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Has the risk index of Islamic banks and conventional banks in GCC countries changed in response to the 2008 economic crisis?

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ABSTRACT

In this empirical study, we investigate the effect of the 2008 economic crisis on the level of risks Islamic banks (IB) and conventional banks (CB) are facing and the determinants of their risk indices. We cover 20 banks operating in the Gulf Cooperation Council (GCC) countries during 2001-2014. The results indicate that while the state of the economy had no effect on the risk index (RI) of banks, the type of bank did have an effect. The results suggest that the RI of IB was significantly lower than that of CB before and after the crisis indicating higher risks for IB. While the RI of CB is explained by solvency and liquidity variables, the RI of IB is explained by liquidity and profitability variables. Discussions, interpretations of research results and implications are provided.

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1.0 Introduction

The recent economic crisis has raised many questions regarding bank risks. Ever since the start of the 2008 economic downturn, banks were exposed to tremendous pressures from regulators and clients to exercise more control over their risks. Goodhart (2008) listed many policies and regulatory issues commanding serious discussions. These issues are scale and scope of deposit insurance, bank insolvency, central banks roles, liquidity risk management, capital adequacy requirements, the scope of regulation and crisis management. Blundell-Wignall et al. (2008) who discussed how the crisis evolved share the same concern and pointed *to the need for far-reaching reforms* in the banking system to better mitigate risks and avoid a similar crisis. Since then, several researchers have strived to investigate these issues. However, the extent of the effect of the crisis on bank risks has not been fully researched, especially with the existing structural differences between IB and CB.

IB and CB differ in their capital structures (Aldeehani et al., 1999 and Archer et al. 1998). As a result, the level of financial risk assumed by the bank also differs (Arifin et al., 2009). Indeed, Vogel and Hayes, III (1998) argued that for IB, *"The risk assumed by depositors enables the institution to tolerate greater risk on its assets side, as it must if it is to make equity investments in Mudaraba ventures instead of lending on interest."* It follows that one would assume that the Islamic bank's RI is lower than that of a typical conventional bank indicating higher risks. The 2008 economic crisis with its long-lasting effect provides an opportunity to study this issue.

In this paper, the focus is on the concept of risk in conventional and Islamic banking. The RI is the specific variable of concern. Given the presumed tendency of IB to take risks, the key question of this research is; does the RI of IB differ from that of CB before and after the crisis? If it does, then, what are the fundamental determinants of the RI of both types before and after the crisis?

The relevant literature will be reviewed to discuss the various definitions of bank's RI and its determinants. From such a discussion, we should be able to extract the research hypotheses and the factors representing the dependent and explanatory variables.

Our research data covers the period from 2001 to 2014 for 20 banks, within the region of the GCC, classified as Islamic and conventional. Investigating the determinants of the RI for this type of data commands a general panel regression model which will be discussed later.

This paper is organized as follows: in section 2, we discuss the relevant literature and hypotheses development. In section 3, we discuss our research sample, data, and methodology. This is followed by hypotheses testing and model estimation in section 4. The main results of the paper are discussed in section 5 then we the paper concludes in Section 6.

2.0 Literature review and hypotheses development

Similar to conventional banking, the main objective of Islamic banking is to maximize the value of shareholders' wealth. This objective is achieved through making profit from borrowing money at a cost rate lower than the rate of return they get from lending the money. The general operation of the two types is the same. They both attract money from savers (depositors) who expect to receive returns on their deposits and provide finances to borrowers who are expected to pay interest (profit) on the money they borrowed. Conventional banking provides finances and facilities to their clients through various contracts of loans. Islamic banking, however, uses profit and loss sharing contracts to provide facilities to the clients. The most popular ones are *murabahah*, *mudarabah*, *musharakah*, *istisna'*, and *ijarah*. Boumediene (2011) provides in-depth definitions and discussions for these contracts. However, the capital structure of IB is unique and differs fundamentally from that of CB. This issue was researched rigorously earlier in the past three decades. That is because IB is not allowed, by the shari'a (Islamic law), to pay or receive interest. They rather attract money in the form of profit sharing and loss bearing investment accounts. The funds in these accounts are mobilized under a contractual agreement called *mudarabah*. The *mudarabah* contract is neither a financial liability instrument nor a shareholder's equity instrument. Unlike lenders, in the case of bankruptcy, Investment account holders are not given priority over shareholders. Theoretical propositions and potential implications regarding profit-sharing risk and returns of IB were provided by pioneering papers (see for example Aldeehani et al., 1999 and Archer et al. 1998). Indeed, Aldeehani et al., (1999) argue that "*the concept of financial risk, on which capital structure theories are based, is not relevant to Islamic banks*."

Ever since the 2008 economic downturn and its evident effect on global economies, it was important to understand the magnitude of that effect on financial markets and institutions. Because of the fundamental differences between IB and CB, researchers have strived to compare between the two type of banks regarding the effect of that crisis on performance and riskiness. Rashwan (2012), for example, investigated the effect of the 2008 crisis on the efficiency and profitability of IB compared to CB. He found that while IB performed better before the crisis, CB performance was better after the crisis. The same result was concluded by other researchers like Ouerghi (2014) and Al-Deehani et al. (2015). Ouerghi (2014) concluded that CB outperformed IB in terms of profitability, credit risk and efficiency in the post-crisis period. This was also supported by Al-Deehani et al. (2015). Exploring the banking industry in the country of Kuwait (a member of the GCC countries), Alkulaib et al. (2013) argued that while having an issue with systematic risk, IB has outperformed CB regarding liquidity.

2.1 Risk Index and development of hypotheses

When discussing Islamic bank risks, researchers are not in absolute agreement on how to define credit, debt or credit risks. One research, for example (see Sadaqat *et al.*, 2011), oddly defined, bank liquidity risk as the ratio of cash to total assets. The concept of risk in IB was thoroughly explained by Arifin et al., (2009). They state that risk in Islamic banking can best be understood when viewed from two dimensions: *gharar* (uncertainty) and freedom of contract. The word "*Gharar*" in the Arabic language is a synonym to cheating (the act of concealing information) in a business transaction. This act is prohibited by the Sharia' (Islamic law) and unlawful in a business transaction. They argue that "*Islam fully recognizes the risk that is generated by financial and commercial factors and elements extrinsic to the formation of the business transaction.*" Given the distinctive nature of their capital structures and the unique contracts they use to provide facilities, IB is bound to deal with credit risks differently. Boumediene

(2011) provides a detailed discussion of the credit risk associated with each contract. Exploring the assertion that Islamic banking exhibits higher credit risk than conventional banking, he found that CB faces higher credit risk. To measure credit risk, Boumediene (2011) used the distance-to-default (DD) measure modeled by Merton (1974) based on Black and Scholes' option pricing formula. The problem with the DD measure is that it is based on the notion that the chance of default leading to bankruptcy -and consequently the transfer of control to debt holders- is determined by the probability that the market value of the bank assets will drop below the value of debt at maturity. Because of the nature of the 'profit and loss' contracts, IB does not treat deposits as debt, therefore, in the case of insolvency, they don't submit to deposit accounts holders (debt holders in the case of CB). As mentioned earlier, the capital structures of IB are fundamentally different from those of CB. Therefore, we believe that the DD method is not applicable to IB.

Investigating the determinants of bank capital ratios in Malaysia during 1995 to 2002, Ahmad et al. (2015) found a strong association between regulatory capital and bank risk taking behavior. Their findings were consistent with how banks all over the world have engaged in risky lending before the 2008 economic downturn. Two risk variables were investigated; the total risk-weighted capital adequacy ratio (*CAR*) as the dependent variable and RI as an independent explanatory variable. Stan and McIntyre (2012) used the accounting measure of risk in the form RI to investigate the riskiness of over 7 thousand banks in the FDIC database for the period from 2001 to 2008. They found that larger banks face higher risks than smaller banks regarding RI measure. Risk variability was found to be explained by ratios like capital to assets and higher variances in return to assets.

An extensive investigation of the RI of Indians banks was conducted by Kantawala (2004). Examining the effect of 21 variables on RI, the author found that the groups of variables groups of profitability, solvency and liquidity do have an impact on RI. Many research attempts were conducted to compare the performance IB to CB in the GCC region. Some authors investigated individual countries (see for example Alkulaib et al. 2013), and others have focused on the region as a whole. Some of the studies were theoretical (see for example Aldeehani et al., 1999 and Archer et al. 1998) and some applied (the latest is Al-Deehani *et al.* 2015). However, none have conducted a comparative study on the effect of the economic crisis on the RI of IB versus CB. This research is intended to bridge this gap. Therefore, and referring to the research questions on the differences in the RI of CB versus IB before and after the crisis, we are proposing two groups of hypotheses. Group 1 tests the significance of means' differences of RI for CB versus IB at times of economic stability and during times of instability. Group 2 test the significance of means' differences of RI of each bank type before and after the economic crisis. The following are detailed statements of the null and alternative hypotheses of the two groups.

Group 1 hypotheses:

1. H_0: at times of economic stability (before the crisis), the RI for CB is not significantly different from that of IB.
   H_1: at times of economic stability, the RI for CB is significantly different from that of IB.
2. H_0: at times of economic instability (before the crisis), the RI for CB is not significantly different from that of IB.
   H_1: at times of economic instability, the RI for CB is significantly different from that of IB.

Group 2 hypotheses:

1. H_0: the RI for CB at times of economic stability is not significantly different from that at times of economic instability.
   H_1: the RI for CB at times of economic stability is significantly different from that at times of economic instability.
2. H_0: the RI for IB at times of economic stability is not significantly different from that at times of economic instability.
   H_1: the RI for IB at times of economic stability is significantly different from that at times of economic instability.

3.0 Sample, data, and methods

Originally, we collected fundamental data for 25 GCC banks. Twelve of which were CB and thirteen were IB covering the period from 2001 to 2014. Unfortunately, some of the IB did not have data for earlier periods. Therefore, and to have a more strongly balanced data, IB with data covering the period from 2001 to 2014 were qualified for inclusion in the sample of this study. The number of IB to be investigated was reduced to 7 banks. The data was collected from specialized reports on GCC countries by the Institute of Banking Studies in Kuwait.

GCC countries have relative similarities in culture, language, religion, economics and characteristics of the financial markets. It is the region in which Islamic banking and finance have originated in the seventies of the past century. According to the IMF (2015), Islamic banking in the GCC accounted for 38.2% of global Islamic banking.

As of 2014, a total of 72 banks are operating in the region, 50 of which are conventional and 22 are IB. According to the Institute of Banking Studies (2015), the size of the banking industry in 2014, regarding total assets, amounts to $1,802,238 million, 22% of which is Islamic. The aggregate return on assets is 1.76% for CB and 1.55% for IB. Return on equity is 13.4% for CB and 11.59% for IB. The size of deposits is $1,083,380 million for CB and $288,582 million for IB. The size of finances is $858,779 million for CB and $294,827 for IB. Table 1 below, summarizes the GCC banking industry as of 2014:

Table1: Summary of GCC banking industry as of 2014

	Conventional Banks	Islamic Banks
Total Assets	1,404,529	397,709
Loans	858,779	294,827
Deposits	1,083,380	288,582
Capital	51,512	23,431
Equity	187,052	53,849
Net Profit	24,782	6,150
ROA	1.76%	1.55%
ROE	13.25%	11.42%
Loans/Assets	61.14%	74.13%
Deposits/Assets	77.13%	72.56%
Loans/Deposits	79.27%	102.16%

The IMF (2015) states that Islamic banking has 25% market share in the GCC market indicating the significant importance of Islamic banking and finance in the region. The list of banks investigated by this study is shown in Table 2 below:

Table 2: List of banks investigated

Type	No	Name of Banks
Conventional	1	Bank of Bahrain and Kuwait
	2	National Bank of Bahrain
	3	National Bank of Kuwait
	4	Commercial Bank of Kuwait
	5	Bank Muscat
	6	Bank Dhofar
	7	Qatar National Bank
	8	Commercial Bank of Qatar
	9	The National Commercial Bank
	10	Samba Financial Group
	11	National Bank of Abu Dhabi
	12	Commercial Bank of Dubai
	13	Al-Rajhi Banking &Inv Co.
	14	Kuwait Finance House
Islamic	15	Dubai Islamic Bank
	16	Abu Dhabi Islamic Bank
	17	Qatar Islamic Bank
	24	Bahrain Islamic Bank
	25	ABC Islamic Bank

From the literature discussed earlier, we elected the *RI*, developed by Hannon and Hanweck (1988), as a measure of the overall riskiness of banks. It is calculated as the bank soundness cushion per one unit of risk. The bank soundness cushion is measured by the combined ratios of return on assets and equity to assets divided. Risk is measured by the standard deviation of the return on assets (σ_{ROA}). The higher the unit of risk the lower the risk index. Similarly, the higher the soundness cushion the, higher the *RI*, hence, the lower the risk.

Because of the fundamental differences in the capital structures of CB versus IB, we believe that the RI method is suitable for comparing the risk levels facing the two types of banks. That is because most of the measures of bank risks involve the element of debt which is not applicable to IB. The RI is a function of three variables return on assets, equity to assets and the standard deviation of the return on assets. No debt is involved.

We follow the definition of *RI* adopted by Sinkey (1988), Eisenbeis & Kwast (1991), Sinkey & Nash (1993), Nash & Sinkey (1997), Kantawala (2004) and Stan and McIntyre (2012) which can be written as:

$$RI = \left(\frac{ROA+E/A}{\sigma_{ROA}}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where RI is the risk index, ROA is the return on assets, E/A is the equity to total assets and σ_{ROA} is the standard deviation of return on assets. From earlier discussions of the literature review, eight fundamental variables were to be investigated for potential explanatory power. The variables represent four influential areas. Bank liquidity is the most important influential area. It is represented by four variables; loan to total assets (*loa*), deposits to total assets (*doa*), loan to deposits (*lod*) and current assets to current liabilities (*caocl*). The second potential influential area is profitability which is represented by two variables; return on assets (*roa*) and return on equity (*roe*). Equity to total assets (*eoa*) represents solvency and total assets (*ta*) represents size of the bank. The following is a summary of the selected explanatory variables and the areas they represent.

Table 3 below provides a summary of the variables' means for each of the banks under investigation.

Table 3: Summary of the variables' means

	Bank No	*eoa*	*loa*	*doa*	*lod*	*caocl*	*ta*	*roa*	*roe*	*RI*
Conventional Banks	1	0.104	0.519	0.789	0.661	6.700	5667.107	0.015	0.143	49.501
	2	0.128	0.433	0.842	0.514	16.340	5094.018	0.018	0.142	93.838
	3	0.148	0.497	0.912	0.583	7.094	36911.785	0.023	0.162	14.848
	4	0.138	0.577	0.796	0.729	5.155	11048.086	0.016	0.115	11.868
	5	0.123	0.698	0.739	0.946	1.663	12362.966	0.017	0.136	34.771
	6	0.127	0.796	0.700	1.825	3.653	3407.588	0.020	0.154	27.627
	7	0.136	0.657	0.776	0.847	1.823	49524.963	0.023	0.175	44.365
	8	0.162	0.592	0.627	1.531	1.930	19298.840	0.022	0.137	19.849
	9	0.112	0.459	0.852	0.540	3.569	60708.715	0.020	0.192	17.045
	10	0.130	0.501	0.826	0.608	3.090	39679.344	0.026	0.213	24.146
	11	0.098	0.612	0.793	0.774	2.794	45232.866	0.018	0.187	27.447
	12	0.171	0.686	0.762	0.903	5.680	7373.918	0.027	0.156	37.106
	13	0.146	0.818	0.773	1.062	2.541	41547.929	0.035	0.243	13.992
Islamic Banks	14	0.103	0.700	0.645	1.140	0.559	34506.799	0.016	0.149	13.273
	15	0.103	0.779	0.772	1.012	2.287	18712.742	0.015	0.144	17.653
	16	0.123	0.821	0.673	1.877	2.306	13694.827	0.013	0.113	32.533
	17	0.157	0.716	0.657	1.117	2.542	9684.823	0.033	0.248	10.631
	24	0.163	0.699	0.772	1.467	3.270	1611.399	0.003	-0.019	6.488
	25	0.171	0.739	0.170	34.241	0.880	872.754	0.134	1.244	0.655

Table 4 depicts the means of the variables for CB versus IB before and after the 2008 economic downturn.

Table 4: Means of the variables for CB versus IB before and after the 2008 economic downturn

		eoa	*loa*	*doa*	*lod*	*caocl*	*ta*	*roa*	*roe*	*RI*
Before Crisis	Conv	0.132	0.578	0.799	0.730	3.978	12742.586	0.023	0.182	34.784
	Islamic	0.139	0.768	0.673	4.800	1.612	8295.492	0.023	0.186	14.245
After Crisis	Conv	0.131	0.594	0.770	1.014	5.937	36642.447	0.017	0.136	32.284
	Islamic	0.136	0.738	0.601	7.176	2.498	26170.586	0.048	0.420	12.962

To test the main hypotheses regarding the significance of the RI of conventional versus IB before and after the economic downturn, we adopt a two independent samples t-test to compare the means of the RI. Following Stan and McIntyre (2012), the t-test will then be supported by the Mann-Whitney nonparametric test to check the significance of the results in the lack of normality.

The data will then be arranged in the form of a balanced panel data. A linear regression model will then be estimated to investigate the relationship between the independent explanatory variables and the RI. Our panel has the form

$X_{it}, i = 1, \ldots, N\ t = 1, \ldots, T,$

Where i is the dimension of banks and t is the dimension of time. A general panel regression model is written as

$$y_{it} = \alpha + \beta' X_{it} + u_{it} \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

We select a fixed effect model with robust standard error to overcome the possibility of the existence of heteroskedasticity which may increase the probability of type I error. The fixed effects model is denoted as

$y_{it} = \alpha + \beta' X_{it} + u_{it}$, …… (3)

$u_{it} = \mu_i + v_{it}$. ……(4)

Where μ_i are the banks specific, time-invariant effects assumed to be fixed over time.

Before testing the research hypotheses and estimate our panel regression model, it would be interesting to have a general idea of how variables are associated. Table 5 illustrated the correlation coefficients between all of the variables.

Table 5: Correlation coefficient between all of the variables

	RI	*caocl*	*doa*	*eoa*	*ln(ta)*	*loa*	*lod*	*roa*	*roe*	*ecnmy*	*type*
RI											
Caocl	0.500										
doa	0.265	0.211									
eoa	-0.005	-0.007	-0.142								
ln(ta)	-0.021	-0.033	0.267	-0.260							
loa	-0.372	-0.441	-0.360	-0.011	-0.219						
lod	-0.226	-0.130	-0.617	0.079	-0.314	0.154					
roa	-0.055	-0.053	-0.186	-0.003	-0.069	0.048	0.166				
roe	-0.059	-0.054	-0.185	-0.056	-0.065	0.049	0.168	0.998			
ecnmy	-0.049	0.161	-0.104	-0.023	0.423	-0.003	0.052	0.025	0.028		
type	-0.462	-0.288	-0.327	0.072	-0.227	0.601	0.242	0.069	0.068	0.000	
year	-0.026	0.156	-0.094	0.019	0.472	-0.026	0.039	-0.016	-0.018	0.868	0.000

With regard to the dependent variable under investigation, *RI*, five variables are significantly correlated with it. These variables are *caocl*, *doa*, *loa, lod* and *type*. The first four variables represent bank liquidity and the fifth represents bank type. The correlation table affirms the importance of the association between bank liquidity and risk variability. The positive correlation signs of *caocl* and *doa* indicate a movement in the same direction with *RI*. In other word, an increase in deposits (more liquidity) is always associated with higher RI indicating lower risks and that is logical. The negative signs of *loa* and *lod* indicate a movement in the opposite direction with *RI*. The two variables also represent liquidity, but they focus on utilization (use) of that liquidity. Therefore, an association of opposite directions is logical. That is, more loans (lower liquidity) is always associated with less RI indicating higher risks. *Type* is the last variable showing a negative association with the RI. The negative sign is just a reflection of the coding used to classify bank types. The codes are 0 for CB and 1 for IB. The sign is negative because the mean RI of IB is lower indicating higher risks. Therefore, the higher code (1) is associated with low RI (higher risk), hence, the movement in opposite directions.

With regards to the potential explanatory variables, the various significant coefficients between these variables may indicate possible multi-co-linearity problems that may arise when estimating the regression models.

4.0 Tests and model estimation

This section consists of two subsections. In the first subsection, we perform tests of the research hypotheses and a discussion of these results. In the second subsection, we estimate our panel data regression model and discuss the resulting outcome on the determinants of RI.

4.1 Hypotheses testing and discussion of results

As mentioned earlier, two groups of hypotheses were developed. The results of testing the hypotheses of group 1 should provide solid statistical evidence on the different levels of risks each bank type faces. We use a two independent samples t-test to compare the means of the RI of the two types of banks supported by the Mann-Whitney nonparametric test to check the significance of the results in the lack of normality. To test the first hypothesis, we canceled out the post-crisis observations, hence, the reduction of the sample to 133 observations for the period from 2001 to 2014. To test the second hypothesis, pre-crisis observations were canceled out, and the sample was also reduced to 133 observations. The results of testing the two hypotheses are provided in Table 6 below.

The results of the t-test and the Mann-Whitney test indicate that both null hypotheses of group 1 are rejected which means that the RI of CB is significantly different from that of IB before and after the economic downturn. The results also show that the RI of IB is significantly lower than that of CB before and after the crisis indicating a higher risk for IB. The mean RI for CB is 34.78 at times of stability (before the 2008 crisis) and 32.28 at times of instability (after the crisis). We can notice a slight decrease in the RI of CB after the crisis indicating higher risks

but we are not sure whether it is statistically significant different or not. The results also indicate that the mean RI for IB is 14.25 before the crisis and 12.96 after the crisis. Similar to CB, we can also notice a slight decrease in the RI of IB after the crisis indicating higher risks, but we are not sure whether it is statistically significant different or not. This is tested next.

Table 6: Results of testing Group 1 hypotheses

Banks	Before Downturn		After Downturn	
	N	Mean	N	Mean
Conventional	84	34.78	84	32.28
Islamic	49	14.25	49	12.96
t-test	5.729		6.303	
p-value	0.000		0.000	
Mann-Whitney U	702.000		646.000	
Z	-6.325		-6.586	
Asymp. Sig.	0.000		0.000	

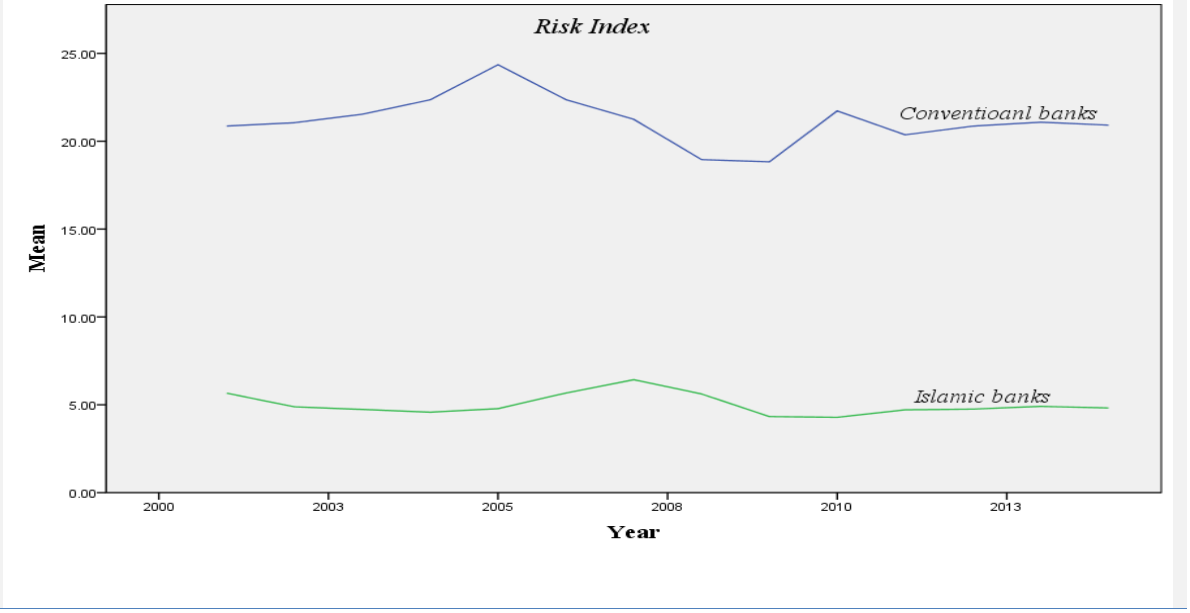
The results of testing the hypotheses of group 2 should also provide statistical evidence of the effect of economy state on each bank type individually. Again the two independent samples t-test to compare the means of the RI of each bank type is performed supported by the Mann-Whitney nonparametric test to check the significance of the results in the lack of normality. The results of testing the two hypotheses are provided in table 7 below.

Table 7: Results of testing Group 2 hypotheses

Economic Crisis	Conventional Banks		Islamic Banks	
	N	Mean	N	Mean
Pre	84	34.78	49	14.24
Post	84	32.28	49	12.96
t-test	0.738		0.617	
p-value	0.462		0.539	
Mann-Whitney U	3406.000		1152.000	
Z	-0.387		-0.345	
Asymp. Sig.	0.699		0.730	

The *p-values* of the t-test (0.462 for CB and 0.617 for IB) and the Mann-Whitney test (0.699 for CB and 0.730 for IB) indicate that both null hypotheses cannot be rejected. These results mean that, for CB, the RI before the crisis is not significantly different from that after the crisis. Likewise, for CB, the RI before the crisis is not significantly different from that after the crisis. Although statistically insignificant, the results show that the risk indices did decrease indicating higher risks for both bank types at the time of instability. The pattern of the mean RI of CB versus IB is portrayed by figure 1.

Figure 1.A: Patterns of RI for CB versus IB



The chart shows the lower and significant RI of IB compared to CB indicating the higher risk IB were facing before and after the 2008 crisis. The trends of the curves also indicate the quicker pickup of CB to increase their RI after the sharp drop in the year 2008. By the end of the year 2010, CB was quicker than IB in lowering and stabilizing their risks. Figure 2 portrays the comparative levels of risk indices of the two bank types before and after the crisis.

The conclusion of the above analysis is that there is conclusive evidence that the RI of CB is significantly different from that of IB before and after the crisis. Referring to our research questions, the logical step now is to provide answers on the determinants of the RI of each bank type before and after the crisis. This is done in the following section.

4.2 Estimating the panel data regression model and discussing the results

Before performing the estimation, we check for three important but constraining potential problems; data stationary of all variables, multi-co-linearity of explanatory variables and heteroskedasticity. Autocorrelation shouldn't be a problem with micro panels with few years of time dimension such as the data of this research. Autocorrelation may be of important concern with long time series, typically, over 20 years.

We test data stationary using Levin-Lin-Chu unit-root. Table 8 illustrates the results of this test for all the variables.

Table 8: Results of stationary test

Series	Statistics	P-Values	Status
eoa	-2.5281	0.0057	stationary
loa	-5.5832	0.0000	stationary
doa	-4.3912	0.0000	stationary
lod	-4.4002	0.0000	stationary
caocl	-2.3211	0.0100	stationary
ta	4.3571	1.0000	non-stationary
roa	-4.1803	0.0000	stationary
roe	-2.7477	0.0030	stationary
RI	-3.5655	0.0003	stationary

Table 8 indicates that the total assets variable is the only non-stationary variable, therefore; it was excluded from the list of explanatory variables.

To investigate the variables that explain and determine the RI of conventional and IB before and after the economic downturn, the following panel data regression model is estimated four times.

$$RI_{it} = \alpha + \beta_1 eoa_{it} + \beta_2 loa_{it} + \beta_3 doa_{it} + \beta_4 lod_{it} + \beta_5 caocl_{it} + roa_{it} + u_{it}, \ldots\ldots(5)$$

4.2.1 Estimating the model to investigate the determinants of RI for CB at times of economic stability. Table 9 below show the results of the estimated model.

Table 9: Results of panel data regression for CB before the crisis

Variable	Coef	t	p-value	VIF	1/VIF
Eoa	217.591	2.35	0.021	1.58	0.634
Loa	95.711	0.37	0.714	154.60	0.006
doa	2.544	0.01	0.991	27.89	0.036
lod	-84.882	-0.40	0.689	213.01	0.005
caocl	0.928	1.11	0.269	1.13	0.882
roa	-688.020	-1.94	0.056	1.16	0.866
\const	22.859	0.12	0.902		
No of Obs	84				
F(6,77)	2.38				
Prob	0.0365				
Adj R^2	0.0908				
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity					$\chi^2(1) = 25.85$ Prob> χ^2 =0.0000
H_0:Constant variance					Hypothesis rejected: heteroskedasticity exists

The table indicates that we face two problems. The first is the existence of multi-co-linearity with the variables *lod* and *loa*. The problem is fixed by canceling out one of the two variables and re-estimating the equation. Table 10 shows the results:

Table 10: Results of panel data regression for CB before the crisis after removing a multi-linear variable

Variable	Coef	t	p-value	VIF	1/VIF
eoa	217.591	2.35	0.021	1.42	0.704
doa	2.544	0.01	0.991	1.70	0.588
lod	-84.882	-0.40	0.689	1.56	0.642
caocl	0.928	1.11	0.269	1.13	0.882
roa	-688.020	-1.94	0.056	1.12	0.897
\const	22.859	0.12	0.902		
No of Obs	84				
F(5,78)	2.86				
Prob	0.020				
Adj R^2	0.101				

The second problem is heteroskedasticity indicated by the Breusch-Pagan / Cook-Weisberg test for heteroskedasticity rejecting the hypothesis H_0: constant variance. The problem is resolved by re-estimating the regression equation with the robust standard error. Table 11 below shows the final results.

Table 11: Results of panel data regression for CB before the crisis after removing a multi-linear variable and fixing heteroskedasticity problem.

Variable	Coef	t	p-value
eoa	228.37	3.10	0.003
doa	81.18	2.60	0.011
lod	-7.28	-0.48	0.631
caocl	0.927	1.15	0.255
roa	-712.39	-1.82	0.072
\const	-42.13	-1.30	0.198
No of Obs	84		
F(5,78)	2.25		
Prob	0.022		
R^2	0.155		

The results indicate that the ratio of equity to total assets (*eoa*) and the ratio of deposits to total assets (*doa*) significantly influence the RI of CB at times of stability. Both coefficients are positive and significant at the 5% level. The return to total assets ratio (*roa*) is also an influential variable at the 10% level. Figure 3 depicts the mean level of the variable *doa*.

4.2.2 Estimating the model to investigate the determinants of RI for CB at times of economic instability

Table 12 illustrates the results of the estimated regression model along with the Breusch-Pagan / Cook-Weisberg test for heteroskedasticity and the variable inflation factor which test for multi-co-linearity.

Table 12: Results of panel data regression for CB after the crisis

Variable	Coef	t	p-value	VIF	1/VIF
eoa	36.147	1.37	0.179	1.52	0.6583
loa	96.378	4.99	0.000	1.16	0.8606
doa	0.533	0.10	0.924	1.79	0.5588
lod	-0.153	-1.42	0.162	1.59	0.6289
caocl	-0.451	-0.35	0.728	1.31	0.7618
roa	22.428	0.28	0.781	1.10	0.9058
\const	-64.285	-3.88	0.000		
No of Obs	49				
F(6,42)	5.49				
Prob	0.000				
Adj R^2	0.359				
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity					$\chi^2(1) = 12.37$ $Prob > \chi^2 = 0.0004$
H_0: Constant variance					Hypothesis rejected: heteroskedasticity exists

The results show no multi-co-linearity problem in the explanatory variables. However, the Breusch-Pagan / Cook-Weisberg test for heteroskedasticity rejects the null hypothesis of constant variance indicating that

heteroskedasticity problem does exist. Therefore, the fixed effect model was re-estimated with robust standard error to overcome the possibility of the existence of heteroskedasticity. The results of the model estimated are shown in table 13.

Table 13: Results of panel data regression for CB after the crisis after fixing the heteroskedasticity problem

Variable	Coef	t	p-value
eoa	36.147	0.99	0.329
loa	96.378	4.14	0.000
doa	0.533	0.14	0.893
lod	-0.153	-2.56	0.014
caocl	-0.451	-0.29	0.773
roa	22.418	0.27	0.785
\const	-64.285	-3.31	0.002
No of Obs	49		
F(6,42)	8.52		
Prob	0.000		
R^2	0.439		

The results indicate that the ratio of loans to total assets (*loa*) and the ratio of loan to deposits (*lod*) are the only variables explaining the variation in the RI of CB at times of instability. The coefficients of both variables are significant at the 5% level. While *loa* has a positive effect on the RI, *lod*, on the other hand, has a negative effect. The later means that the higher the ratio of *lod*, the lower the RI (i.e. the higher the risk facing the bank). The mean level of the variable *lod* is show in figure 4.

4.2.3 Estimating the model to investigate the determinants of RI for IB at times of economic stability. Table 14 shows the result of the estimated model.

Table 14: Results of panel the data regression for IB before the crisis

Variable	Coef	t	p-value	VIF	1/VIF
eoa	-53.29	-1.02	0.312	1.74	0.574
loa	-7.98	-0.45	0.654	2.27	0.441
doa	-26.64	-1.64	0.105	3.34	0.300
lod	-2.06	-1.48	0.143	2.04	0.491
caocl	1.83	7.21	0.000	1.49	0.672
roa	856.30	3.68	0.000	1.42	0.705
\const	41.14	2.05	0.044		
No of Obs	83				
F(6,76)	16.23				
Prob	0.000				
Adj R^2	0.527				
Breusch-Pagan / Cook-Weisberg test					$\chi^2(1) = 8.41$
for heteroskedasticity					Prob> χ^2 =0.0037
H_0: Constant variance					Hypothesis rejected: heteroskedasticity exists

Multi-co-linearity does not exist between the explanatory variables, but we have a problem of heteroskedasticity. Again this is resolved by re-estimating the regression model and using the robust standard error. Table 15 below shows the results.

Table 15: Results of panel the data regression for IB before the crisis after fixing the heteroskedasticity problem

Variable	Coef	t	p-value
eoa	-53.29	-1.13	0.262
doa	-26.64	-1.69	0.096
lod	-2.06	-2.19	0.032
caocl	1.83	6.51	0.000
roa	856.30	4.93	0.000
\const	41.14	1.84	0.069
No of Obs	83		
F(6,76)	15.22		
Prob	0.000		
R^2	0.562		

Figure 2: Comparing levels of RI of CB versus IB

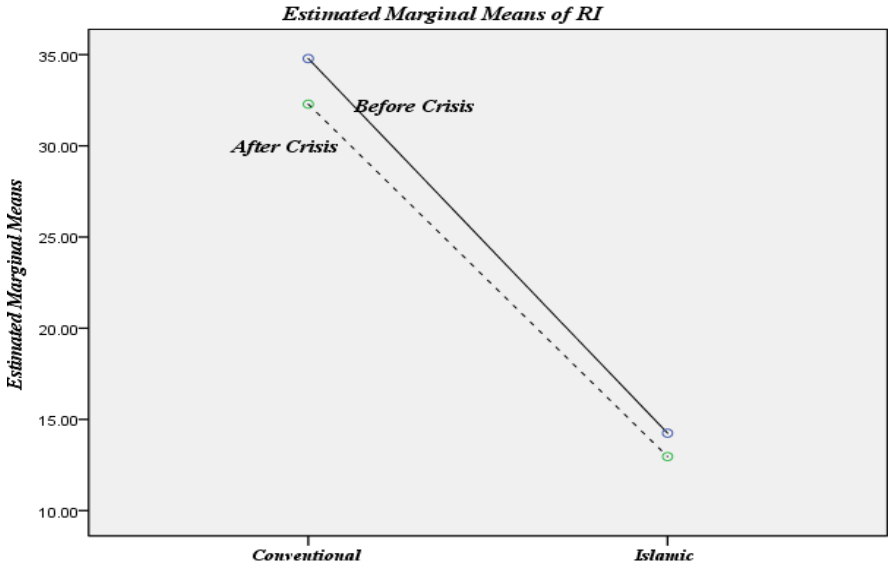


Figure 3: The mean level of the variable *doa*

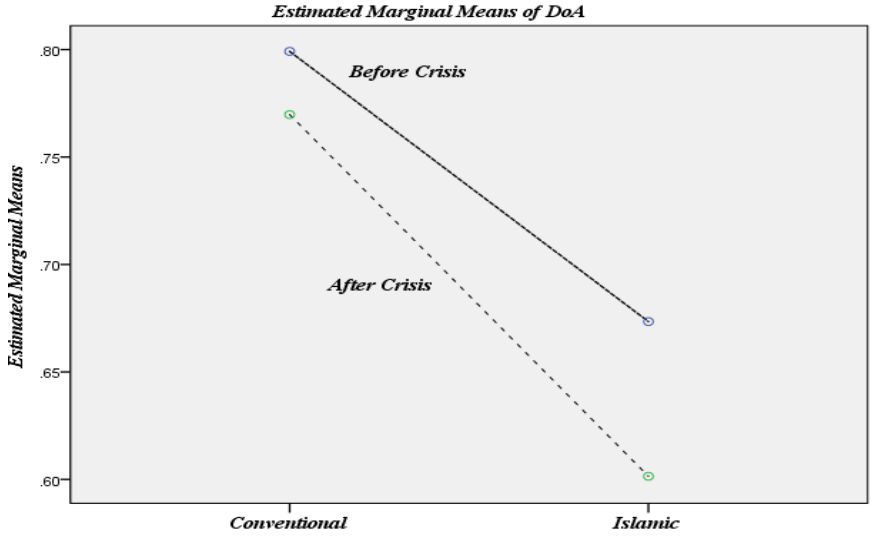


Figure 4: The mean level of the variable *lod*

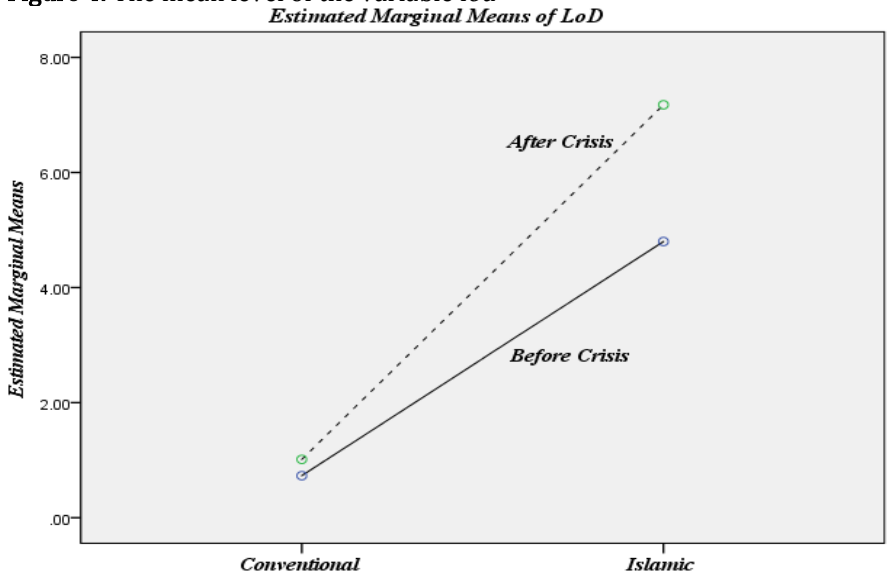
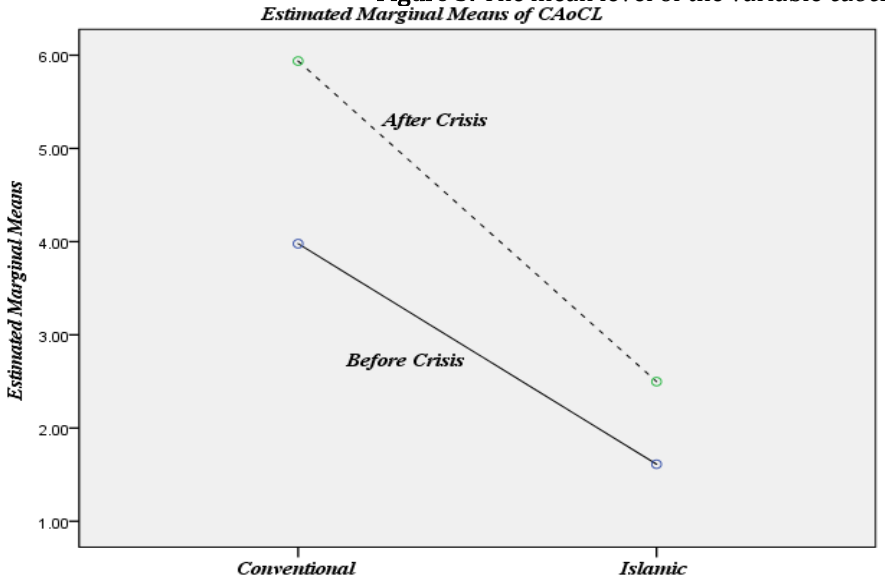


Figure 5: The mean level of the variable *caocl*



The table 15 indicates that the RI of IB at times of stability is determined by three ratios; the loans to deposits (*lod*), and the ratio of current assets to current liabilities (*caocl*) and the returns on assets (*roa*). The coefficients of all these variables are significant at the 5% level. The effects of *doa* and lod on the RI is negative. This means the higher the two ratios the lower the index indicating higher risks facing IB. The effect of *caocl*, however, is positive which means the higher the ratio the higher the RI indicating lower risks for IB. The return to total assets variable (*doa*) ratio also explains the variation in the RI but at the 10% level with positive effect. This means the increase in *doa* will decrease the RI of IB indicating lower risk. The mean level of the variable caocl is depicted in figure 5.

4.2.4 Estimating the model to investigate the determinants of RI for IB at times of economic instability

The results in table 16 show that we have no multi-co-linearity problem and the null hypothesis of constant variance is not rejected indicating that heteroskedasticity does not exist. However, the RI of the IB at times of economic instability is not explained by any of the explanatory variables.

Table 16: Results of panel data regression for IB after the crisis

Variable	Coef	t	p-value	VIF	1/VIF
eoa	-14.47	-0.44	0.659	1.36	0.735
loa	25.00	1.35	0.186	1.11	0.903
doa	7.92	0.98	0.333	3.09	0.323
lod	-0.13	-1.19	0.240	2.40	0.417
caocl	-0.05	-0.06	0.949	1.36	0.737
roa	-0.06	-0.10	0.918	1.18	0.848
\const	-7.20	-0.44	0.661		
No of Obs	49				
F(6,42)	2.22				
Prob	0.060				
Adj R^2	0.132				
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity					$\chi^2(1) = 2.51$ Prob> χ^2 =0.1132
H_0: Constant variance			Hypothesis accepted: heteroskedasticity does not exist		

An overall look of the result suggests some outstanding feature. *First*, RI of CB before the crisis is significantly different and higher than that of IB. This indicates that IB were exposed to higher risks compared to CB. The result can be explained by the fact, unlike CB, IB tend to tolerate greater risk when mobilizing the money received from the investment accounts holders. This is a logical outcome of the unique capital structure of an Islamic bank. The result confirms the findings of earlier research discussed in this paper. *Second*, RI of CB after the crisis is also significantly different and higher than that of IB indicating a lower risk for CB. After the crisis, the gap of the mean RI between the two types of banks remained almost constant indicating that the crisis had no effect on significant effect on the level of bank risks. *Third*, although insignificant, the RI of CB has decreased after the crisis indicating higher risks. The same result can be concluded for IB. This result confirms the findings of Nabi and Bourkhis (2013) who concluded that the 2008 crisis did not have a significant effect on the soundness of CB and IB. *Fourth*, Variability of the RI of CB before the crisis was found to be explained by the ratio of equity to total assets and the ratio of deposits to total assets. The results showed positive relationships. This is explained by the fact that equity is a major element of bank solvency (ability to repay and honor liabilities) therefore higher equity amount leads to higher RI and lower levels of risks and vice versa. Although it is classified as a liability in conventional banking, a number of deposits is the main determinant of bank liquidity. More liquidity increases the ability of the bank to repay its liability, hence, the positive effect on the RI. *Fifth*, variability of the RI of CB after the crisis was found to be affected by two ratios; the loans to total assets and the loans to deposits. Again the relationship was positive. This is explained by the fact that the amount of loans is another element that affects the level of bank liquidity. More liquidity leads to lower risks and vice versa, hence the positive effect on the RI of the bank. *Finally*, the RI of IB before the crisis was found to be affected by three variables, loans to deposits, current assets to current liabilities and returns on assets. These variables are different from those affecting CB for the same period. Our interpretation of this result is based on the fact that the capital structure of IB is different. Note that a number of loans in IB represents the profit and loss instruments used to mobilize the funds deposited by the investment accounts holders.

5.0 Conclusion

The paper investigates the effect of the 2008 financial crisis on the risk levels of IB compared to CB. We elected the RI as the measure of risk levels. We believe this is a suitable measure as it does not involve the element of debt or credit. Within this context, we had two main objectives. First, we wanted to test whether there is a significant

difference between the RI of CB and IB. Second, we wanted to identify the determinants of the RI for each bank type.

Before the crisis, the RI of CB was found to be significantly different (higher) from that of IB indicating higher risk levels for IB. The same result was concluded after the crisis. Moreover, the crisis did have a significant effect on the level of risks of CB. We found the same result for IB. The RI of CB was affected by the ratio of equity to total assets and the ratio of deposits to total assets before the crisis and by the ratios of loans to total assets and loans to deposits. The RI for IB was affected by loans to deposits, current assets to current liabilities and returns on assets.

The results indicated that for CB, liquidity and solvency are important determinants of the risk levels. For IB, the important determinants are liquidity and profitability. Our interpretation of this conclusion is that although important, and given the profit and loss contract, solvency for IB is not a critical issue when compared to CB. Due to the mudaraba, musharakah and murabahah contracts, profit margins of IB exhibit more variability compared to returns made by CB which is of stable nature. We believe the paper has provided two main contributions to the body of knowledge. First, we now know that, although the RI of IB and CB differs significantly, its level was not affected by the crisis. Second, the determinants of the level of RI for IB and CB are not the same. The evidence that IB are lagging in the level of the risks they have been facing before and after the crisis is in line with findings of some earlier research (see for example Hussein, 2010, Hasan and Dridi, 2011, Alkulaib et al. 2013 and Aldeehani et al. 2015). One obvious implication of these findings is that IB still has a long way to improving their management of risk while honoring Shari'a rules. Another implication is that regulators need to put more effort in the development of control policies related to the profitability and liquidity of Islamic banks.

Finally, it is worth noting that this research has focused on banks in the GCC region only. The inclusion of banks in other markets such as the Middle East and the Far East should provide a more profound outcome. Moreover, the paper has elected fundamental explanatory variables. Modeling the panel data with additional external variable may provide a wider understanding of the determinants of the banks' RI levels.

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