Pricing of Islamic Banking and Conventional Banking: An Empirical Study

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Abstract— **This paper examines and assesses the extent to which pricing of Islamic banking and finance (IBF) worldwide is correlated to conventional finance. The data used were obtained from the Islamic Finance Country Index (IFCI) and the Cbonds platform. The IFCI is a methodology developed by Edbiz Consulting to measure the growth of IBF. The IFCI has been gathering data for nine years, sufficient time to yield meaningful results. Cbonds is a financial-data vendor highly specialised in the analysis of bond markets. This study provides both a qualitative analysis in the form of a tile map chart and a statistical test aimed at generalising the correlation between IBF expansion and interest rates to all countries where IBF banks might locate. This correlation is estimated by dividing the analysed countries into tertiles according to their interest rate and comparing the mean IFCI scores. The difference between the lowest tertile and the others is statistically significant. This appears to be the first empirical study to incorporate the whole geographical scope of the IFCI and analyse the interest rates of all countries to which IBF expansion metrics apply. Emerging markets represent an important growth opportunity for Islamic banks. In fact, the presence of Zakat as a mandatory tax to reduce poverty and the idea of a system based on distribution of wealth are important factors for developing economies. This study is consistent with previous findings: the IBF pricing system is correlated to the conventional banking system, and there is a positive correlation between the IFCI and countries with high yields. The main limitation of this study is the difficulty in obtaining the 10-yearyield to maturity (YTM) of countries for which no data was available.**

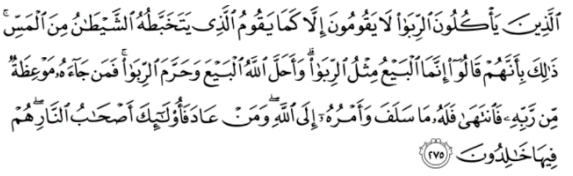
Keywords: ***Islamic banking and finance, interest rates, murabaha, mudarabah.***

I. INTRODUCTION

The concept of modern Islamic banking and finance (IBF) was developed in the 1960s and 1970s to address the unique Islamic economic philosophy. IBF market growth into the Western world has been impressive. The philosophy of IBF is premised upon social justice, risk and profit sharing, and distribution of wealth, as well as a rejection of interest rates, gambling, speculation, and investments that are not Sharia compliant. IBF's original goal was to offer a harmonious financial and ethical model based on partnership finance [11]. However, with the development of the Islamic banking sector, this view has shifted into a more sales-based financial model [11]. Unlike conventional banks, Islamic banks should not charge any interest – rather, they should operate according to a profit–loss sharing (PLS) system. Several studies have compared pricing in Islamic banks against that of conventional banks. Ahmed, Rahman, Ahmed, and Ullah [1] analysed 106 banks in Bangladesh to measure the pricing linkage between conventional and Islamic banking. The findings suggested that the lending interest rates of conventional banks and the investment rates of Islamic banks are highly correlated. A similar study was conducted by Kader and Leong [6], who examined the relationship between the variation of basic lending rates and the demand for IBF products; they found that Islamic banks are significantly affected by changes in basic lending rates. Likewise, Uddin, Ali and Radwan [21] stated that the two pricing systems are similar. In their study they found that Islamic and conventional money markets rates are significantly correlated. Thus, to remain competitive and attractive compared to their conventional counterparts, the pricing mechanism of Islamic banks induces them to structure their financial products like conventional banks. For example, the mark-up of Murabaha is often linked to the London Interbank Offered Rate (LIBOR)[1]; the latter is strictly prohibited in Islamic finance [10]. As the Murabaha instrument moves closer to conventional loans, it is considered less aligned with the Sharia perspective.

[1]LIBOR is the benchmark interest rate for short term unsecured borrowing in the interbank market

The prohibition of interest rates is specifically based on **verse 2:275 of the Quran:**



*"Those who consume interest cannot stand [on the Day of Resurrection] except as one stands who is being beaten by Satan into insanity. That is because they say, 'Trade is [just] like interest.' **But Allah has permitted trade and has forbidden interest**. So, whoever has received an admonition from his Lord and desists may have what is past, and his affair rests with Allah. But whoever returns to [dealing in interest or usury] – those are the companions of the Fire; they will abide eternally therein."*

In relation to this current debate, many questions arise regarding the extent to which the Islamic banking system is unique in its ideology and can be considered free of interest rates. The purpose of this research is to fill the gap in the current literature by incorporating a wider geographical scope when measuring the correlation between interest rates and Islamic finance. The following section discusses the main academic theories developed by Islamic scholars and experts regarding the pricing system of Islamic and conventional banks. The second section presents the research methodology aimed at assessing, on a global geographical scale, whether Islamic banks' growth potential is correlated to interest rates, which in turn hints at a correlation between interest rates and Islamic banks' pricing and profitability. The third section analyses the main findings and compares them with the current literature, showing that the results are aligned. This is followed by the last section of this research, where we provide a summary of our findings and the main limitation of this study.

II. LITERATURE REVIEW

a) The Development of Islamic Finance: From a Partnership Model to a Sales-based Model

With the Islamic banking sector's worldwide rise to prominence, numerous studies have attempted to analyse the pricing relationship between IBF and conventional banks. However, Islamic scholars have voiced significant concern regarding the use of certain financial products and the lack of *shariah* experts [20]. According to Warde [11], the original idea of Islamic banking was to offer a model based on partnership finance and not on interest rates. An example of partnership finance is Mudarabah, which is a contract between two parties, the Rabb-el-maal (financer) and the Mudarib (entrepreneur), who share profits and losses based on a ratio agreed upon by both parties [11]. With the establishment of the first Islamic bank, the guiding principles of IBF shifted from a profit–loss sharing model to a mark-up transaction model. An example of a mark-up contract is Murabaha, where a buyer agrees to purchase an asset, which is acquired by the bank and then sold back with an agreed-upon mark-up [11]. Today, many Islamic banks are adopting Murabaha as a financing technique. However, since the IBF world has shifted to a more sales-based model, many scholars have begun to criticise Murabaha. Warde [11] and Alkhamees [2] argued that Murabaha does not bring significant social and economic benefits to society, as it tends to replicate conventional, interest-based finance instruments [11]. Therefore, even though several Islamic banks claim to follow an interest-free banking system, several studies have proven that interest rates are strongly correlated to Islamic loans and deposits. For example, Redzuan and Kassim [19] argued that the existing Islamic pricing model for home financing relies on interest rates.

b) Islamic Banking Products: Murabaha andMudarabah

Azmat, Azad, Bhatti, and Ghaffar [16] argued that the strong competition between Islamic and conventional banks creates highly correlated pricing systems. A financial instrument that raises a seriousconcern amongst scholars is Murabaha, which accounts for 70–80% of Islamic banks' total financing. Murabaha shares a risk profile similar to that of loans of conventional banks. This agreement involves the purchasing of an asset by the bank which is then sold with an agreed mark-up to the customer. This asset goes under the ownership of the bank before being transferred to the client. Thus, Islamic banks carry an additional risk related to the temporary ownership of the asset. In fact, if the asset is destroyed, the Islamic bank will bear the entire loss. Azmat, Azad, Bhatti, and Ghaffar [16] developed a theoretical model for Islamic banks to find an optimal lending and deposit rate using Murabaha on the asset side and Mudarabah on the liability side. Murabaha is the Islamic deposit, which is based on a profit-sharing ratio. The customer places the fund in an Islamic bank seeking capital growth without interest rates. The bank is the "Mudarib"or "Entrepreneur", and its main objective is to invest the clients' money through a full or restricted discretionary mandate. Both parties agree on a profit–loss sharing ratio, which is disclosed before entering a Mudarabah agreement. Profits generated by the bank are shared with the Rabb-el-maal (financer). The Rabb-el-maal is exposed to the underlying bank risk due to the fact that deposit insurances are not allowed in the Islamic banking system.

c) Pricing of Murabaha and Mudarabah

The model developed by Azmat, Azad, Bhatti, and Ghaffar [16] showed that there is a convergence with conventional loans and deposits. The following proposition demonstrates the optimal deposit and lending rates for conventional banks.

$$RDc = \frac{\cup}{PD} + \frac{(1-P)}{P}$$

$$RLc = \frac{(1-P)}{P} - \frac{L(RLc)}{L(RLc)}$$

The model assumes that RLc is the rate that banks charge to customers for conventional loans, and RDc is the rate that banks pay to conventional depositors. P is the probability of success of the project funded by the bank, for which the bank will get back the loan issued plus the RLc. On the other hand, 1−P is the probability of failure of the project, and in the case of a default event, the bank will lose the principals and RLc. Likewise, if the bank's project succeeds, the customer will receive D (face value of the deposit) plus the return RDc. The reservation utility[2] of conventional depositors is expressed with ∪.Islamic banks face an additional risk compared to conventional banks. In the case of Murabaha, the purchased asset goes under the ownership of the bank for a specific time (T) before being transferred to the customer. Therefore, if the asset is destroyed while under the ownership of the bank, the customer is not liable. Azmat, Azad, Bhatti, and Ghaffar [16] evaluated T as a continuous random variable with a density function given by *f (t).*

$$Pd = \int_0^T f(t)dt$$

On the liability side, the Islamic bank is assumed to have Mudarabah. The bank pays a βR_{Li}, where β is the Mudarabah profit-sharing ratio. This ratio must be proportioned to the depositors' investment ratio and it cannot be negotiated. The depositors will receive the face value of their deposit D plus the βR_{Li} only if the asset is protected under the bank's ownership and if the funded project succeeds. Similarly to a conventional bank, the reservation utility is given by ∪.
Therefore, the optimal lending and deposit rate of Islamic banks is given by the following equation:

$$\beta = \frac{\cup + PdD}{(1-Pd)PRLiD} + \frac{(1-P)}{PRLi}$$

$$RLi = \frac{Pd}{(1-pd)P} + \frac{(1-P)}{P} - \frac{L(RLi)}{L'(RLi)} = \frac{\int_0^T f(t)dt}{(1-\int_0^T f(t)dt)P} + \frac{(1-P)}{P} + \frac{L(RLi)}{L'(RLi)}$$

To remain attractive to customers in a competitive environment, Islamic banks will have to price their loanscomparable toconventional banks. Azad, Azmat, Chazi, and Ahsan [17], similarly to that stated by Azmat, Azad, Bhatti, and Ghaffar [16], pointed out that as Islamic banks are competing and operating in a global context, their rates cannot diverge from conventional benchmarks. Their study aimed to explore the relationship between the Islamic Interbank Benchmark Rate (IIBR) and the London Interbank Offered Rate (LIBOR),revealing a strong correlation between the two pricing systems. Kafder and Leong [6]conducted a study to measure the impact of interest rate change on IBF. Using monthly data from 1999 to 2007, they revealed that increases in the base lending rate encourage people to seek financing from Islamic institutions. The study also concluded that Islamic banks are influenced by interest rate fluctuations. A similar study was conducted by Khalidin and Masbar [8],who explored the influence of interest rate fluctuations within the Malaysian IBF system, analysing the following variables:

- *Islamic Banks' Total Financing (IBFinTot)*
- *Murabaha Financing (MuraFin)*
- *Profit-sharing Rate of IBFinTot (PSRibfintot)*
- *Profit-sharing Rate of MuraFin (PSRmurafin)*
- *Commercial Banking Rate Consumption (CBR)*
- *Commercial Banking Rate for Working Capital (CBRwc)*
- *Interbank Money Market Rate (IMMR)*
- *Consumer Price Index (CPI)*
- *Industrial Production Index (IPI)*

Two models have been used to assess total financing and Murabaha financing in respect to Islamic banking.

Model 1. IBFinTot = f (IBDepTot, PSRibfintot, CBRwc, IMMR, CPI, IPI)

Model 2. MuraFin = f (PSRmurafin, CBRc, IMMR, CPI, IPI)

The result of a Pearson correlation test using both models suggests that in **Model 1**, all variables are significantly correlated except for CPI and IPI; in **Model 2**, all variables are correlated except for IPI. The IBFinToT correlates significantly with total deposits, profit-sharing rates, commercial banking rates for working capital, and interbank money market rates. In addition to the Person correlation, a Granger causality test[3] was employed to evaluate the causality among the variables. Both studies showed that there is a correlation between interest rates and Islamic bank activities in Malaysia [8]. A slightly different result was

[2]The central bank sets a minimum amount of reserves that must be held by a commercial bank. This amount is based on the deposit liabilities owned by the commercial bank to its customer.

[3]The Granger Causality is a statistical hypothesis test based on prediction. The method helps to identify the relationship between two variables for time series data.

found by Sukmana and Ibrahim [13], who performed a nonlinear assessment of Islamic and conventional banking rates in Malaysia. They found that deposit rates of Islamic banks are not pegged to conventional deposit rates.

Wali, Sarwar, Rahman, and Samiul [14], similarly to that stated by Sukmana and Ibrahim [13], claimed that there is a significant difference between deposit rates of conventional and Islamic banks. Their study covered monthly data from 2009 to 2013 using a sample size of 53 banks in Bangladesh. They assessed the association between lending and deposit rates of conventional and Islamic banking through graphical time-series analysis and a correlogram. A Z-test used to measure the relationship between variables showed that the null hypotheses of no difference between fixed and saving deposit rates are rejected, proving that there is a difference between the two pricing systems. This result is slightly inconsistent with the study conducted by Ergeç and Arslan [12],who measured the impact of interest rate variation on Islamic loans and deposits in Turkey. The findings showed that any shock in interest rates affects Islamic loans and deposits. While most studies seem to be consistent when measuring the relation between the variation of interest rates on Islamic and conventional loans, there is some divergence when assessing Islamic and conventional deposits. Hence, in consideration of the current debate and concern amongst Islamic scholars and experts, this paper attempts to further assess the relation between interest rates and Islamic banks by incorporating a large geographical scope.

III. Research and Methodology

a) Collected Measures

The extent of IBF development in each country included in this study is estimated through an ad-hoc metric: the IFCI score, which is the result of a factor analysis conducted by Edbiz Consulting in 2017 and revised in 2019. Table I.A (Appendix A) reports the annual IFCI scores by country, whereas Table II reports the average value of said score over the whole observation period. The "Yield" column in Table II reports the average yield to maturity (YTM) of the 10-year bond emissions[4]on a country basis. Both columns provide averages representing the mean value for the country in question, from 2011 to 2019, to correspond with the nine-year availability of IFCI scores. The IFCI was developed with the purpose of tracking the growth of IBF for 49 countries and is now considered a reliable index to measure the presence of Islamic finance in a specific country.

[4]A bond YTM is the internal rate of return required in order to obtain the current bond price when summing all future cash flow of the bond and the principal. The 10-year bond emission is the current rate that government treasury pays to investors if they purchase the bond today. This yield is a significant benchmark for commercial banks when pricing mortgages and borrowing rates.

b) Scope of Analysis

All countries for which both IFCI scores and YTM data are available, except the Gulf Cooperation Council (GCC) countries—Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates, and Yemen—have been evaluated in this study. IBF originated in these GCC countries, making them irrelevant to an exploration of development dynamics across the world outside this IBF birthplace.

c) Data Sources

The present study relied on Cbonds, an independent information agency specialised in fixed-income securities, for information on Kazakhstan, Azerbaijan, Iran, and Brunei. For these countries, the YTM was estimated by averaging the bond emissions for which data were available. Bloomberg supplied the YTM data for the remaining countries.

d) Model

The scope of the present study is the largest possible, in that it encompasses all the countries where the scale of IBF development can be measured at present by means of the adopted metric (IFCI score). This constitutes a sample that includes all the countries where IBF banks might locate in the near future; in this respect, the findings related to the group of countries covered by the present study can be generalised through inferential statistics. The present observational study aims to test the significance of low yields as a factor that does not favour the settlement and development of IBF based on the characterisation of business models such as Murabaha linked to interest rates.

For this purpose, we divided the countries for which both IFCI and yield data are available into tertiles according to the cut-off values reported in Table III (AppendixA), introducing the following naming scheme:

T0 = 1st tertile = low-yield tertile
T1 = 2nd tertile = medium-yield tertile
T2 = 3rd tertile = high-yield tertile

Subsequently, we established the following alternative hypothesis, which states that a correlation exists between low yields and low IFCI scores.

Hypothesis: The medium- and high-yield tertiles have IFCI values significantly higher than those of the low-yield tertile.

To test this hypothesis, we classified the countries into two macro-groups:

Group 0. G0 = {T0} → low-yield countries
Group 1. G1 = {T1, T2} → medium-yield and high-yield countries

We conducted a one-tailed t-test to compare the IFCI value of Group 1 against the mean IFCI value of Group 0, and examined whether the former is higher than the latter and whether this difference is statistically significant. The difference of mean ("Diff. 1–2") confidence interval was above zero, which proves that the alternative hypothesis holds, meaning that the "Group 1" mean is significantly higher than the "Group 0" mean. The confidence interval computation refers to the standard confidence level (CL):

Confidence level = 95%

The standard error estimate was based on pooled variance on the grounds of the outcome of the equality of variance test (equality of variance hypothesis not rejected).

Table IV (Appendix A) reports the mean value of the dependent variable for Group 1 and Group 0, providing the mean difference – i.e., the difference between Mean 1 ("mean of Group 1") and Mean 0 ("mean of Group 0"), along with its respective confidence interval (CI):

Difference of means = 1.0880
CI = [+0.01257; infinity]

The alternative hypothesis holds
p-value (Pr > t) = 0.03

The IFCI distributions related to Group 1 (above) and Group 0 (below) are plotted in Fig. I for ease of comparison. The kernel plot represents a normal distribution which approximates the sample distribution.

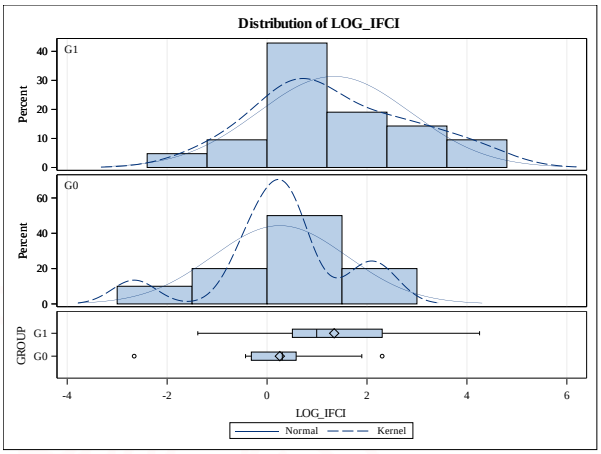


Fig. I. Comparative Distribution: Group 0 (low yield) vs. Group 1 (moderate & high yields)

A qualitative analysis is provided by Fig. II in the form of a tile map characterised as follows:

- Each tile represents a country
- Tile size corresponds to the IFCI score
- The lowest-yield tertile, T0, is coloured white, and the higher-yield tertiles correspond with darker shades of blue

This qualitative analysis demonstrates the prominence of low yields (white tiles) among the lower IFCI scores (smaller tiles).

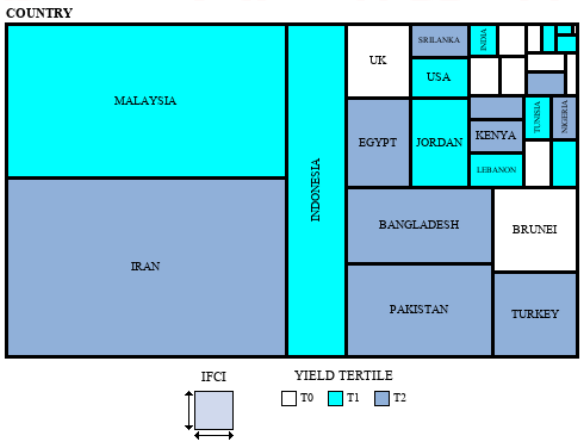


Fig. II. Tile map of the IFCI scores by countries/yield-based colouring scheme.

e) Dependent Variable Manipulation

A proper pre-processing of the dataset before submitting the t-test was necessary, as the IFCI scores' distribution departs from normality, which is a prerequisite for the t-test. Table V (Appendix A) reports the following related metrics:

Kurtosis: 2.99
Skewness: 8.80

The pre-processing, aimed at meeting the normality requirement, replaced the raw dependent variable—the IFCI score—with its logarithm. We thus define the following derived variable:

$$LOG\_IFCI = log_{10}(IFCI)$$

This transformation applied to the dependent variable is feasible based on the monotonicity of the logarithm function: The higher the raw measure, the higher the logarithm. Table VI (Appendix A) shows that, for the derived dependent variable, the normality assumption is acceptable:

Kurtosis: 0.20
Skewness: 0.32

Fig. III provides the Q–Qplot of the derived variable LOG_IFCI (dotted plot), which approximates a normal distribution (a continuous line plot) characterised by the mean and the standard deviation of our sample. As a result, we adopted the derived variable LOG_IFCI as the dependent variable in the t-test. Table IV and Figs. I and III refer to LOG_IFCI as well.

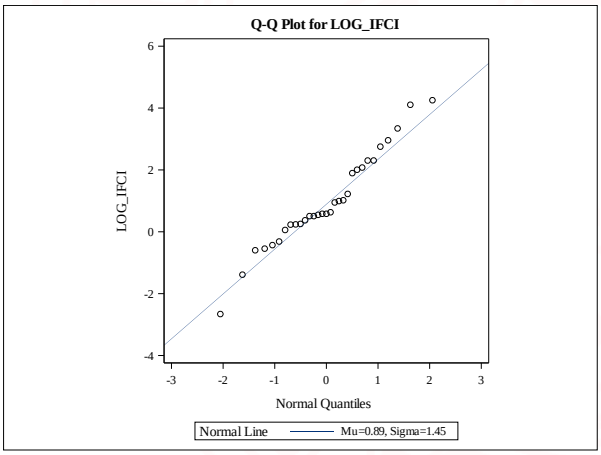


Fig. III. LOG_IFCI Q–QPlot

IV. Findings and Results

Based on the results obtained, there is a higher likelihood of IBF growth in countries with high-yield sovereign bonds. According to Omar et al. [9], Islamic banks are using conventional finance as a benchmark to determine the cost of funding. The findings are in accordance with the study conducted by Kader and Leong [6], which determined that an increase in interest rates would induce individuals to seek financing from Islamic institutions, thereby enhancing IBF growth. Moreover, not all clients are Sharia compliancy orientated. Therefore, an Islamic finance customer could shift to conventional banks if Islamic banks are more expensive. Similar findings were also presented by Khalidin and Masbar [8], who found that the Interbank Money Market Rate is significantly correlated to IBF banks' total financing. Both studies used the Malaysian Islamic banking sector as a benchmark for their analyses and agreed that interest rates and IBF growth are positively correlated. Chong and Liu [15] claimed that Islamic deposits in Malaysia are not interest rate free – rather, they are pegged to conventional deposits.

All major studies available in the current literature have been limited to the Malaysian banking sector, which is the founding country of modern IBF. This paper adds some important features to the current literature as it covers a much larger geographical scope; it is more general, and it does not rely on the assumption of a linear relation between the variables. In fact, to the best of our knowledge, this is the first empirical study attempting to evaluate the growth potential of Islamic banks in countries with high interest rates. Based on our findings, we can state that pricing of Islamic banks is linked to conventional banks, and countries with high yields are a good market for Islamic banks' growth.

V. Conclusion

This study illuminated one of the current issues of IBF growth: There is some contention between scholars and finance experts whether IBF should be influenced by interest rates to be as profitable as its conventional counterparts. On the other hand, if emerging markets have higher yields in general, we can also argue that Islamic banks have a strong appeal to retail customers, and therefore a definite growth potential, in such markets. Several studies claimed that there is a positive correlation between Islamic finance growth and domestic GDP of developing countries [3]. For example, Daly and Frikha [4] stated that Islamic banks have a crucial role in the growth of the GDP of developing economies. Moreover, the core principles of Islamic finance are based on ethical values, profit–loss sharing and distribution of wealth (Zakat). These values are important in developing countries, especially the inclusion of Zakat as a mandatory tax to support the poor population. Regardless of interest rates' influence on IBF, the Islamic model remains faithfulto its ethical priorities and considerations. Financial manipulations such as speculation, leverage, and short selling are all strictly banned by Islamic banks. In fact, with their adherence to Sharia, all Islamic banks managed to successfully weather the storm of the 2008 financial crisis, which caused the bankruptcy of Lehman

Brothers and the collapse of numerous conventional financial markets worldwide. From a macro-level perspective this study provides important tools to further develop the presence of Islamic banks in developing economies. In fact, the correlation highlighted by the present paper shows a competitive advantage for Islamic banks which arises in geographical contexts—namely, countries—characterised by higher interests' rates. Kader and Leong[6] also hinted at the role of the base lending rate in the preference accorded to Islamic banks by retailers, but the present study has confirmed this dynamic on a much wider geographical scope that is of practical relevance for targeting IBF investments on a global scale. According to this study, Islamic banks can consider strengthening their presence in emerging economies in order to enhance their growth and support the local community. The positive association between Islamic banks and low- and middle-income economies was also demonstrated by Imam and Kpodar [18] who claimed that Islamic finance is positively associated with economic growth.

The main limitation of the present study is the difficulty in obtaining the 10-year YTM of certain countries for which data are not available. In fact, for Kazakhstan, Azerbaijan, Iran, and Brunei, the YTM was calculated by averaging bond emissions with different maturities. Moreover, exponential growth of debt continues to remain a key factor to differentiate Islamic rules from conventional banks, but no empirical studies have been conducted yet due to the difficulty in accessing the data providing ample fodder for further research.

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Appendix A

Table I.A Average IFCI Score over the 9-Year Observation Period (Part 1/2)

	FRANCE	GERMANY	INDIA	INDONESIA	IRAN	JORDAN	KAZAKH STAN	KENYA
2011				22	46	4		3.2
2012	0.57	0.45	0.82	15.6	51.71	2.7	0.5	2.35
2013	0.83	0.66	1.04	20.22	68.31	3.6	1.08	2.02
2014	0.82	0.65	1	19.82	75.24	3.08	1.26	1.97
2015	0.81	0.59	1.73	22.45	77.93	3.98	1.13	2.32
2016	0.8	0.62	1.27	24.21	77.39	7.98	1.2	2.28
2017	0.78	0.66	1.3	23.96	78.37	10.29	1.32	2.85
2018	0.57	0.67	1.29	24.13	79.01	13.01	2.12	2.85
2019	0.67	0.88	1.88	81.93	79.03	18.33	5.71	3.39
AVG	*0.73*	*0.65*	*1.29*	*28.26*	*70.33*	*7.44*	*1.79*	*2.58*

	THAILAND	PHILIPPINES	TUNISIA	TURKEY	UK	USA	BRUNEI
2011	2.3			7.5	7	4.01	3.3
2012	1.17	0.2	1.79	5.21	7.84	0.11	2.81
2013	1.2	0.63	1.49	6.48	8.15	4.28	3.24
2014	1.57	0.62	0.48	7.23	5.94	4.26	3.03
2015	1.73	0.61	1.76	8.83	6.13	3.27	2.89
2016	1.7	0.63	2	8.95	5.96	3.28	5.85
2017	1.69	0.65	2.87	12.16	5.88	3.5	8.85
2018	1.71	0.55	3.01	13.01	6.33	3.48	10.11
2019	1.9	0.78	4.09	20.77	6.69	4.37	49.99
AVG	*1.66*	*0.58*	*2.19*	*10.02*	*6.66*	*3.40*	*10.01*

Table I.B Average IFCI Score over the 9-Year Observation Period (Part 2/2)

	LEBANON	MALAYSIA	AUSTRALIA	AZERBAIJAN	BANGLADESH	CANADA	CHINA	EGYPT
2011	3.4	30		2.5	12		1	8
2012	2.16	32.36		0	5.16	0.24	0.01	5.7
2013	2.64	42.69	0.62	1.02	9.19	0.25	0.46	5.69
2014	2.42	49.53	0.61	1.19	9.97	0.24	0.57	5.11
2015	2.39	73.09	1.26	1.23	11.11	1.9	0.57	7.34
2016	2.67	77.77	1.25	1.11	16.14	1.87	0.56	9.02
2017	2.64	79.2	1.22	1.15	16.72	1.82	0.57	9.99
2018	2.7	81.01	1.23	1.17	17.78	1.83	0.56	10.01
2019	3.3	81.05	1.22	2.01	43.01	1.99	0.67	11
AVG	*2.70*	*60.74*	*1.06*	*1.26*	*15.68*	*1.27*	*0.55*	*7.98*

	NIGERIA	PAKISTAN	RUSSIA	SINGAPORE	SOUTH AFRICA	SPAIN	SRILANKA	SWITZER LAND
2011	3.5	19		1	2		2.6	
2012	0.67	11.27	0	1.31	1.26	0	1.33	0.5
2013	1.07	14.15	0.2	1.72	2.47	0	2	0.51
2014	1.45	11.49	0	2.1	1.66	0	1.84	0.51
2015	1.24	13.38	0.2	2.13	2.06	0.05	2.72	2.1
2016	2.35	18.89	0.19	2.05	1.73	0.05	2.96	1.97
2017	0.01	24.3	0.21	1.94	1.74	0.06	3.78	1.93
2018	2.34	24.01	0.22	1.81	1.99	0.05	3.77	1.89
2019	2.29	36.88	1.01	2.01	2.01	0.35	3.89	2.21
AVG	*1.66*	*19.26*	*0.25*	*1.79*	*1.88*	*0.07*	*2.77*	*1.45*

Table II. ICFI Scores and Yields by Country

COUNTRY	YIELD	IFCI
AUSTRALIA	1.80	1.06
AZERBAIJAN	8.16	1.26
BANGLADESH	9.00	15.68
BRUNEI	1.50	10.01
CANADA	1.78	1.27
CHINA	3.26	0.55
EGYPT	14.20	7.98
FRANCE	0.49	0.73
GERMANY	0.13	0.65
INDIA	6.84	1.29
INDONESIA	7.08	28.26
IRAN	17.00	70.33
JORDAN	6.45	7.44
KAZAKHSTAN	7.68	1.79
KENYA	12.38	2.58
LEBANON	7.12	2.70
MALAYSIA	3.46	60.74
NIGERIA	12.06	1.66
PAKISTAN	10.97	19.26
PHILIPPINES	4.18	0.58
RUSSIA	6.77	0.25
SINGAPORE	1.84	1.79
SOUTH_AFRICA	8.25	1.88
SPAIN	1.09	0.07
SRILANKA	10.50	2.77
SWITZERLAND	-0.27	1.45
THAILAND	1.86	1.66
TUNISIA	7.10	1.73
TURKEY	10.11	10.02
UK	1.10	6.66
USA	2.02	3.40

Table III. Yield Tertiles Cutoff Values

Analysis Variable: YIELD			
YIELD TERTILE	N Obs	Minimum	Maximum
T0	10	-0.2700000	1.8600000
T1	11	2.0200000	7.6800000
T2	10	8.1600000	17.0000000

Table IV. Mean LOG_IFCI of GroupI (moderate & higher yields) vs. Mean LOG_IFCI of Group 0 (low yields)

GROUP	Method	N	Mean	Std Dev	Std Err	Minimum	Maximum
GI		21	1.3433	1.5267	0.3331	-1.3863	4.2532
G0		10	0.2553	1.3499	0.4269	-2.6593	2.3036
Diff (1-2)	Pooled		1.0880	1.4741	0.5664		
Diff (1-2)	Satterthwaite		1.0880		0.5415		

GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
GI		1.3433	0.6484	2.0382	1.5267	1.1680	2.2046
G0		0.2553	-0.7104	1.2210	1.3499	0.9285	2.4644
Diff (1-2)	Pooled	1.0880	0.1257	Infty	1.4741	1.1740	1.9816
Diff (1-2)	Satterthwaite	1.0880	0.1540	Infty			

Method	Variances	DF	t Value	Pr > t
Pooled	Equal	29	1.92	0.0323
Satterthwaite	Unequal	19.968	2.01	0.0291

Table V. Assumptions Check (Normality of IFCI scores)

Moments			
N	31	Sum Weights	31
Mean	8.62903226	Sum Observations	267.5
Std Deviation	16.5007035	Variance	272.273216
Skewness	2.99424285	Kurtosis	8.80970842
Uncorrected SS	10476.4626	Corrected SS	8168.19647
Coeff Variation	191.223106	Std Error Mean	2.96361383

Table VI. T-Test Assumptions Check (Normality of LOG_IFCI scores)

Moments			
N	31	Sum Weights	31
Mean	0.99231857	Sum Observations	30.7618758
Std Deviation	1.53875967	Variance	2.36778132
Skewness	0.20278175	Kurtosis	0.32147809
Uncorrected SS	101.55902	Corrected SS	71.0334395
Coeff Variation	155.067103	Std Error Mean	0.27636939

Table VII.LOG_IFCI and Yields Group (G0, G1, G2) by Country

COUNTRY	GROUP	LOG_IFCI
AUSTRALIA	G0	0.05827
AZERBAIJAN	G1	0.23111
BANGLADESH	G1	2.75239
BRUNEI	G0	2.30358
CANADA	G0	0.23902
CHINA	G1	-0.59784
EGYPT	G1	2.07694
FRANCE	G0	-0.31471
GERMANY	G0	-0.43078
INDIA	G1	0.25464
INDONESIA	G1	3.34145
IRAN	G1	4.25320
JORDAN	G1	2.00687
KAZAKHSTAN	G1	0.58222
KENYA	G1	0.94779
LEBANON	G1	0.99325
MALAYSIA	G1	4.10660
NIGERIA	G1	0.50682
PAKISTAN	G1	2.95803
PHILIPPINES	G1	-0.54473
RUSSIA	G1	-1.38629
SINGAPORE	G0	0.58222
SOUTH_AFRICA	G1	0.63127
SPAIN	G0	-2.65926
SRILANKA	G1	1.01885
SWITZERLAND	G0	0.37156
THAILAND	G0	0.50682
TUNISIA	G1	0.54812
TURKEY	G1	2.30458
UK	G0	1.89612
USA	G1	1.22378

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