Does interest rate affect the saving account deposits of islamic banks ? evidence from Malaysia

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Does interest rate affect the saving account deposits of islamic banks ? evidence from Malaysia

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Abstract:

In theory, the islamic bank saving deposits should not be affected by the conventional interest rate since the interest rate is prohibited in Islamic law. However, in practice it is generally believed that in a dual banking system (both conventional and Islamic banks existing), the interest rate does affect the saving deposits of islamic banks. The focus of this paper is to test whether indeed interest rate does affect or not the islamic bank deposits. The standard time series techniques are employed and Malaysia is used as a case study. Our findings based on the generalized variance decompositions tend to indicate that interest rate did not have any significant effect on the saving deposits of islamic banks at least in the context of Malaysia. This finding has strong policy implications.

Keywords: Islamic bank saving deposits**,** commercial bank saving deposits, profit rate, interest rate, VECM, VDC, Malaysia

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1.INTRODUCTION: OBJECTIVE AND MOTIVATION OF THE STUDY

In a conventional economy, saving will be determined by the interest and profit rate. Higher profit rate will result in higher saving and vice versa. Interest and profit rates do have influence on the amount of saving.

There are a few studies done on the effect of interest and profit rate for the conventional banks, but there are limited studies on the effect of interest rate and profit rate on the Islamic banks.

Therefore this paper tends to fill this gap by answering the following research question:

What relationship is apparent between the amount of saving deposited in commercial banks, and the amount of saving in Islamic Banks and the relation with interest and profit rate, i.e. which of these are exogenous and endogenous?

As an evidence, the authors used available data of saving deposit in Malaysian commercial banks and Islamic banks.

The variables involved in this study consist of four; amount of saving deposits in Commercial banks and amount of saving account in Islamic banks; and their respective rates, the interest and profit rate.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The fundamental principle of the classical theory recognized that aggregate saving, represented by an upward-sloping function of the interest rate; as the interest rate rises, the economy tends to save more. Interest rate has long been recognized not only by classical and neo-classical economists but also by contemporary economists as one of the factors that determines the level of savings in the economy. Although there are cases of inconsistent findings, it is a generally an accepted opinion that interest rate has a positive relationship with savings.

Findings of Haron and Ahmad (2000) provide evidence regarding the relationship between the amount of deposits placed in the Islamic banking system in Malaysia and returns given to these deposits. The findings confirmed that customers who place their deposits at saving and investment account facilities are guided by the profit motive. The existence of the utility maximization theory among the Muslim customers is further confirmed by the negative relationship between the interest rate of conventional banks and the amount deposited in interest-free deposit facilities. Therefore, if profit rate of Islamic banks is lower than conventional interest rate, then Islamic banks will lose depositors. On the other hand, if profit rate is higher than interest rate, then Islamic banks will lose clients/ entrepreneurs who will refuge to take investment from Islamic banks.

Haron and Azmi (2008) in their study support the long-run relationship between the amount of deposits placed in the Islamic banking system in Malaysia by various economic units; and financial and economic variables. The findings suggest that economic units have similar behavioral patterns. Furthermore, they find evidence to suggest that Islamic bank depositors are influenced by both financial and economic variables, which is in contrast with the Islamic saving theories. For example, all Islamic bank depositors are sensitive to movement in the financial variables. Therefore, management of Islamic banks should pay more attention not only in managing their profit rate but also to the movement of interest rate in the conventional banks.

Many of the existing works done focused on interest and profit rate as dependant as the dependent variable and finding the cause of the increase or decrease in saving deposit. However, there is probably none, (according to the limited knowledge of the author) that

looks into what drives the saving in Islamic bank. This can be explained further by the time series technique since data will show the true movement of variables. Based on the limited number of literature review, it is now relevant to proceed to the next step with quantitative analysis of the study. Since there is no clear theory in the area of research, the literature review provided will be referred to and if there are explicit controversies, intuition and knowledge will help to explain the findings.

3. RESEARCH METHODOLOGY, RESULTS AND INTERPRETATION

This study is based on a time series technique, which employs most importantly the long run structural modelling and error correction model. The model will involve several steps starting with the tests of unit roots and ending with persistence profiles.

The method used here is considered as one of the current models used for econometric modelling and is generally chosen over the basic regression that has survived for 60 years. One of the reasons that this study does not favour regression is because of the assumption that has to be made in using regression. The assumption that the data is stationary cannot at all be used in this regard, since financial data are almost always non stationary at their level forms. If regression is still employed, then the results would not have significant meaning since the statistical tests would not be valid.

Statisticians have solved this problem in regression by using the differenced form of the variables, which is by differentiating the variables to make them stationary. With stationary data, it is then possible to use regression model and results would be more meaningful. However, in applying the differenced form of the variables to make them stationary, the researcher will have put out the long term theory leaving only the short term, seasonal effects.

The time series technique is also a model that does not require the researcher to determine or force the dependent variable. As already discussed briefly in the literature review section, most of the studies done had the interest rate and profit rate as the dependent variable. While this can also be true in the time series technique, it could also result in a more

interesting outcome if other variables turn out to be the endogenous. This can be explained by the time series technique characteristic of allowing data itself to show the real movement of variable without having to force them. Therefore, the result from this study may differ altogether from the previous studies if the saving account in Islamic banks does not end up being endogenous.

Since the data for Islamic banks are still limited, this study uses monthly data of five years. There are a total of 58 observations and 4 variables used:

- Saving Account Deposit for Commercial Bank (SAFCB)

- Saving Account Deposit Islamic Bank (SAIB)

- Interest rates (INT)

- Profit rates of Islamic banks (PROFR)

Data was taken from the monthly bulletin from Bank Negara Malaysia website for five years.

The method is simplified below through the eight steps that must be done in the time series technique through the software, *Microfit*:

1. Testing stationarity of variables
2. Determination of the order of the VAR model
3. Testing for cointegration
4. Long run structural modelling (LRSM)
5. Vector error correction modelling (VECM)
6. Variance decompositions (VDC)
7. Impulse response function (IRF)
8. Persistence profiles

3.1 Testing Stationarity of Variables

The purpose of testing stationarity/non-stationarity of the variables is to enable us to test for cointegration in the later steps. To proceed with cointegration testing, the variables involved should be I(1) , that is, the variables are stationary only once they are differenced once. This differenced form version of variables is created by taking the difference of the log forms that have been defined. For example, as in the case of the Saving Account Deposit For Commercial Bank which has been defined by the author as

SAFCB = LOG(DEP)

will have its differenced form through:

DSAFCB=SAFCB-SAFCB (-1).

Further in this test, the Augmented Dickey Fuller (ADF) test is used to enable the author to distinguish the non stationary and stationary variables. The results are in APPENDIX A1-A8 and are summarized as below:

Variable	Test Statistic	Critical Value	Interpretation
SAFCB	-1.9343	-3.4935	VARIABLE IS NON-STATIONARY
SAIB	-1.9114	-3.4935	VARIABLE IS NON-STATIONARY
INT	-1.3624	-3.4935	VARIABLE IS NON-STATIONARY
PROFR	-1.4877	-3.4935	VARIABLE IS NON-STATIONARY

Variable	Test Statistic	Critical Value	Interpretation
DSAFCB	-5.0410	-2.9167	VARIABLE IS STATIONARY
DSAIB	-5.3069	-2.9167	VARIABLE IS STATIONARY
DINT	-3.5732	-2.9167	VARIABLE IS STATIONARY
DPROFR	-5.9032	-2.9167	VARIABLE IS STATIONARY

The test statistic highlighted above are chosen according to the AIC and SBC criteria, that is choosing the ADF from which the AIC is highest. However, all other test statistics are relevant in the case of level form variables. As in the case of differenced form variables, this criteria was needed since some of the other test statistics are not significant to show that they are stationary.

From the above results, it is concluded that all variables involved are I(1) and therefore the test for cointegration can be done. But before that, the next step will help determine the lag order of the VAR model.

3.2 Determination of order of the VAR model

The determination of order of the VAR model is defined as the number of lags to be used in the analysis. This is done using the unrestricted VAR function in *Microfit* by selecting an exceptionally high order, 6. The outcome will show both AIC and SBC where AIC will give the maximum lag order, while SBC gives the minimum. The results are in APPENDIX B1 and summarized below:

	Criteria	
	AIC	SBC
Optimal order	4	0

Given the clear conflict between suggestions of lag order by AIC and SBC, it may have resulted from possible serial correlation and needs to be checked. Choosing a lower order may be a problem as a result from autocorrelation, while a higher order may drop degrees of freedom. From the diagnostic tests, only a single autocorrelation is found (APPENDIX B2); therefore the author chooses 6 as the optimum lag order (even though the normal lag order is either 2 or 3). A higher order in this case is thought to be relevant more degrees of freedom.

3.3 Testing for Cointegration

Two tests are carried out to see for cointegration in the study. One is the Engle-Granger method which only identifies at most, one cointegration, and the Johansen method which could actually identify more than one .The author tried to run the Engle-Granger method but it could not be done, the Johansen method only been run. It is learnt through class discussion, more cointegrations would be identified with the Johansen Method and this is considered more precise. This brings us to the Eigen Value and Trace criteria under Johansen Method.

In the case of these two criteria, the two hypotheses would be:

H_0: there is no cointegration

H_1: there is cointegration

The way it is interpreted is through looking at the test statistics and compare them against the critical values. For example, an extract from the output of the maximal Eigen Value is as below:

Null	Alternative	Statistic	95% Critical Value	90%Critical Value
r = 0	r = 1	81.3580	31.7900	29.1300
r<= 1	r = 2	21.4498	25.4200	23.1000
r<= 2	r = 3	11.6139	19.2200	17.1800

In the first row, were null is r=0, the test statistic is more than the critical values of 95% and 90%. Therefore, the null hypothesis is rejected (meaning that there is cointegration, but we are not sure how many, just yet), so we move onto the next row. The test statistic number is now lower than the critical values, therefore we accept the null (which is now r<=1).

From the Eigen Value test, it is confirmed that there is only one cointegrating vector, similar to the Engle-Granger method. However, according to the Trace criteria, there are two cointegrating factors found. For the purpose of this paper, we assume only one cointegrating relationship.

It makes sense to say that these variables are cointegrated, meaning that they do somehow relate to each other in the long run, especially regarding the saving in Islamic bank that started off depending on the conventional counterpart . The profit rate for saving in Islamic bank also would be logically related from intuition and knowledge since profit rate in Islamic banks will also take into consideration the interest rate. Therefore we can say the relationship between these four variables is not spurious and they tend to move together in the long run.

3.4 Long Run Structural Modelling

Since the previous step already confirmed one cointegration among the variables, this step is an attempt to quantify that relationship. This then enables us to compare with statistical findings to our intuition and knowledge, or theory if available. Since this study does not depend on any strong ground theory, we only rely on the available resources of literature personal knowledge, and intuition.

The Long Run Structural Modelling (LRSM) is done through normalizing the particular variable of interest (in this case the profit rate (PROFR) by identifying a4=1. The results show that variable SAIB is become insignificant with this normalization. The manual calculation of t-ratios and summary of the output below shows this insignificance.[1]

Variable	Coefficient	Standard Error	t-ratio	Interpretation
SAFCB	-0.97503	0.023006	42	Variable is significant
SAIB	−0.43595	0.90217	0.4	Variable is insignificant
INT	−0.93904	0.0854	11.0	Variable is significant
PROFR	−	−	−	-

From the above table, all the t-ratios show a signal of insignificance since all are less than 2. This result raises curiosity since some the literature related mentioned saving account

[1] APPENDIX D1

in Islamic bank is to be significant. Thus there is a need for over identification restriction to test our intuition that SAIB is significant.

An overidentification was made on variable SAIB which is insignificant using normalizing PROFR, however, when it is being tested, it still insignificant..

The percentage error of rejecting the null hypothesis (that a2=0) is 0.000

Variable	Coefficient	Standard Error	t-ratio	Interpretation
SAFCB	-.050395	.026816	2.5	Variable is significant
SAIB	-	-	-	-
INT	-.64594	.082780	8	Variable is significant
PROFR	–	–	–	-

Based on this an over-identifying Restriction on the Cointegrating vector, not include SAIB. SAIB is statistically insignificant; while SAFCB and INT statistically affect the PROFR.

Now the authors chose the interest, whether it is significant and found that all variables are significant. As the t-ratio is bigger than 2, we failed to reject the null hypothesis, A3=1. The result is below

Variable	Coefficient	Standard Error	t-ratio	Interpretation
SAFCB	.10383	.024576	5	Variable is significant
SAIB	.46425	.070056	6.5	Variable is significant
INT	-	-	-	-
PROFR	-1.0649	.096922	11	Variable is significant

INT-0.10SAFCB –0.46SAIB- 1.0PROFR -0.002 → I(0)

Even though LRSM allows us to see the equation and compare our intuition with statistical outcome, it does not tell us which variables are endogenous and which ones are exogenous. Thus we are not able to conclude which variables are independent or dependent. This will be solved in the next step, Vector Error Correction Model.

3.5 Vector Error Correction Model (VECM)

From the steps we have gone through thus far, we know that the variables are cointegrated to some degree but we are not given any information on the causality of the variables. In other words, we do not know which of the variables determine which. Having information on the leading and following variables are particularly important to regulators and policy makers in that they need to know which factor should be 'kicked' first in order to result in the movements of other variables, called the followers. At the same time, the most exogenous variable or the leader will be closely monitored since this variable is the one that brings significant effect on the others. Vector Error Correction Model (VECM) gives us this particular information on the causality of the variables involved. Through this step, the change in each variable is decomposed to short and long term components and it also determines which variables are exogenous or endogenous by looking at the ecm(-1) term in the output. Through Granger-causality, we are able to determine the extent to which one variable is influenced by another in the previous period. The following table summarizes this part of the output in VECM.[2]

Variable	ECM(-1) t-ratio[prob]	Interpretation
SAFCB	.56917[.573]	Variable is exogenous
SAIB	.028610[.977]	Variable is exogenous

[2]

INT	-1.5973[.120]	Variable is exogenous
PROFR	4.6661[.000]	Variable is endogenous

The interpretation can be looked at from the two numbers, either t-ratio or probability. Both will give the same interpretation, but the author simply looks at the t-ratio; that is, a t-ratio higher than 2 represents endogenous variable, while a t-ratio lower than two represents exogenous variable.

This outcome seems to be a little puzzling since the initial normalization was to make a3=1, that is the INT as the dependent variables. Thus we see the characteristic of the time series technique here that data will show the true movement of variables. Here, the saving deposit in commercial bank, saving deposit in Islamic bank and INT happen to be the exogenous variables, the leaders, which PROFR is the follower. The drawback of this method is however, it cannot determine which of the variables are most exogenous or the weakest endogenous when there more than one of the same type. For example, in this case, there are three exogenous variables, but we do not know which one is the ultimate leader i.e. the most exogenous.

This limitation of VECM will be solved in the next step, which is the Variance Decomposition.

3.6 Variance Decomposition (VDC)

Since the VECM in the previous step is not able to tell us the relative endogeneity of the three variables, we need the VDC to provide us with this information. The VDC has two methods in the *Microfit* software. One is the orthogonalized and the other is the generalized version. What VDC does is it decomposes the variance of forecasted error of the different variables individually into proportions attributable to shocks from each variable. This not only happens in the whole system, but also including its own shock. The least endogenous variable will be considered exogenous. This is seen from how much the variable is explained by its own past.

This step started off with the orthogonalized VDCs. The orthogonalized VDC assumes that when a particular variable is shocked, all others are 'switched off'. In addition, the numbers presented in the output depends on the ordering of the variables in the VAR. Usually, the first written variable will have the highest percentage since it is given priority as the first. Therefore, this first variable will normally turn out to be the most exogenous. To test whether this is true, the variables SAFCB and PROFR are switched places in the VAR to see whether PROFR would turn out to be the exogenous. From the experiment however, the results show that PROFR is the least endogenous variable. From the author's point of view, this may be a result of the limited number of observations in the study or it may be that after all, PROFR is the most leading factor in this study that could be influenced by other variables not included here.

The table below shows the orthogonalized VDC[3], which the author decided to take 11th horizon, which clearly indicates that the INT is the most exogenous variable with 82% contributed from its own shock compared to other variables. The highlighted diagonal pattern is the relative exogeneity; INT being the most exogenous with 82%, and the PFOFR being the least endogenous 54%. . The result is in line with the VECM. The SAIB is the least exogenous. In the **orthogonalized VDC** , the first order of the variables normally will be the most exogenous, but here turn out to be in the second rank. It might be noted that interest rate is the most strong leader.

	SAFCB	SAIB	INT	PROFR
SAFCB	**.75921**	.081089	.055881	.024964
SAIB	.11852	**.56199**	.45409	.18338
INT	.20765	.13227	**.81694**	.15929
PROFR	46063	.24098	.45179	**.53937**

The orthogonalized VDC had a few assumptions which the generalized VDC does not assume. The generalized VDC does not consider the particular ordering of the variables and does not assume that when one variable is shocked, the others are 'switched off'. However, the numbers in the row for generalized version does not add up to 1 or 100% like the

3

orthogonalized. Thus, manual calculation of the numbers needs to be done in order to get consistent numbers as a percentage amount.

As for the generalized VDCs, the results are summarized in table form

	SAFCB	SAIB	INT	PROFR
SAFCB	0.627227	0.323922	0.010448	0.038403
SAIB	0.051625	0.917015	0.003604	0.028393
INT	0.050988	0.917015	0.003604	0.028393
PROFR	0.255875	0.070449	0.317269	0.356406

The two tables above (both orthogonalized and generalized) show inconsistent findings regarding the exogeneity of the variables. Using orthogonalized VDC, the result is similar to VECM, while when using generalized VDC, it indicates differently. The generalized VDC does not consider the particular ordering of the variables and does not assume that when one variable is shocked, the others are 'switched off'. In this case, when we shock interest, the others are not assumed to be switched off.

The outcome rank using generalized VDC the relative exogeneity is as follows.

No.	Variable
1	SAIB
2	SAFCB
3	PROFR
4	INT

It can be interpreted that, when we shock INT and we see the effect on other variables, saving in Islamic banks will not be affected, as interest is not the main concern for Islamic bank. Interest is prohibited in Islam. The Islamic bank deposits are the most exogenous and not affected by interest rate.

However, **the orthogonalized VDC and VECM outcomes rank the relative exogeneity as follows.**

No.	Variable
1	INT
2	SAFCB
3	SAIB
4	PROFR

From here we are able to see that both steps 5 and 6 (orthogonalized VDC), are consistent in giving out the results when the author placed a3=1; that is the variable INT as the dependent. It turns out to be that the profit rate will be most affected followed by saving deposit in Islamic bank, and saving in commercial bank. It might be the banking system in Malaysia is based on conventional banking, which relies mostly on interest based.

But from the both steps, step 5 and step 6 (orthogonalized VDC), it is obvious interest (INT) is the most exogenous. This is a logical reasoning from the author's perspective higher interest will increase saving, since people opt to save more. From this set of data, the profit rate (PROFR) happens to be the most endogenous, it may be the result that the customers do not generally depend on the profit rate to deposit their money. It could originally be because of their own religious intentions act in the first place, except that it is difficult to quantify.

Interpreting INT to be most exogenous in both steps also indicate that, saving is being affected with the profit rate. Higher profit rate will generate more money to come in saving deposit. Since people will opt not to use the money and keep saving to generate more money.

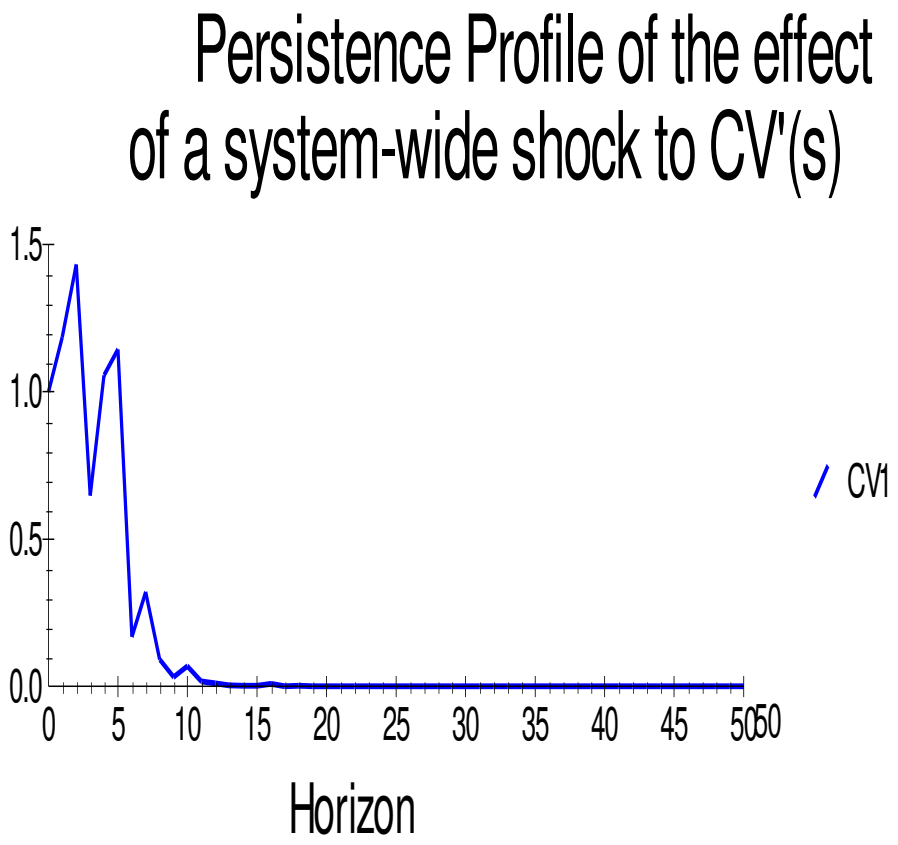
3.7 Impulse Response Functions (IRFs)

The Impulse response functions basically show the graphical representation of the VDCs in the previous step. While the VDCs prints out the numbers in the output, the IRFs uses

these numbers to generate graphs. IRFs essentially map out the dynamic response path of a particular variable owing to a standard deviation shock of one period to another variable.

3.8 Persistence Profiles

The IRFs through VDCs illustrate a situation that depends on a shock to a single variable. But here in this step, the persistence profiles give a situation where the entire system is given a shock; that is, the whole cointegration equation is shocked. Both IRFs and persistence profiles map out the dynamic response of long term relationships but differ in that the former is based on variable-specific shock and the latter, the whole system shock. The graph in persistence profiles will also indicate how long it would take for the relationship to get back to equilibrium in the long run. As the graph below illustrates, the equilibrium time is around 15 time horizon; that is to say, it would take approximately 15 weeks for the cointegrating relationship to get back to equilibrium after a system-wide shock.



4. CONCLUDING REMARKS

The conclusion that can be drawn from this study is firstly, the time series technique allows the data to determine the movement of the variables under study. This is the reason why the interest comes out to be the most exogenous of all variable, to confirm the theory. But in a few certain tests, it is in contradiction with the theory as in generalized VDC shows us. There are a few reasons. In this study , it indicates that, using generalized VDC, saving in Islamic bank will be least affected, meaning that, the Islamic banking is stable. This is the uniqueness of Islamic system. However, since the relative endogeneity/exogeneity in this study is quite inconsistent along the steps, it is believed that the interest is actually affecting the other three variables. Profit rate in step 5 happens to be most endogenous. Deposit in saving account, either in commercial bank and Islamic bank will affecting the profit rate. But in the authors'

view, it cannot be concluded that those are only the factors since that, there is no ground theory on that. At the same time, there are many other influential factors in the economy that could move the profit rates up and down. We now are able to answer the research question in general through steps 5 and 6; again in the form of **the following table of the generalised VDC**:

No.	Variable
1	SAIB
2	SAFCB
3	PROFR
4	INT

With the aid of this study, Islamic banks can find more alternative way in attracting people to come and save more with their banks. More deposit will generate more capital for them. Potential project with less riskier and based on profit sharing should be encouraged more, since bank will use the saving and return back to the client with more profit. Islamic banks should also take into consideration interest rate in managing their profit rate.

Islamic bank cannot defend themselves from being affected forever. In the end Islamic bank also will feel the heat from interest since that Islamic banking system in Malaysia is based on conventional system. Furthermore, this study also showed that interest rates and profit rate do not have direct influential effects on saving in Islamic bank. Therefore the profit rate is not the only factor that customers look at when they decide to invest in the Islamic banks, rather it could be the increase in awareness that triggers the public to put their money in Islamic banking system, no riba.

5. LIMITATIONS AND RECOMMENDATIONS

As most of the literature have established that interest do have a strong effect on saving, the limitations of this study may have come from the arbitrariness of the variables chosen and the limited time horizon. Since data collected from Islamic bank is very limited .

In the future, it is suggested the study be done relatively short and long term period to see and trace another strong factor which attracts people to save more with Islamic banks.

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