality. However, Islamic banks were not as efficient as the conventional banks. Abedifar et al. (2013) employed mean test and OLS random effect model while investigating more than 500 conventional and Islamic banks in more than 20 countries during 1999 to 2009.

Their findings demonstrated better capitalization, high profitability, and low credit risk in Islamic banks. In a recent study, Khediri, Charfeddine and Youssef (2015) employed tree of classification, including Logit model and discriminant analysis, model in exploring conventional banks and Islamic banks in GCC countries between 2003 and 2010. They found Islamic banks were highly profitable, better capitalized, liquid, and had comparatively low credit risks.

### **3. Theoretical Model**

Banking profitability is one of the main elements to be addressed in this study. Hassoune (2002) asserted that conventional banks are less profitable than Islamic banks. He also stated that funds are accumulated by Islamic banks through non-remunerative current accounts, which lowers the cost of funding for Islamic banks and make them more profitable. Furthermore, Abedifar et al. (2013) claimed that the Profit Loss Sharing (PLS) arrangement makes Islamic banks secure in crises. In addition, they argued that Islamic banks' profit is found to be less insecure because of the high religiosity of the accountholders: they are more faithful to the Islamic banks, accept little or even no profit, and even refuse to withdraw funds in times of poor performance. In addition, paying high rent for banking services to the Islamic banks is happily managed by the religious clients based on spiritual belief. Consequently, the first hypothesis posited is that the profitability of Islamic banks is higher than that of conventional banks.

Moreover, efficiency is taken into consideration in this study. As far as the comparative efficiency of the two types of banks are concerned, the research work by Olson and Zoubi (2008), Srairi (2013), Beck et al. (2013), and Johnes et al. (2014) found that conventional banks are more efficient than Islamic

banks. This lower efficiency of Islamic banks may occur for a number of reasons. Khediri et al. (2015) argued that Islamic banks have to tailor most of the conventional banking products based on Shari'ah law, resulting in additional operational cost of Islamic products. Olson and Zoubi (2008) and Abdul-Majid et al. (2010) indicated that Islamic banks have comparatively smaller dimensions; this limits financial viability and makes Islamic banks less efficient than conventional banks. In addition, Johnes et al. (2014) asserted that conventional banks are more efficient than Islamic banks. They argued that Islamic banking products are more complex to standardize than the conventional products. Hence, the next hypothesis is that conventional banks are more efficient than Islamic banks.

Default risk of banks is to be tackled in this study. If the borrowers fail to realize their contractual responsibilities, it is referred to as the credit risk. The loss is resulted from the borrowers' failure to pay, which gives rise to credit risk. A bank can also be the default if its assets become worth less than its liabilities. According to the findings of Olson and Zoubi (2008), Beck et al. (2013), and Khediri et al. (2015), conventional banks have more credit risk than Islamic banks. Olson and Zoubi (2008) explained that based on the PLS agreement (Mudaraba and Musharaka), the funds are mobilized by the Islamic banks to entrepreneurs; therefore, Islamic banks are able to transfer the risk of credit from assets part out of the liability part of the balance sheet. Consequently, the liability side is decreased, with no reduction in the assets side. According to Abedifar et al. (2013), Islamic banks in the worst financial conditions can eliminate the insolvency risk of non-payment to depositors on account of the PLS agreement. Accordingly, their loss absolving capacity is greater than that of conventional banks. Markup (Murabaha, Islisna, and Ijara)

is another channel of fund mobilization in Islamic banks, where the real economic properties are to assist the financial transactions. Abedifar et al. (2013) and Beck et al. (2013) stated that the likelihood of being involved in speculative behavior (Gharar) is reduced due to this attribute of Islamic banks. Islamic financial law strictly restricts Gharar. Furthermore, gambling (mysir) is also banned in Islamic finance, which needs a balance of information between entrepreneurs and banks. As a result, ethical exposure and adverse selection of Islamic banks are ultimately reduced. The default risk of Islamic banks is mitigated as a result of the religiosity of the entrepreneurs. Therefore, it is hypothesized that the credit risk of conventional banks is higher than that of Islamic bank

Bank liquidity will also be dealt with in this study. Banks could encounter a liquidity crisis because of the excessive withdrawal from savings and current accounts. To keep the liquidity risk low, a high liquidity ratio needs to be maintained by banks. According to earlier studies, such as Bourkhis and Nabi (2013), Beck et al. (2013), and Khediri et al. (2015), high liquidity ratio is better maintained by Islamic banks than by conventional banks. The Shari'ah approved halal projects are only financed by the Islamic banks. Islamic banks cannot make investments in the conventional interbank fund market or interest-driven government securities, which causes difficulty in their liquidity management. Consequently, Islamic banks need to be highly capitalized to bolster up liquidity. According to Iqbal (2001), Abedifar et al. (2013), and Khediri et al. (2015), the capitalization of Islamic banks is better than that of conventional banks. As far as high capitalization is concerned, Hasan and Dridi (2011) believed that a high capital buffer needs to be kept by the Islamic banks, so that the challenge of liquidity management could be encountered considering

the PLS investment with unsure return or limited scope of risk sharing. Thus, a hypothesis can be developed regarding capitalization and liquidity: the liquidity of conventional banks is lower than that of Islamic banks and the capitalization of Islamic banks is higher than that of conventional banks.

Over the last decade, a handful of fully-fledged Islamic banks have been introduced in Saudi Arabia. Although theory does not suggest a specific effect of what type of banks contributes more to economic growth, Islamic banks are believed to contribute more to Saudi economic growth than conventional banks do. Islamic banks have helped drive the profit rates (interest rate) down and Non-Performing Loans (NPLs) are likely to decline (holding other factors constant). This has meant increased financial stability. The relative rivalry among the Islamic banks and the high religiosity of the society made people more faithful to Islamic banks. Additionally, this study avoids many weaknesses common in the research literature, including heavy reliance on short time period data, which may draw imprecise conclusion.

#### **4. Empirical Model, Data and Index**

This study employed Binary Logistic Regression (BLR) to distinguish between Islamic banking and conventional banking. It splits the data into two sets on the basis of likelihoods yielding from the method of maximum-likelihood. Maximum-likelihood method approximates the parameters value to maximize the likelihood of acquiring the real observations. For such a case, if the model returns  $P$  is higher than 0.5, the case is allocated to set 1. If not, the case is allocated to set 2. The BLR model is shown in equation (1):

$$\ln\left(\frac{p}{1-p}\right) = \Omega + \lambda_1 \textit{Profitability} + \lambda_2 \textit{Efficiency} + \lambda_3 \textit{Liquidity} + \lambda_4 \textit{Capitalization} + \lambda_5 \textit{Riskness} + \lambda_6 \textit{Economic Growth} + \lambda_7 \textit{Size} + \varepsilon_t \quad (1)$$

Where, P demonstrates the likelihood of an event happening, and 1-P demonstrates the likelihood of the non-happening of the event. Moreover,  $\ln\left(\frac{p}{1-p}\right)$  is the odds ratio, which is the ratio representing the likelihood of happening to non-happening of the event. Two potential sets are 1 and 2; if odds ratio is less than 1, that is P is less than 1-P, otherwise 1.  $\Omega$  and  $\lambda$  are the parameters of the Logit functions to be estimated. The likelihood of an event happening (P) is calculated in BLR in equation (2) as follows:

$$P = \frac{e^{\Omega + \lambda_1 \textit{Profitability} + \lambda_2 \textit{Efficiency} + \lambda_3 \textit{Liquidity} + \lambda_4 \textit{Capitalization} + \lambda_5 \textit{Riskness} + \lambda_6 \textit{Economic Growth} + \lambda_7 \textit{Size}}}{1 + e^{\Omega + \lambda_1 \textit{Profitability} + \lambda_2 \textit{Efficiency} + \lambda_3 \textit{Liquidity} + \lambda_4 \textit{Capitalization} + \lambda_5 \textit{Riskness} + \lambda_6 \textit{Economic Growth} + \lambda_7 \textit{Size}}} \quad (2)$$

Cox and Snell's pseudo  $R^2$  has been used in BLR model to measure the goodness of fit of the model where model fit is measured by determining the percentage of correct prediction. This study employs the BLR model on its dichotomous dependent variable. Islamic banks have been coded as one while conventional banks have been coded as zero. The study also compares both banking systems in terms of six factors of banking performance: profitability, efficiency, contribution to economic growth, credit risk, capitalization, and liquidity. The author considers PR, E, C, L, R, GDP, and S as the proxy of profitability, efficiency, capitalization, liquidity, credit risk, economic growth, and size of the bank respectively. Profitability is measured using average return

on assets, average return on equity, and profit margin; these are the indicators of profitability (PR). These ratios display how efficient a bank is in utilizing its assets; equity and margins are also useful to aid comparison among peers in the same industry. The higher these ratios are, the greater the indication of a more profitable bank is. A Principal Components Analysis (PCA) has been utilized to construct a single composite profitability index to avoid the problem of multicollinearity and achieve more precise results.

Risk has been measured as a ratio of average total liabilities to average stockholders' equity (R). The higher this ratio is, the riskier the bank is. Capitalization has been measured as a ratio of equity to total assets (C). The higher this ratio is, the greater the indication that the bank is able to absorb more loss during economic crises. Liquidity ratio has been measured by a net loan to total assets as a proxy of bank's liquidity (L). A low L ratio may indicate high liquidity of the bank. Efficiency has been measured by cost to income (E) ratio, which indicates the operational efficiency of the bank. A lower E ratio means that the bank is operating at high efficiency. Furthermore, size of the bank (S) has been measured by a natural log of the total assets of the bank; S is believed to be a confounding variable that influences all banking performance indicators.

#### **4.1 Data**

To differentiate between Saudi Arabian Islamic and conventional banks in terms of performance, the author relies on the performance of bank level indicators. Bank level data from the Saudi Arabian Monetary Authority (SAMA) database from 1988 to 2016 were collected for 12 local banks in Saudi

Arabia: four Islamic banks (Al Rajhi Bank, Alinma Bank, Bank Aljazira<sup>4</sup>, and Bank Albilad) and eight conventional banks. Unbalanced panel, statistical software package STATA were employed for processing the results and BLR model to achieve the intended objectives of the study.

## 4.2 Index

Table 1 presents the outcomes of PCA of the three measures of bank profitability (PR). The eigenvalue of PR associated with the PCA1 is 2.25; thus, it is significantly larger than one. PCA1 explains roughly 75 percent of the standardized variance, PCA2 explains another 14 percent, and PCA 3 accounts for only 11 percent of the variation. Noticeably, PCA1 explains the variations of the Saudi local banks better than any of the other linear combinations of explanatory variables. For this reason,, it is the most accurate measure of financial development.

**Table 1: Principal Components Analysis of Profitability Index**

Component	Eigenvalue	Difference	Proportion	Cumulative Value	Cumulative Proportion
PCA 1	2.246590	1.818693	0.7489	2.246590	0.7489
PCA 2	0.427897	0.102385	0.1426	2.674487	0.8915
PCA 3	0.325513	---	0.1085	3.000000	1.0000

<sup>4</sup> Bank Aljazira has been treated in this study as a conventional bank until 2006.

## **5. Results and Discussion**

The outcomes from BLR are summarized in Table 2. The model's hit ratio is well over 90 percent: the model correctly predicted 97 percent for conventional banks and 79 percent for Islamic banks. Chan (2004) claimed that the low standard error of the explanatory variables indicates that model does not suffer from collinearity. The results in this study indicated that all the explanatory variables have low standard error. Thus, the author can conclude that the model is unbiased. Diagnostic tests are summarized in Table 3. The estimates of the BLR model demonstrate that there is a substantial difference between Islamic banks and conventional banks in terms of profitability (PR), risk (R), capitalization (C), efficiency (E), liquidity (L), and contribution to the economic growth (GDP). The regression outcomes indicate that all indicators are statistically significant. The profitability composite index indicates that Islamic banks are four times more likely to be profitable than conventional banks are. This is perhaps due to the non-remunerative current accounts of Islamic banks, which make their higher net interest margin and lower funding cost in a high interest rate market. In addition, Islamic banks' profit is found to be less insecure because of the high religiosity of the accountholders. This finding is analogous to Iqbal (2001), Hassoune (2002), Olson and Zoubi (2008), Abedifar et al. (2013), and Noman, Pervin, Chowdhury, Hossain, and Banna (2015). The capitalization indicator specifies that Islamic banks are 40 percent more likely to be better capitalized than conventional banks. This is because Islamic banks are able to absorb more losses during crisis than conventional banks. The risk indicator identifies that conventional banks are 50 percent more likely to be riskier than Islamic banks. This is due to the principle of the PLS of Islamic

banks on the deposit side. This finding is analogous to Abedifar et al. (2013). The efficiency indicator suggests that conventional banks are 20 percent more likely to be efficient than Islamic banks. This is because of the complexity of standardizing the Islamic products; Islamic banks tailor most of the products of Islamic banking based on Shari'ah law, resulting in additional operational costs of Islamic products. This finding is analogous to Johnes et al. (2014). Moreover, the liquidity indicator shows that Islamic banks are 40 percent less likely to be more liquid than conventional banks. This is due to the fact that most Islamic banks' assets are held up in loans. Thus Islamic banks need to diversify their investment portfolio through setting up Islamic equity funds for Small and Medium-sized Enterprises (SMEs), which can play a significant role in diversifying financing sources. This finding is not analogous to Bourkhis and Nabi (2013), Beck et al. (2013), and Khediri et al. (2015). This may be due to those conventional banks having large Islamic windows that kept them more liquid; nonetheless, the chance of being different is very small between the two types of banks. Finally, the economic growth indicator points out that Islamic banks are two times more likely to contribute to economic growth than conventional banks. This is perhaps because Islamic banks have helped drive the profit rates (interest rate) down that had resulted from the increase the relative rivalry among the Islamic banks in Saudi Arabia from 1988 to 2016.

**Table 2. Binary Logistic regression results**

Variable	Estimates		Wald test
	Odds Ratio	S.E.	
<b>PR</b>	4.0054	1.863251	3.77***
<b>E</b>	1.20218	.0493767	4.48***
<b>L</b>	1.362377	.1010774	4.17***
<b>C</b>	1.342731	.1407959	2.81***
<b>R</b>	.6365005	.1218793	-2.36**
<b>GDP</b>	1.817045	2.652929	2.66*
<b>S</b>	0.613018	1.864876	3.76***
<b>Constant</b>	6.23e-17	9.40e-16	-2.47**

\*\*\* Statistically significant at 1%, \*\* statistically significant at 5%, \* statistically significant at 10%

**Table 3: Diagnostic test**

Classified	True		Total
	D	~D	
+	34	6	40
-	9	214	223
Total	42	220	263

Classified + if predicted  $\Pr(D) \geq .5$   
True D defined as Islamic  $\neq 0$

Sensitivity	$\Pr(+ D)$	79.07%
Sensitivity	$\Pr(- \sim D)$	97.27%
Positive predictive value	$\Pr(D +)$	85.00%
Negative predictive value	$\Pr(\sim D -)$	95.96%
False + rate for true ~D	$\Pr(+ \sim D)$	2.73%
False - rate for true D	$\Pr(- D)$	20.93%
False + rate for classified +	$\Pr(\sim D +)$	15.00%
False - rate for classified -	$\Pr(D -)$	4.04%
Correctly classified		94.30%

## **6. Conclusion and Policy Implication**

In recent years, policy makers, researchers, and investors have highly focused on interest-free banking due to its lower susceptibility to financial crises. A significant number of theoretical studies have paid particular attention to Islamic banking. The comparative studies of conventional and Islamic banks to date have focused on efficiency, profitability, risks, and other allied attributes; their findings are conflicting. The key objective of this study is to find empirically the differences between Saudi Arabian conventional banks and Islamic banks in terms of bank level performance. The binary Logit regression and an unbalanced panel regarding four Islamic banks and eight conventional banks, for the period 1988-2016, were employed in the investigation process. Six hypotheses dealing with risk, profitability, efficiency, liquidity, capitalization, and contribution to the economic growth of Islamic banks and conventional banks were examined. Therefore, important distinctions between conventional banks and Islamic banks in the Saudi Arabia were revealed.

As per the findings of the study, Islamic banks are more profitable, have higher capitalization, have lower risk, and contribute more to economic growth than conventional banks. Nevertheless, the conventional banks are more efficient and have more diversified investment portfolios than Islamic banks. According to the study outcomes, Islamic banks are able to use their high capitalization to increase profitability. However, they are less efficient than conventional banks; this is probably due to the lack of standardized products across the Islamic banks in Saudi Arabia. Besides, Islamic banks tend to have less diversified investment portfolio owing to a lack of Shari'ah-compliant investment products. In fact, they may need to diversify their investment

portfolio. They should also invest heavily in financial technology (Fintech) to reduce their operational costs and become more efficient.

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