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Does a country's external debt level affect its Islamic banking sector development? evidence from Malaysia based on quantile regression and markov regime switching

Mohammed Yaw Broni¹ and Mansur Masih²

Abstract

The importance of Islamic banking is recognized globally. Its development has become a matter of great interest for many economies. Initiatives such as establishment of institutions and regulatory framework in countries that are at the forefront of promoting Islamic banking, have been pursued, yet some stakeholders seem to suggest that Islamic banking development is in stagnation. This may be due to the fact that such initiatives have often ignored the macroeconomic environment in which Islamic banks operate. One such environment is the external debt levels of the country that hosts Islamic banks. The “debt overhang” theory suggests that huge debt levels discourage investment, and may lead to banking crisis. Other theories postulate that external debt provides liquidity which benefits the banking sector. Empirically too, conflicts exist in connection with the impact of external debt on the banking sector. While some findings report that external debts have effect on bank loan prices, others find banking crisis to be insensitive to external debt burden. This paper has two objectives; firstly, to investigate the impact of external debt on Islamic banking development, and secondly to find out whether the relationship between external debt and Islamic banking development is linear or non-linear. Analyzing ten years' monthly data of Malaysia using VECM, Quantile Regression and Markov Regime Switching techniques, the findings tend to suggest that there exists a positive relationship between external debt and Islamic banking development, which seems to be non-linear. Under sound economic conditions, the impact of external debt on Islamic banking development is significantly positive, but the impact is insignificant during economic downturn and uncertainties.

Keywords: External debt, Islamic banking sector, Malaysia, Quantile regression, Markov regime switching

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1. INTRODUCTION

Given the global recognition of the importance of Islamic banking system, policy makers and interested parties desired that its level is brought at least at par with its conventional counterpart. Several policy interventions have been made by various stakeholders to ensure its growth. For instance in Malaysia, the promulgation of Islamic financial Services Act (IFSA) 2013, the establishment of the Shariah Advisory Council (SAC) and the Shariah Governance Framework are part of initiatives to ensure the sustenance of Islamic banking development specifically, and Islamic finance in general. However despite the double digit growth rate registered by Islamic finance globally for the past decade, keen watchers of the sector are concerned that, Islamic banking seems to be stagnating.

Governments and policy makers in an attempt to enhance a strong Islamic banking system, have concentrated their efforts towards building institutional structures and regulatory environment as a catalysts for growth. What they have neglected though, seems to be the macroeconomic environment in which these banks operate. Understanding the impact of such environment on Islamic banking development is key to facilitating its growth. One of such macroeconomic environment that is crucial, is the level of external debt of the country of habitat of Islamic banks. The motivation for this paper therefore is the desire to see that Islamic banking growth is accelerated and sustainable. This paper seeks to achieve two objectives. Firstly, to investigate the impact of external debt levels on Islamic banking development, and secondly to determine whether the relationship between them is linear or non-linear.

According to theory countries that are exposed to huge levels of foreign debts are more exposed to banking crisis. High foreign debt levels may cause domestic currency depreciation causing bank runs. Thus government would have to intervene by increasing interest rates to prevent capital outflow. Increasing interest rates and capital outflow both are detrimental to the banking sector. On the contrary, another hypothesis is of the view that low levels of debt provide liquidity, which is good for the banking sector. In addition, the “debt overhang” hypothesis indicates that in a situation where an economy faces high debt service burden, high proportion of output benefits foreign lenders and thus discourage investments. This would surely affect Islamic banks negatively since their products are based on investments.

Empirically most studies have focused on the relationship between external debt and economic growth. With a few that looked at external debt and the banking sector, the findings are varied. For example, one such study reports that banking crisis is insensitive to external debt burden (Eichengreen and Rose, 1998). On the other hand, others have reported the existence of a relationship between external debt and price of bank loans (Hallak, 2012, and its impact on liquidity. Both theoretical work and empirical studies seem to have produced conflicting results about the impact of external debt on banking development. Again, the fact that no such study has been conducted to investigate the impact of external debt on Islamic banking development, to the best of my knowledge, makes this paper contribute to the body of knowledge.

Monthly data spanning from January 2007 to January 2017 was analyzed using VECM, Quantile Regression and Markov Regime-Switching techniques. The results point to two major findings as follows;

1. There exists a positive relationship between external debt and Islamic banking development, which seems to be non-linear.
2. Under sound economic conditions, the impact of external debt on Islamic banking development is significantly positive, but the impact is insignificant during economic downturn and uncertainties.

Hence the results appear to suggest that the relationship between these variables might not be linear. The rest of the paper is arranged in the following order; section 2 is literature review followed by description of data and variables in section 3. Section 4 presents methodology, section 5 is empirical results and discussions, and section 6 presents conclusion and policy implications.

2. LITERATURE REVIEW

2.1 THEORETICAL ISSUES

Though we may not find theories linking external debt with Islamic banking development directly, existing theories present a lot for concern. For instance, one such theories is that countries with large amounts of short term, variable-rate, foreign-currency-denominated, and foreign debts are more exposed to banking crisis. Exposure to such high debt may lead to currency crisis, causing bank runs especially from investors who wish to seek for higher returns in other countries with stable currencies. To curtail outflow of funds from the country, government may be obliged to raise interest rates which may be detrimental to the banking sector. This action may likely cause high levels of non-performing loans that is injurious to the banking sector.

There is also a hypothesis that links the impact of debt on growth. According to this theory the relationship between debt and growth is non-linear. Low levels of debt is seen to have a positive impact on growth because it provides liquidity. However high levels impact negatively on the economy, as excessive debt retard growth. These opposing phenomena have varying implications for the banking sector. This theory is similar to the conventional view that debt stimulates aggregate demand and output in the short run, but in the long run it may lead to crowding out capital and reduction in output.

Besides the theories mentioned above the “debt overhang” hypothesis may also be indirectly linked to the banking sector. From this theory we learn that in situations of heavy debt service burden, a higher proportion of output accrues to foreign lenders, creating a disincentive for investments. Low investment culture would certainly hurt Islamic banks as their business models heavily leans

towards investments and the real sector. Again, in some quarters it is believed that private sector debt contributes to international financial stability to a greater extent compared to sovereign debts.

From the above analysis of theories, it not clear how external debt affect the banking sector in general, and the Islamic banking in particular. Theory seem to have failed to provide direction in this matter making way for us to consult empirical studies in line with the relationship between external debt and Islamic banking development.

2.2 EMPIRICAL REVIEW

Most studies related to debt, whether public, private, or external in literature, have been conducted to investigate its impact on growth. For instance Pattillo, Poirson and Ricci (2002), Kumar and Woo (2010), Eehart, Minea and Villieu (2014), and Hossain (2016) studied how debt affects economic growth. Pattillo, Poirson and Ricci (2002) observe that the debt-growth relationship seems to be a non-linear one. The studies covers a panel data of 93 developing countries from 1969-1998. They also observed that for a country with average indebtedness, doubling the debt ratio would reduce per capita growth by between half to full percentage points. In addition they report that high debt would reduce growth mainly by lowering efficiency of investments, not its volume. Kumar and Woo (2010) also find a non-linear relationship between debt and growth, but only at higher levels of initial debt. Their work considered a panel data of advanced and emerging economies from 1970–2007. They report in their findings of an inverse relationship between initial debt and subsequent growth. They add that higher levels of initial debt have a proportionately larger negative effect on subsequent growth. Eehart, Minea and Villieu (2014) find the existence of Growth Laffer Curves indexed by the levels of debt and of seigniorage when they investigated a panel data of 100 developing countries covering the period 1980–2010. Considering the macroeconomic environment of which external debt cannot be excluded, and how it impacts on growth, Hossain (2016) reports that inflationary shocks affect real interest and exchange rates, which in turn impact real output growth. His sample was made up of 9 Muslim-majority countries, from the late 1970s to 2014.

Even though most part of literature deviate from external debt-banking sector development relationship, we still have a few that are relevant to this paper. I have grouped such studies into two. The first group may not directly refer to debt-banking development relationship, but are associated with the banking or the financial sectors. The second group directly deals with the subject of this paper. In the first group, I refer to studies conducted by Hassan and Bashir (2003), Algahtani, Mayes and Brown (2016), and Naifar and Hammoudeh (2016). From a world-wide data of Islamic banks from 21 countries, spanning from 1994-2001, Hassan and Bashir (2003) provide evidence to show that high capital and loan-to-asset ratios, lead to higher profitability. They further

report that everything being equal, implicit and explicit taxes affect the bank performance measures negatively while favorable macroeconomic conditions impact performance measures positively. Looking at the performance of Islamic banks under different economic conditions, Algahtani, Mayes and Brown (2016) find that while Islamic banks performed better in terms of capitalization, profitability and liquidity in the early stages of the global financial crisis (GFC), they performed worse in later stages with the real economic downturn, particularly in the areas of capitalization, profitability and efficiency. Their data covered a period from 1998–2012 and made up of 101 banks across six Gulf Cooperation Council (GCC) economies. Naifar and Hammoudeh (2016) studied the GCC sukuk and global sukuk markets and how they are affected by the conventional bonds market. According to their findings, the GCC sukuk returns are not affected by the conventional bond market. It is the global sukuk index which is mainly affected by the global conventional bond market uncertainty, they added.

Lastly, I now turn attention to literature in the second group that mainly considered the effect of debt on the banking sector. These studies include Eichengreen and Rose (1998), Hallak (2012), and Trenca, Petria and Corovei (2015). According to Eichengreen and Rose (1998) banking crisis in emerging countries are associated with adverse external conditions, but the results seem to be insensitive to changes in external debt burdens. They investigated 105 developing countries with data from 1975-1992. On the contrary Hallak (2012) provides evidence stating that the private sector share of external debt negatively and significantly impacts the price of bank loans. He took data from 4,417 facilities covering a period between 1990 to 2006. Using a quarterly panel data of 40 commercial banks from 2005-2011, Trenca, Petria and Corovei (2015) find that public deficit among others, determine bank liquidity.

The empirical analysis has exposed contradictions in the findings. Whiles some report that banking crisis is insensitive to external debt burdens, others have reported that it has significant impact on loan prices and liquidity of banks. Again, it obvious that both theory and empirical literature have failed to address directly the impact of external debt on banking sector growth in general, and on Islamic banking development in particular. My motivation therefore is spurred by the fact that this paper would be the first in addressing this issue. I make a contribution to the body of knowledge by investigating the direct impact of external debt on Islamic banking sector development.

3. DECRPTION OF DATA AND VARIABLES

The main focus of this study is to investigate the impact of external debt on Islamic banking sector growth. Measurement of external debt of a country and Islamic banking sector growth therefore are key variables in this study. In addition, macroeconomic and bank-specific factors that impact on the two key variables have also been utilized to control for their effects. In studies involving banking sector development, different variables have been employed as proxy for this sector. Domestic credit to the private sector, bank total assets, bank deposits, and broad money supply are among the most commonly used indicators for banking sector growth. Total assets attributed to

Islamic banks have been employed to represent development of Islamic banking. The rationale is that, as Islamic banks seek to expand their businesses, acquisition of more assets is inevitable. The higher they develop, the bigger their assets since they have to expand both geographically and technologically.

External debt in literature has been measured using the external portions of Debt as a percentage of GDP, Debt service to GDP and Interest payment to GDP ratios. In this paper I used central bank's external liabilities as proxy for external debt. The measure was adopted because it was the only one available on monthly basis. It also adequately represents the financial obligation of a country to external parties whether interest is paid on them or otherwise.

The rest of the variables used in this study include nominal GDP, Lending rate, and Exchange rate. All three variables are macroeconomic in nature. In addition lending rate is most crucial in the banking sector, and affects Islamic banks specifically. Empirical studies have shown that high interest (lending) rates expose Islamic banks to withdrawal and commercial displacement risks. When interest rates are high, conventional banks make more profits and hence can pay competitive deposit interest rates. This results in withdrawal of deposits from Islamic banks to their conventional counterparts. Lending rate therefore has huge impacts on the development of Islamic banks.

Islamic banks are not isolated from the rest of the world. Exchange rate movements affect their profitability and development. Indeed most Islamic banks have Forex departments or units, and also deal in forward and international capital markets. These transactions exposed their earnings to foreign exchange risk. The importance of exchange rate movements to Islamic banking development cannot be over emphasized.

The progress of any sector of the economy is greatly influenced by the level of economic activities in the country. Levels of economic activity is measured in several ways including GDP growth, GDP per capita and nominal GDP. Because of difficulty in obtaining monthly data on GDP, this paper uses monthly Industrial production Index which is found in literature to be a good proxy for nominal GDP. A high GDP increases income which in turn increase savings. High savings enables banks including Islamic banks to provide financing to the public. There more financing they make the higher their profitability and development.

This paper looks at the impact of external debt on the development of Islamic banks in Malaysia. Malaysia is chosen for this study because over the years, the authorities have put up extensive infrastructure for the development of the Islamic banking system. With the promulgation of IFSA 2013 and establishment of the Shariah Advisory Council (SAC), Islamic banks have the conducive environment to prosper and develop. All the data are related to Malaysia, and obtained from Thompson Reuters data stream. I used monthly data from January 2007 to January 2017. External debt, Industrial production (GDP) and Islamic banking assets are in millions of Malaysian Ringgits. Exchange rate is represented by the value of the RM to USD. Interest rate is represented

by the commercial bank lending rate. Below in table1 is a description of the variables used in this paper.

TABLE 1; Description of variables

VARIABLE	DESCRIPTION
IB	ISLAMIC BANKING DEVELOPMENT
XD	EXTERNAL BEDT
GDP	GROSS DOMESTIC PRODUCT
LR	LENDING RATE
ER	EXCHANGE RATE

4. METHODOLOGY

Unlike in traditional regression where exogeneity and endogeneity of variables are assumed, in an econometrics studies such assumptions are not applied. Again, traditional regression assumes theoretical relation between variables. In contrast econometrics techniques tests for theoretical relationships between variables, and allows data to decide which variable is exogenous or endogenous. A cointegration test would indicate whether the variables are moving together in the long run. For these reasons before we undertake to investigate the impact of external debt on Islamic banking development, we have go through certain procedures to ensure that these variables have theoretical relationship.

Firstly there is the need to find out whether each variable is stationary or non-stationary in its level form. The Augmented Dickey-Fuller (ADF) unit root test is employed for this purpose. Other methods for determining stationarity of variables include the Dickey-Fuller (DF) and Phillips-Peron (PP). It is desirable that all variables should be non-stationary because only non-stationary variables possess long term information. Then the Vector Autoregressive (VAR) technique is used to the determined the order of lag.

The next procedure to follow unit root and VAR tests is cointegration. This test is designed to determine the existence of long run relationships between variables and to rule out random or spurious relationship between them. Long Run Structural Modelling (LRSM) process is then used to confirm that the results obtained in the cointegration test are correct, by using exact identifying and over identifying of coefficients obtained earlier in the E-G and Johanssen cointegration tests. However to determine which variable is endogenous or exogenous we use the Vector Error Correction Model (VECM). VECM is incapable of providing the relative exogeneity or endogeneity between variables.

We then use the Variance Decomposition (VDC) technique to rank the variables in terms of exogeneity or endogeneity, in case we have more than one endogenous variable. The VDC is able to rank the various by decomposing the variance of the forecast error of a variable, according to

the contributions from shocks of all the variables including itself. The proportion of the variance attributed to its own past is used to determine its relative endogeneity or exogeneity.

After establishing the theoretical relationship between the variables, we can then proceed to perform our regression and quantile regressions of our model. Quantile regression analysis (QRA) provides the level of dependence at different levels of the dependent variable. This technique is the most appropriate measure of the impact of exogenous variables on the dependent variable at different economic conditions such as in upturns or recessions. The estimated coefficients in a normal regression may not efficiently represent the whole period under investigation, especially when the relationship under investigation is suspected to be non-linear.

Since debt is said to have a non-linear effect on growth (Pattillo, Poirson and Ricci, 2002), and because this paper principally is interested in the impact of external debt on Islamic banking development, it is appropriate to capture different impacts at different quantiles of Islamic banking development. QRA gives consideration to the nature of curves at different quintiles of the dependent variable, along its conditional distribution. The impact of the exogenous variable on the dependent variable is not expected to remain constant in a non-linear relationship. Here we expect to obtain different coefficients at different quantiles, and check whether they are significantly different from that provided by the traditional linear methods. The impact of explanatory variables on a dependent variable at any quantile (τ), is given by the relationship below;

$$Y_{t}(\tau) = \alpha + \beta_{1}(\tau)Y_{t-1} + \beta_{2}(\tau)X_{it} + \beta_{3}(\tau)X_{it-1}$$

Where Y represents the dependent variable, Y_{t-1} is the lagged value of Y, X_i is vector of explanatory variables and X_{it-1} is the lagged values of the explanatory terms.

Another technique that is able to capture non-linearity in the relationship among variables is the Markov regime-switching method. This model provides the researcher with the behavior of say two variables in different regimes. Examples of regimes include economic upturns or downturns, bullish and bearish market conditions, and low and high periods of uncertainties in financial markets. In addition to establishing whether the impact of one variable on another differ in the various regimes, this technique also provides transition probabilities that indicate the likelihood of persistence of a regime, and the likelihood of transition to the other regime. A relationship between the variables would be considered non-linear, if the impacts vary across the regimes.

5. EMPIRICAL RESULTS AND DISCUSSIONS

Descriptive statistics have been presented in table D1 and D2. Islamic banking development is shown to be highly volatile over the period under investigation. Interest and exchange rates on the other hand have relatively low volatilities.

Table D1: Descriptive Statistics

	IB	XD	GDP	LR	ER
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Mean	9234.604	29.5203	112.0469	5.0561	4.4262
Median	7892.199	26.4778	109.1000	4.8500	4.2835
Maximum	27017.66	76.3132	142.7000	6.5700	5.4860
Minimum	452.1620	21.0719	85.1400	4.4400	3.9555
Standard Deviation	6279.697	11.3948	13.8906	0.6361	0.3834

Table D2: Correlation between the Variables

	IB	XD	GDP	LR	ER
IB	1.0000	0.2705	0.4281	-0.7180	-0.1585
XD	0.2705	1.0000	0.6573	-0.4166	0.6501
GDP	0.4281	0.6573	1.0000	-0.5542	0.5374
LR	-0.7180	-0.4166	-0.5542	1.0000	-0.1774
ER	-0.1585	0.6501	0.5374	-0.1774	1.0000

Cointegration can only be performed when variables have been found to be non-stationary or I(1) in their level forms. It is also important that when the variables are converted into their differenced forms they become stationary or I(0). The main technique used in the conduct of this test is the Augmented Dickey-Fuller (ADF) unit roots test. The results of the stationarity test is presented in tables 2 and 3 for level and differenced forms variables respectively. All variables are found to be non-stationary in their level forms and stationary in their differenced forms.

As indicated earlier, PP and KPSS tests are also used to perform unit roots test which could be used for confirmation of my results. I did not employ their use for two reasons. Firstly the results from the ADF technique was not in conflict and therefore did not need to confirm them. Secondly, the Microfit 4.1 software I used is incapable of conducting those techniques.

TABLE 2 Augmented Dickey-Fuller Unit Root Test for Level form variables

VARIABLE	ADF	VALUE	T-STATS	CV	RESULTS
LIB	ADF(5) =SBC	-15.1647	-2.1592	-3.4491	Non-Stationary
	SDF(5)=AIC	-4.1850	-2.1592		
LXD	ADF(1) =SBC	66.8713	-2.7734	-3.4491	Non-Stationary
	SDF(2)=AIC	72.5140	-2.1682		
LGDP	ADF(3) =SBC	192.0789	-2.9145	-3.4491	Non-Stationary
	SDF(3)=AIC	200.3137	-2.9145		
LLR	ADF(1) =SBC	317.2705	-1.9890	-3.4491	Non-Stationary
	SDF(1)=AIC	322.7603			
LER	ADF(1) =SBC	281.2381	-.90168	-3.4491	Non-Stationary
	SDF(1)=AIC	286.7280			

Notes; Variable is stationary if T-stats > CV, and non-stationary if otherwise

TABLE 3 Augmented Dickey-Fuller (ADF) Unit Root Test for Differenced form variables

VARIABLE	ADF	VALUE	T-STATS	CV	RESULTS
DIB	ADF(5) =SBC	-16.2587	-5.0654	-2.8868	Stationary
	SDF(5)=AIC	-6.6820			
DXD	ADF(1) =SBC	66.4315	-10.1947	-2.8868	Stationary
	SDF(1)=AIC	70.5358			
DGDP	ADF(1) =SBC	190.9794	-11.4197	-2.8868	Stationary
	SDF(2)=AIC	195.8387			
DLR	ADF(1) =SBC	314.1450	-6.4147	-2.8868	Stationary
	SDF(1)=AIC	318.2493			
DER	ADF(1) =SBC	278.5733	-7.5607	-2.8868	Stationary
	SDF(1)=AIC	282.6776			

Notes; Variable is stationary if T-stats > CV and non-stationary if otherwise

5.1 LAG ORDER SELECTION

The lag order was selected based on the VAR test. This test indicates how far the variables depend on their past values. Selection order is similar to that of unit roots tests where consideration is given to highest value of AIC and SBC. According to AIC the lag order is 1 while SBC selected order 0. This conflicting results provided the avenue to use the adjusted LR p-values, which selects the optimal lag order based on the least p-values higher than the critical value (CV) of 5%. On the basis of the adjusted LR the lag order of 1 was selected as indicated in table 4.

TABLE 4; Order of lag selection

Selected order of lag	AIC	SBC	Adjusted LR P-value	CV
1	860.8193	819.7763	(.092)	5%

5.2 COINTEGRATION

Once the unit roots and lag order selection tests have been performed, we can now proceed to determine whether the variables are cointegrated in the long run. The existence of cointegration means the variables are in equilibrium in the long run, and that they are theoretically related. I used E-G technique initially for the investigation. The results as shown in table 5, indicates that there is no cointegration among the variables, as the t-ratio is less than the CV. I then employed Johansen technique. This technique makes the variables cointegrated by assigning them various hypothetical coefficients that make the error term stationary. It also indicates the number of cointegration existing among them. Table 6 (a) and (b) represent respectively Eigenvalue and trace stochastic matrices of the Johansen technique. The results show that there is only one ($r = 1$) cointegration.

Table 5; E-G Cointegration test for variables LXD LIB LGDP LLR and LER

	Statistics	LL	AIC	SBC	HQC
DF	-5.2186	66.3550	65.3550	63.9869	64.7997
ADF(1)	-4.3812	66.5771	64.5771	61.8409	63.4667
ADF(2)	-4.0029	66.5782	63.5782	59.4739	61.9125
ADF(3)	-3.8907	66.7019	62.7019	57.2295	60.4810
ADF(4)	-3.5307	66.7258	61.7258	54.8853	58.9496
ADF(5)	-3.5076	66.9121	60.9121	52.7035	57.5807

95% critical value for the Dickey-Fuller statistic = -4.5398

Notes: Engle-Granger test is checked as ADF test. If stationary (CV>T-STAT), we have cointegration & no cointegration if otherwise.

Johansen Cointegration Test

Table 6; Johansen Cointegration results for variables LXD LIB LGDP LLR and LER

(a) LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

Null	Alternative	Statistics	95% CV	90% CV
r = 0	r = 1	45.4642	33.6400	31.0200
r ≤ 1	R = 2	25.2412	27.4200	24.9900

(b) Cointegration LR Test Based on Trace of the Stochastic Matrix

Null	Alternative	Statistics	95% CV	90% CV
r = 0	r ≥ 1	90.1962	70.4900	66.2300
r ≤ 1	r ≥ 2	44.7320	48.8800	45.7000

Notes: The statistics refer to Johansen-Juselius's log-likelihood maximal eigen value and trace statistics. From the above results we select one cointegrating vector based on the eigen value and trace statistics at 95% level.

5.3 LONG RUN STRUCTURAL MODELLING (LRSM)

In LRSM the cointegration obtained is being tested based on information from theory. This is done by imposing exact-identifying and over-identifying restrictions on the variables. The significance of the long run relationship of the variables is being tested through LRSM. Firstly one variable is restricted in a normalization process by imposing a value of 1 on it.

Table 7; Exact-identifying and over-identifying restrictions on the cointegrating Vectors

Variable	(1) Exact-identifying	(2) Over-identifying
LXD	-1.9131** (.55457)	-.0000 (*NONE*)
LIB	1.0000 (*NONE*)	1.0000 (*NONE*)
LGDP	2.9404**	.23107

	(1.3609)	(2.5066)
LLR	7.1637**	8.2137**
	(.68789)	(.89106)
LER	5.1633**	5.1633**
	(1.0999)	(1.8241)
CHSQ(1)	None	18.8408
		(.0000)

Notes: The output above shows the maximum likelihood estimates subject to exact identifying (Panel 1)

**significant at 95% confidence level

If any variable is found to be insignificant, an over-identifying restriction is then carried out. After imposing restriction on the variable LIB, all the other variables remained significant. In the over-identifying process the coefficient of LXD was tested by restricting its coefficient to zero (0). Here the null was rejected given the significance of the CHSQ(1) p-value, indicating that the coefficient of LXD is indeed not zero. In table 7 the results of the LRSM is presented.

5.4 VECTOR ERROR CORRECTION MODEL (VECM)

The VECM is a technique used in determining whether a variable is endogenous or exogenous. In this technique the determination is based on the significance or otherwise of the error term e_{t-1} in several equations when each variable intern, is made the dependent variable as indicated below;

$$DXD = C + \beta_1 DIB + \beta_2 DGDP + \beta_3 DLR + \beta_4 DER + e_{t-1}$$

$$DIB = C + \beta_1 DXD + \beta_2 DGDP + \beta_3 DLR + \beta_4 DER + e_{t-1}$$

$$DGDP = C + \beta_1 DXD + \beta_2 DIB + \beta_3 DLR + \beta_4 DER + e_{t-1}$$

$$DLR = C + \beta_1 DXD + \beta_2 DIB + \beta_3 DGDP + \beta_4 DER + e_{t-1}$$

$$DER = C + \beta_1 DXD + \beta_2 DIB + \beta_3 DGDP + \beta_4 DLR + e_{t-1}$$

However the equality sign does not make any variable a dependent one. It only shows that prior to determination by the VECM, any variable can be placed at the left hand side of the equation.

At least one of the equations above should be significant (p-value > 5%) for the validity of existence of long run relations between the variables. Table 8 shows that IB representing Islamic banking development is endogenous. The rest of the variables are exogenous.

Table 8; Vector error correction estimates for external debt, Islamic banking development, GDP, lending rate and exchange rate

Ecml(-1)	Coefficient	Standard Error	T-Ratio (Prob)	CV	Result
DXD	-.0243	.0365	-.6666[.506]	5%	Exogenous
DIB	-.3528	.0715	-4.9372[.000]***	5%	Endogenous
DGDP	-.0232	.0139	-1.6670[.098]	5%	Exogenous

DLR	-0.0029	.0040	-0.7053[.482]	5%	Exogenous
DER	-0.0025	.0054	-0.4519[.652]	5%	Exogenous

Notes: *** denote significance at 1%, P>5% denotes exogenous, P<5% denotes endogenous

In table 9, I present the OLS and Quantile regression results, analyzed using Eviews. The main issue in this paper is to examine how Islamic banking development is influenced by the level of external debt of Malaysia. Other explanatory variables only serve as controls. The results are arranged in 8 columns. Columns 5, 6 and 7 presents estimates for lower, median and upper quantile regressions respectively. Column 1 shows regression of LIB on the level forms of the explanatory variables. I then add the lag-dependent variable in column 2, and in column 3, regression on lags of dependent and explanatory variables are applied. In column 4, differenced forms of all the explanatory variable are added to the explanatory variables in column 3. Finally, column 8 represents results of a subgroup of the sample period covering April 2009 to March 2014.

Table 9: Quantile Regression Results with LIB as dependent variable

Variable	(1)	(2)	(3)	(4)	(5) L-Quantile	(6) M-Quantile	(7) U-Quantile	(8)
C	24.0974*** (0.0000)	10.6662*** (0.0000)	12.3444*** (0.0000)	11.4278*** (0.0000)	6.5236** (0.0108)	9.9105*** (0.0002)	12.8872*** (0.0000)	17.7307*** (0.0027)
LXD	0.5956*** (0.0003)	0.30534** (0.0249)						
LGDP	0.0958 (0.7810)	-0.0541 (0.8464)						
LLR	-7.1899*** (0.0000)	-3.0782*** (0.0000)						
LER	-4.1414*** (0.0000)	-1.7911*** (0.0003)						
LIB _{t-1}		0.5683*** (0.0000)	0.5777*** (0.0000)	0.5759*** (0.0000)	0.7126*** (0.0000)	0.6351*** (0.0000)	0.6362*** (0.0000)	0.5471*** (0.0000)
LXD _{t-1}			0.4163*** (0.0029)	0.3966** (0.0101)	0.3299** (0.0242)	0.3679*** (0.0072)	0.3993*** (0.0008)	1.1878*** (0.0011)
LGDP _{t-1}			-0.5608** (0.0460)	-0.3158 (0.3129)	0.1137 (0.7462)	-0.2956 (0.4491)	-1.0937** (0.0290)	-1.2520 (0.1123)
LLR _{t-1}			-3.0544*** (0.0000)	-3.0321*** (0.0000)	-2.0518*** (0.0030)	-2.5490*** (0.0000)	-2.6005*** (0.0001)	-4.2909*** (0.0022)
LER _{t-1}			-1.6379*** (0.0011)	-1.7741*** (0.0008)	-1.6315** (0.0130)	-1.6119*** (0.0019)	-1.0281* (0.0559)	-3.3387*** (0.0004)
DXD				0.1418 (0.4557)				
DGDP				0.5970 (0.2259)				
DLR				-2.8726* (0.0923)				
DER				-0.9467 (0.4498)				
R-squared	0.9020	0.9350	0.9351	0.9379	0.8046	0.7746	0.7151	0.8709
Adjusted R-squared	0.8986	0.9321	0.9322	0.9328	0.7960	0.7648	0.7026	0.8590
Prob (F-statistic)	0.0000	0.0000	0.0000	0.0000				0.0000
Prob (Quasi-LR stat)					0.0000	0.0000	0.0000	

Notes: *, **, and *** denote 10%, 5% and 1% significance level respectively.

Column 1 reveals that apart from GDP, all level form variables including external debt (XD), lending rate and exchange rate have significant relationship with Islamic banking development. Also results in column 3 indicates that lags of all the variables are significantly related to Islamic banking development, but the lag of GDP does not seem to be robust as indicated in column 4. I have decided to base the interpretation of this analysis on column 3 for two reasons. Firstly, when a regression was carried by the combination of level form and lags of the variables as repressors (results not reported), most of the coefficients were insignificant. Secondly, Ramsey RESET test in table 10 proves that the model specification in column 3 is adequate. Hence quantile results are based on this column.

The lags of GDP, lending rate and exchange rates are found to have a significantly negative association with Islamic banking development (IBD) in Malaysia. A one percent (1%) increase in GDP in a particular month will lead to a decrease in IBD by about 0.6% in the following month.

The results also show that a 1% increase in the lending rates would cause a reduction in IBD by about 3.1%. This result is supported by many studies that report that in a dual banking system, interest rate changes have impact on Islamic banks' profitability and growth. According to these studies, rise in interest rates causes customers to shift their funds from Islamic banks to conventional banks. Interest rate changes therefore exposes Islamic banks to withdrawal risk.

However to keep their customers, Islamic banks are forced to raise profit rates on deposits and investment accounts. This action cost Islamic banks money, which are normally charged against their profits. In fact in some circumstances Islamic banks forgo their share of profit sharing arrangement, just to keep their customers. As a result of the ease at which Islamic banks customers switch to conventional banks in response to hikes in interest rates, has lead them to be described as being risk-averse.

According to the results, a 1% increase in exchange rate of the Malaysian ringgit to USD will lead to a lowering of IBD by about 1.6%. An increase in exchange rate implies that the RM has depreciated. Hence the results indicates a decrease in IBD with a depreciating RM. One way to explain this phenomenon is the movement of capital across international borders. Investors are looking to invest in countries where currency values are reasonable and stable. Any sign of depreciation of currency of a country would cause investors to look for other destinations where returns on their investments would not be eroded by depreciation. Islamic banks are not immune from such behavior of investors. The globalization of the financial sector implies that funds move easily with a speed light. Depreciation of the RM would therefore cause IBD to be negatively affected directly or indirectly. Secondly if Islamic banks have already entered into contracts where they have to receive payments in RM, or make payments in dollars, any depreciation of the RM would impact negatively on their profits. This is also detrimental to their growth prospects.

Two positively significant relationships with IBD are obtained from column 3. The results indicate that IBD is significantly influenced by its immediate past value. A 1% increase in its past leads to

0.6% increase in IBD. Most importantly for this paper, the results show a positive relationship between the lag of external debt and IBD, and it is significant. An increase of 1% of external debt of Malaysia in a particular month, causes IBD to increase by about 0.4% in the following month. From this results, one may infer that external debt is good for the development of the Islamic banking sector and supports the findings of Eichengreen and Rose (1998), who reported that banking crisis in emerging markets are strongly associated with adverse external conditions, and not dependent on changes in external debt burdens.

To explain the reported relationship between external debt and IBD in Malaysia, let us look at what happens to the domestic banking sector when government contract debt from abroad. Without borrowing from outside, government would have had to contract loans from domestic banks at least in the short term. This action would crowd out the private sector, making the cost of financing very high, implying interest rates would rise. In this scenario, Islamic banks would be affected in two ways. Firstly, cost of financing would go up deterring customers and business clients from borrowing. Since financing is essential to IBD, their growth is curtailed when government relies on domestic banks for funding. However when government obtains the bulk of its debt externally, the pressure on domestic funding is relaxed and excess reserve accumulate. Interest rates then falls to reasonable levels. Islamic banks can now provide a lot more financing to the public. Thus generate higher revenues for growth. Secondly the resultant increase in lending rates when government relies on domestic sources for loans, is not conducive for IBD. Results from this paper has indicated that higher interest rates retard IBD. Also the risk-averse nature of Islamic bank customers exposes Islamic banks to withdrawal and commercial displacement risk.

The second objective of this paper is to determine whether the relationship between external debt and IBD is linear or non-linear. This necessitated the use of quantile regression in the analysis. With this technique, we are able to ascertain whether the impact of external debt on IBD significantly differ or not, across various quantiles. Results in columns 5, 6 and 7 representing the lower, median and upper quantiles respectively, indicates that the impact of external debt on IBD is significantly positive in all three quantiles. Going by these results, a 1% increase in external debt would cause an increase in IBD by 0.33%, 0.37% and 0.40% in the lower, median and upper quantiles respectively. To check whether this coefficients are statistically different, the Wald's slope equality test was performed. From table 10, the result shows that the coefficients in these quantiles are statistically not different from one another. In addition the R-software provides further evidence graphically to that effect, presented in graph 3.

From the perspective of the quantile regression analysis backed by the slope equality test, the relationship between external debt and IBD seem to be a linear one. To probe further, the CUSUM and CUSUM Squared diagnostics tests were performed to check for structural stability in the model. The result is represented in the graph 1 and 2. Structural breaks exposed by the CUSUM square test indicates that this break occurred between the periods April 2009 and March 2014. An OLS regression was then conducted on a sub-group of the data covering the period of the structural break, and the results presented in column 8.

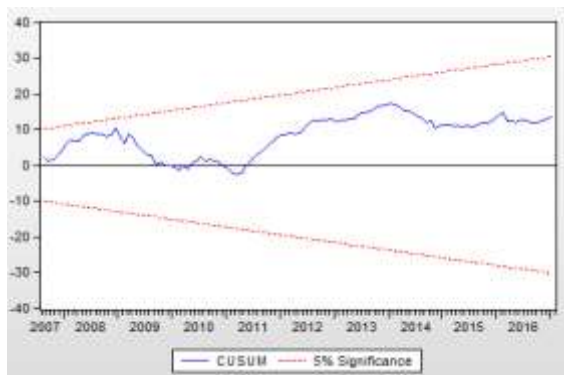
Table 10: Diagnostic Tests

Test	Statistics
Ramsey RESET Test	1.3697 (0.1735)
Wald Test	11.06911 (0.3522)
Ramsey RESET Test (MS)	1.1193 (0.2654)

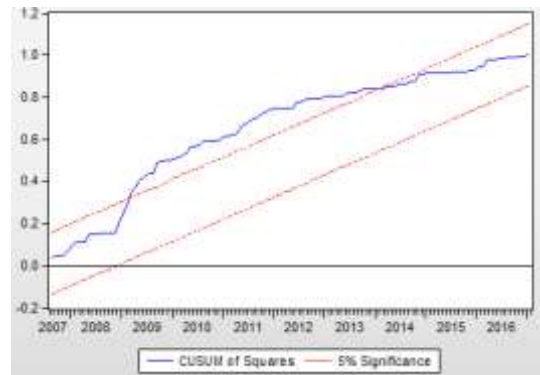
The results in column 8 indicate that, considering this period, a 1% increase in external debt, IBD would increase by about 1.2%. This impact is three times higher than the 0.4% obtained for the whole sample period.

To present the impact of external debt on IBD as 0.4% to policy makers could be misleading. To probe further, I applied the Markov Regime-Switching (MS) technique. This technique provides insights into whether there is difference in the impact of one variable on another, in different regimes which may be invisible.

Graph 1: Structural Stability



Graph: Structural Stability



Graph 3: Slope equality test from R-software

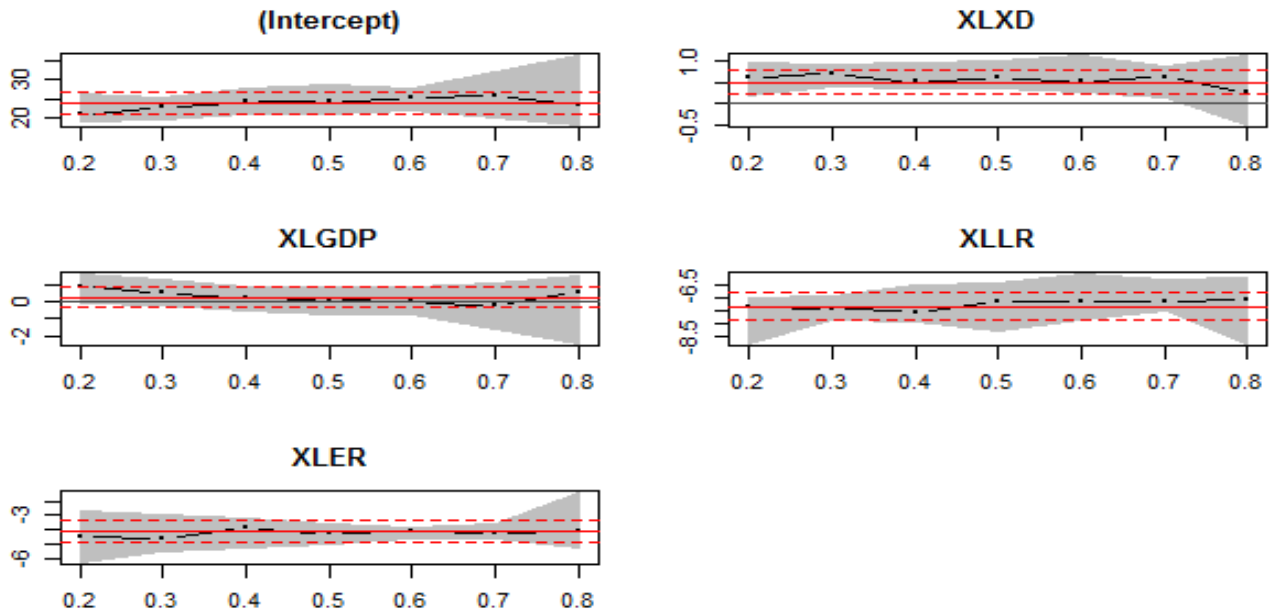


Table 11: Markov Regime Switching Results with LIB as dependent variable

Variables	(1)	(2)	(3): Regime-1	(4): REGIME-2
C	8.8692*** (0.0002)	23.8772*** (0.0000)	27.7989*** (0.0000)	27.7989*** (0.0000)
LIB _{t-1}	0.6192*** (0.0000)			
LXD _{t-1}	0.1403 (0.3279)	0.5083*** (0.0029)	1.2526*** (0.0003)	0.1432 (0.3875)
LGDP _{t-1}	0.1991 (0.4941)	0.2555 (0.4779)	-1.1745*** (0.0009)	2.2610*** (0.0000)
LLR _{t-1}	-2.8471*** (0.0000)	-7.3344*** (0.0000)	-6.5346*** (0.0000)	-8.3344*** (0.0000)
LER _{t-1}	-1.5889*** (0.0021)	-4.1632*** (0.0000)	-4.7037*** (0.0000)	-5.1168*** (0.0000)
R-Squared	0.931	0.8936	0.9498	0.9485
Adjusted R-Squared	0.928	0.8899		

Notes; *** denotes 1% significance level

In table 11, MS results are presented. There are four columns on this table. Column 1 contains all variables of interest which were used for the normal regression in column 3 of table 9. In column 2, the lag-dependent variable is dropped. Columns 3 and 4 are results for regimes 1 and 2 respectively. The inclusion of the lag-dependent variable made the main explanatory variable (external debt) insignificant when the R-software was employed. The R-software was employed to allow for the MS technique to be carried out since that method was unavailable on Eviews 7.

When the lag-dependent variable was dropped, the impact of XD on IBD became significant. A RESET test on the model in column 2 indicates that the model is well specified. The result of the RESET is also reported in table 10.

Two regimes are identified from results of table 11. It shows that the impact of XD on IBD is positive and significant in regime 1. The same cannot be said however of the results in regime 2 where the relationship between the two variables is not significant. Considering regime 1, the results further show that for a 1% increase in XD, IBD will increase by about 1.3%. This result is very close to that of column 8 of table 9 when a subgroup of the sample based on the structural break was used for the regression.

Table 12: Transition Probabilities

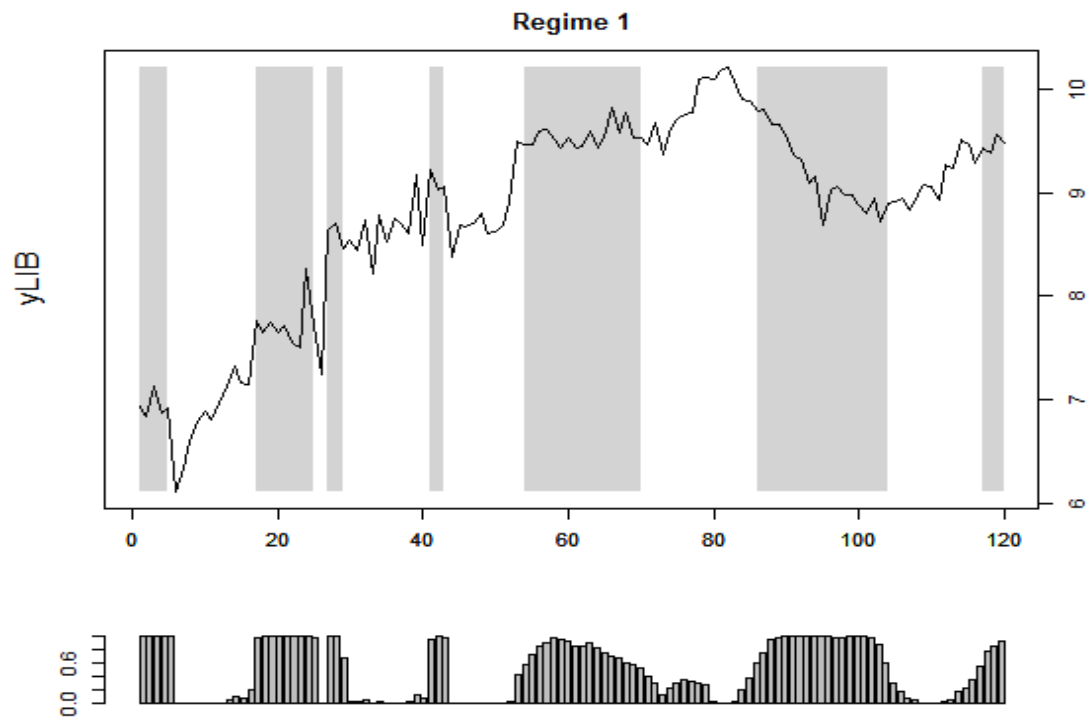
	Regime 1	Regime 2
Regime 1	0.8744335	0.1225075
Regime 2	0.1255665	0.8774925

At this point, let us digress for a while to consider the impact of the other explanatory variables. Lending rates (LR) and IBD relationship is significantly negative in both regimes even though the values of the impacts differ. In regime 1 the results suggest that a 1% increase LR would cause a 6.5% decrease in IBD, but the decrease in regime 2 is 8.3%. Also exchange rate (ER) shows a significantly negative relationship with IBD in both regimes. Here too the magnitude of the impact increases from regime 1 to regime 2. A 1% increase in ER would cause a decrease of 4.7% and 5.1% in IBD respectively in regimes 1 and 2.

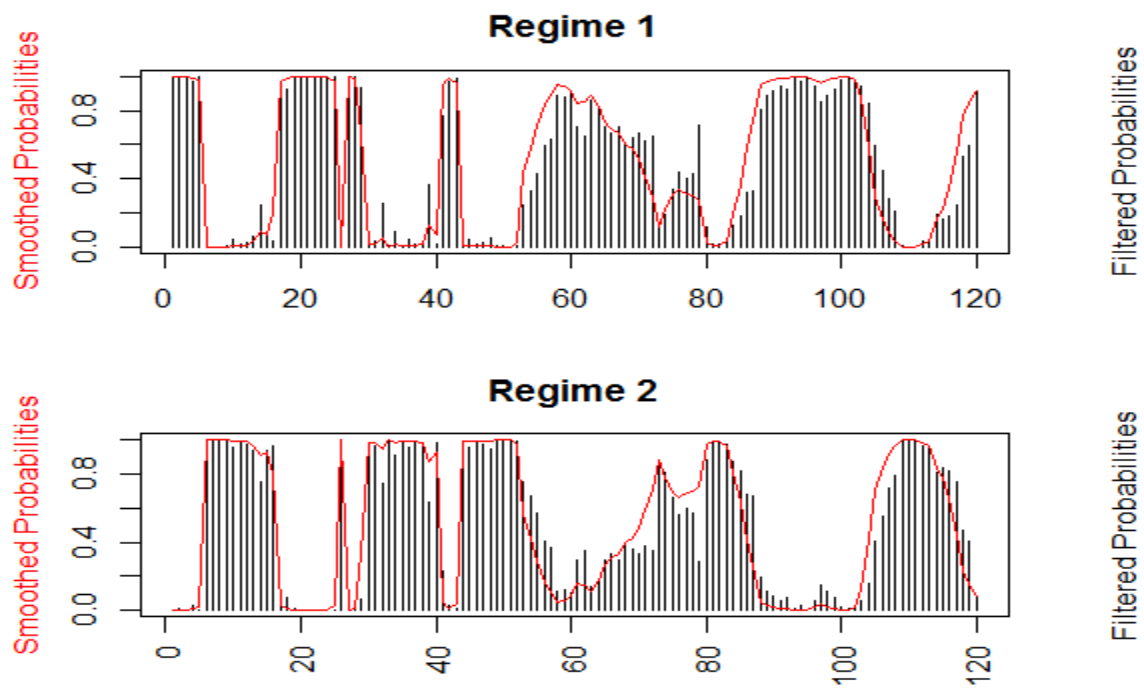
Interestingly, though the relationship between GDP and IBD is insignificant (column 2) in the normal regression, it appears to be significant in both regime 1 and regime 2, with negative and positive impacts respectively. It would have been erroneously reported that GDP has no significant impact on IBD had we limited ourselves to only a linear-model relationship. The report indicates that in regime 1, a 1% increase in GDP would cause a decrease of 1.2% in IBD, whereas in regime 2, the impact is an increase of 2.3%. Graphical representation of the regimes are shown in graphs 4 and 5.

Identifying the conditions for both regimes is an important task in attempting to interpret appropriately the results obtained. An examination of regime 2 indicates that it occurred approximate between 15-25, 30-39, 44-53, 80-83, and 109-114 horizons of the data. Given that the data begins from January 2007, the approximation dates of regime 2 occurrences were March 2008-January 2009, June 2009-March 2010, August 2010-May 2011, August 2013-November 2013, and January 2016-June 2016. An analysis of these periods with global events reveals that they are connected in one way or the other with economic and financial turmoil.

Graph 4



Graph 5



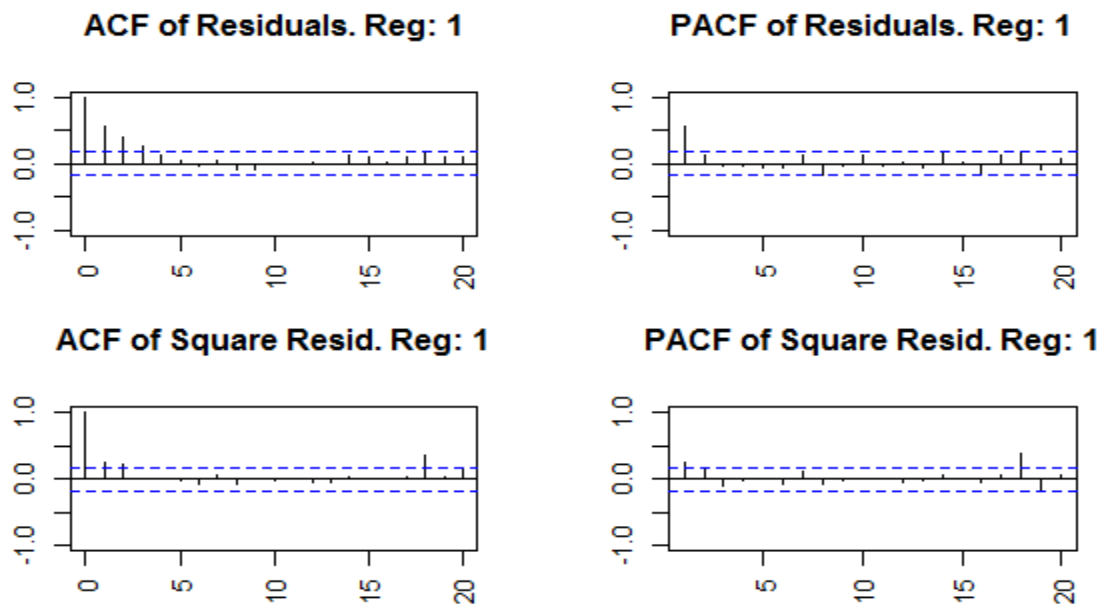
For instance the global financial crisis which began with the USA subprime mortgage crisis, was in the early part of 2008. This crisis lead to losses amounting to about trillions of USD globally, with banks having to write off loans amounting to about 850 billion USD. Following the subprime mortgage crisis was the global oil crisis in July the same year, when price of oil fell to its lowest level. Both crisis quickly spread globally adversely affecting many economies.

Regime 2 can also be linked to the Eurozone debt crisis which started with Portugal, Ireland, Italy, Greece and Spain, in 2009. This was a period of uncertainty globally in the financial sector. Obviously Brexit which occurred in 2016, was also a source of volatility in financial markets across the globe, and it also occurred in the regime 2. Lastly, the first half of 2016 caused a lot of anxiety and uncertainty in financial markets due to the elections in USA that finally resulted in the election of President Trump.

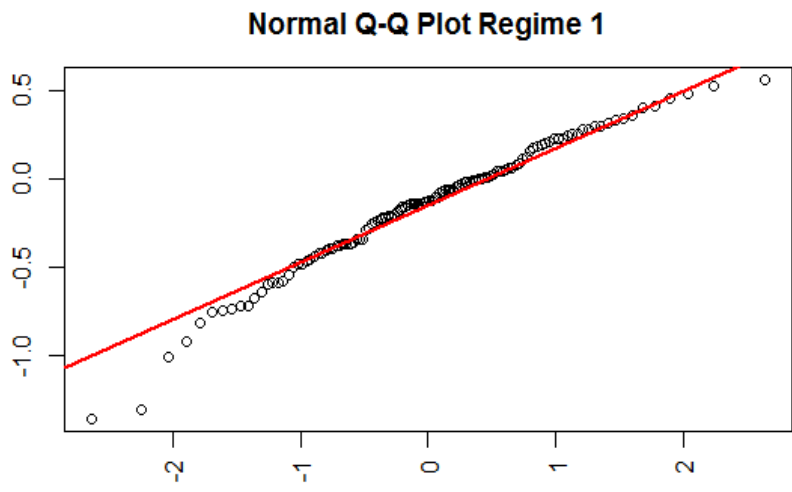
From the analysis stated above, it seem to appear that while regime 1 is associated with sound and stable economic conditions, regime 2 sets in under conditions of economic downturns, crisis and uncertainties. Hence in my humble opinion, XD has a significantly positive relationship with IBD during stable economic conditions, but the relationship is insignificant during periods of economic crisis, downturns and uncertainties.

Diagnostics for Markov Switching Regime

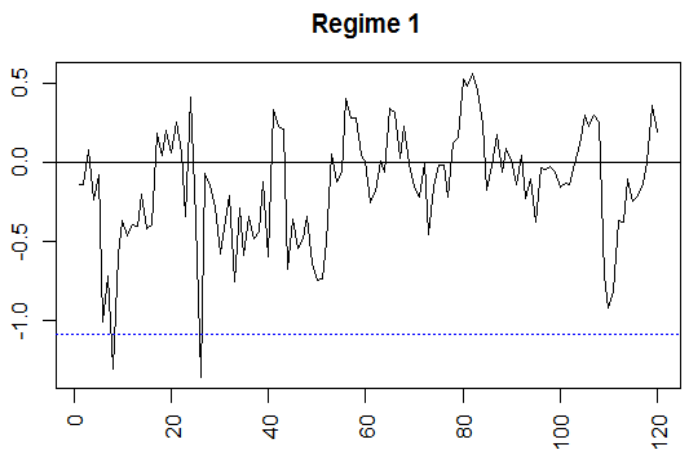
Graph 5



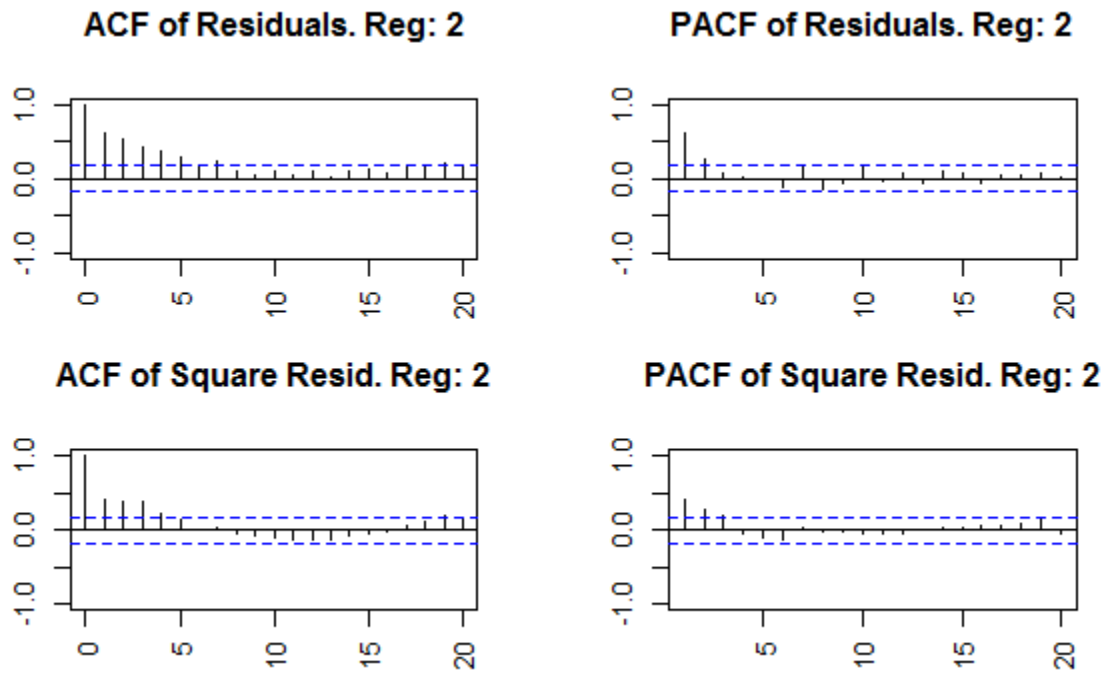
Graph 6



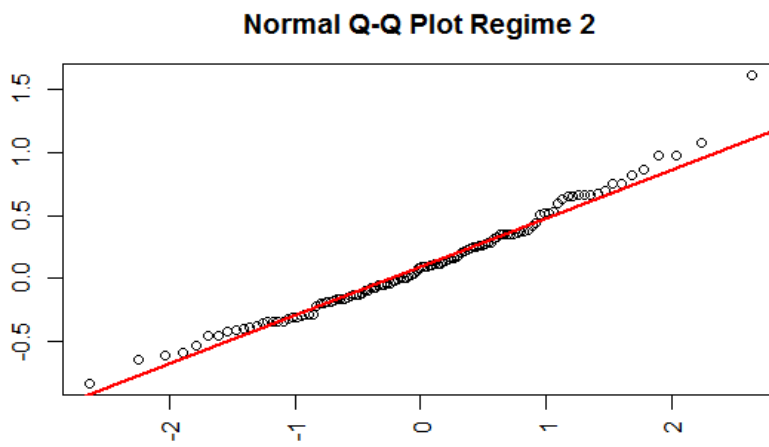
Graph 7



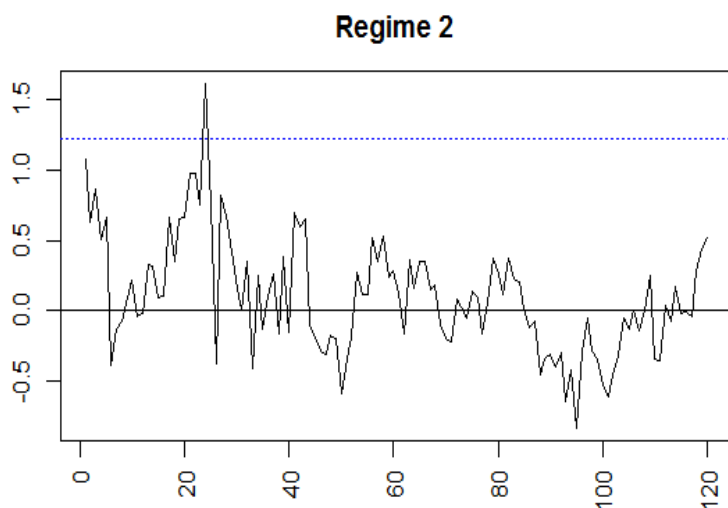
Graph 8



Graph 9



Graph 10



Results in table 12 indicate that under regime 1, the probability for that regime to persist is about 87.4%, while the likelihood for transition to regime 2 is only about 12.3%. On the contrary in regime 2, the probability for persistence is 12.6% whereas the likelihood of switching to regime 1 is 87.8%. Graphs 5-10 represent diagnostic test for the MS analysis. The ACF and PACF for both regimes indicate that the residuals are not randomly distributed.

6. CONCLUSION AND IMPLICATIONS FOR POLICY

Conventional banking system is several decades ahead of its Islamic banking counterpart. In a dual-banking system especially, policy makers' main concern is finding out ways of bringing up Islamic banks at least to the level of their conventional counterparts. Despite the double digit growth rate of Islamic finance world-wide, observers are worried that the Islamic banking sector may be stagnating.

Malaysia is seen as spearheading the growth agenda of Islamic banks. However, most of the efforts have been focused on the building of structural institutions, and promulgation of various laws and regulations in the hope that, the Islamic banking sector would be supported and stimulated. What has been neglected though is the macroeconomic environment in which these banks operate. The external debt level of a country is one such economic factor which has received little attention. In this paper therefore, two important questions have been tabled for redress thus;

- a. What is the effect of external debt levels on Islamic banking development
- b. Is the relationship between external debt and Islamic banking development linear or non-linear?

Using Malaysia as a case study, this paper employed monthly data for a period of ten years, and VECM, Quantile regression, and Markov regime-switching techniques to arrive at the following findings;

1. There is a positive relationship between external debt levels of Malaysia and Islamic banking development, which seems to be non-linear.
2. Under stable economic conditions, Islamic banking development has a significantly positive association with external debt, but the relationship appears to be insignificant under economic downturns and crisis, and during increased financial uncertainties.

The results have some implications for policy. Firstly, government may have to consider borrowing externally for a higher proportion of its debts. This action would provide a breathing space in the credit market, thus keeping lending rate under control. Such a policy would reduce withdrawal and commercial displacement risks that Islamic banks are exposed to. Secondly government would have to take steps in shielding the domestic economy against the spillover of crisis and uncertainties arising from external sources. This would curtail the occurrence of regime 2, which makes the effect of external debt on Islamic banking development insignificant. Lastly, policy makers should try to stimulate the economy, since in regime 2, GDP is seen as the only variable that has positive impact on Islamic banking development.

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