DETERMINANTS OF CREDIT RISK OF ISLAMIC BANKING IN A DUAL BANKING SYSTEM: A CASE OF SELECTED MUSLIM COUNTRIES

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ABSTRAK

Tahap risiko kredit perbankan Islam telah menimbulkan kebimbangan kepada pihak berkuasa perbankan di kebanyakan negara Islam sejak beberapa tahun yang lalu. Oleh itu, kajian ini meneliti penentu risiko kredit perbankan Islam dalam sistem dwiperbankan yang merentasi negara bagi tempoh 2007 hingga 2015. Lag Autoregresif Teredar (ARDL) dan OLS Dinamik telah digunakan untuk menyiasat kewujudan hubungan jangka panjang antara risiko kredit bank-bank Islam dan pembolehubah khusus bank serta makroekonomi terpilih. Indeks Hirschman-Herfindahl (HHI) juga telah digunakan untuk menentukan tahap tumpuan pembiayaan oleh bank-bank. ARDL membuktikan wujudnya hubungan jangka panjang antara risiko kredit bank-bank Islam dan kadar faedah, pengembangan kredit, jurang pembiayaandeposit, pendapatan sebenar, bekalan wang, dan kadar pertukaran di Malaysia, Indonesia, dan Bahrain. Justeru, bukti-bukti ini menunjukkan bahawa faktor-faktor tersebut menerangkan risiko kredit bank-bank di negara-negara berkenaan dalam tempoh tersebut. Sementara itu, bukti daripada HHI dan OLS Dinamik juga mendedahkan kewujudan tumpuan pembiayaan oleh bank-bank Islam di Malaysia, Indonesia, dan Bahrain. Di samping itu, bukti-bukti yang seterusnya menunjukkan hubungan yang positif antara tumpuan pembiayaan dan risiko kredit bank-bank Islam di Malaysia dan Bahrain. Risiko yang wujud dalam tumpuan pembiayaan terutamanya dalam sektor isi rumah dan pengguna menunjukkan kehadiran *moral hazards* dalam pembiayaan bank Islam di negara-negara ini. Hasil kajian memberikan bukti lanjut kepada pengurusan bank-bank Islam dan pihak berkuasa tentang faktor-faktor yang perlu sentiasa dipantau dalam strategi pengurusan risiko kredit bank. Kefahaman tentang kewujudan *moral hazards* dalam tumpuan pembiayaan oleh bank-bank Islam juga dapat memberikan panduan kepada semua pihak yang berkepentingan.Ini bagi memastikan bahawa bank-bank bukan sahaja patuh syariah dalam operasi mereka tetapi juga memelihara kepentingan jangka panjang pemegang saham mereka dan seluruh kestabilan sistem kewangan.

Kata kunci:Risiko kredit, perbankan Islam, kointegrasi, dan *moral hazards*

ABSTRACT

The level of credit risk of Islamic banking has generated a great deal of concern to the banking regulatory authorities of many Muslim countries in the last few years.This study, therefore, examined the determinants of the credit risk of Islamic banking within the dual banking system of selected Muslim countries for the period 2007-2015. Autoregressive distributed lag (ARDL) and Dynamic OLS were employed to investigate the existence of a long-run relationship between the credit risk of Islamic banking and selected bank-specific and macroeconomic variables. Hirschman-Herfindahl-Index (HHI) was also employed to determine the level of financing concentration by the banks. Evidence from ARDL indicates the existence of a long-run relationship between the credit risk of Islamic banking and financing-deposit gap, real income, money supply, interest rates, credit expansion, and exchange rate in Malaysia, Indonesia and Bahrain. Similarly, evidence from HHI reveals the incidence of financing concentration by Islamic banks in these countries. Furthermore, evidence from Dynamic OLS indicates the existence of a long-run relationship between credit risk and financing concentration in Islamic banking in Malaysia and Bahrain.The inherent risk in financing concentration particularly in the household and consumer sectors indicates the presence of moral hazard in Islamic banking financing. The implication of the findings of the study suggests that the managements of Islamic banks and the relevant regulatory authorities need to further strengthen the existing credit risk management and monitoring strategies to prevent the incidence of the banking crisis and Islamic banking failure. The understanding of the existence of moral hazard in financing concentration will also guide relevant stakeholders in Islamic banking to ensure that banks are not only Sharia-compliant but also ensure optimum financing portfolio mix that can guarantee the long-run interest of their stakeholders and the overall financial system stability.

Keywords: Credit risk, Islamic banking, co-integration, moral hazard.

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CHAPTER ONE

INTRODUCTION

1.1 Background and Motivation of the Study

The crisis in the sub-prime housing market in the US which started in 2007 triggered the credit crunch and economic meltdown in the US and led to the global financial crisis of 2008. The crisis has far-reaching effects on the economies of many countries of the world (Dicevska, 2012; Probohudono, Tower & Rusmin, 2013; Rohit, 2008). Due to the intensity of its effects, it has been labeled the worst crisis since the Great Depression (Hengchao & Hamid, 2015; Smolo & Mirakhor, 2010). According to Rohit (2008), the bankruptcy of the Lehman Brothers in 2008 further deepened the financial crisis in the US. Rohit asserts further that it was the crisis that led to the takeover of Merrill Lynch by the Bank of America. Also, it was the same crisis that led the likes of Goldman Sachs and Morgan Stanley erstwhile, frontline investment bankers in the US, to transform into ordinary deposit-receiving banks. It took countries like the USA, China and EU billions of dollars of the bailout and liquidity injections to curtail impacts of the crisis (Md Zaber, 2012). According to Hengchao and Hamid (2015) the US subprime crisis, even though, started in the US, it spread to other countries, both developed and developing, as well. The crisis was precipitated by unwholesome practices in the credit market and the failure of the main vehicle of capitalism; free Market System with the doctrine of invisible hand mechanism (Moniruzzaman, 2014).

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Ironically, at a time when the whole world is immersed in this financial crisis and world leaders are searching for alternative financial systems, interest in Islamic based financing is rising not only in the traditional Muslim countries of the Middle East and Asia but also in the major financial centres of Europe and America. According to Khan and Bhatti (2008), Islamic finance and banking industry has been making breakthrough improvements to become a truly viable alternative to conventional financial and banking institutions at the global level. Resilience of the Islamic financial system became noticeable during the global financial crisis of 2008 (Hassan & Dridi, 2010). Increasing recognition of its value propositions has made Islamic finance more widely acceptable in many countries such as the UK, Singapore, and Germany. The importance of Islamic financial industry in the global financial system is captured in the argument of Hassan and Dridi (2010) in which they state that "as one of the fastest growing segments of the global financial finances, Islamic finance has become systematically important in many markets and too big to ignore in others".

However, in spite of the observed stability of the Islamic banking sector during this crisis period, Islamic financial industry, according to Smolo and Mirakhor (2010), has not been totally immune to the banking crisis. It has been hit as well, although to a lesser extent. Smolo and Mirakhor (2010) further argue that this may indicate the existence of a possible extensive herding effect of the happenings in the conventional banking sector on the Islamic sub-sector of the banking industry. According to Al-Wesabi and Ahmad (2013), Islamic banks are also exposed to the various types of

risks that can lead to systemic failure as banks face many risks in the course of their intermediation functions.

Among the various parameters used to measure the degree of the risk inherent in a bank and therefore its vulnerability to the crisis is the proportion of the non-performing financing/loans to the total financing/loan portfolio of the bank. The ratio of non-performing financing/loans to total financing/loans also measures the quality of the risk assets owned by the banks. Non-performing loans or the possibility of default by counterparty among other factors has been used to define credit risk in financial institutions (Ahmad & Ahmad, 2004; Joint Forum[1], 2015; Louzis, Vouldis & Metaxas, 2012).This has become an important measure of the degree of risk inherent in, and the stability or otherwise of a bank. Concern for non-performing financing in Islamic banks is not in any way, significantly, different from that of the conventional banks.

Table 1.1

Non-performing financing of Islamic banks and the non-performing loans of the conventional banks in Malaysia.

Year	ISLAMIC BANKS	CONVENTIONAL BANKS
	%	%
2007	4.1	3.2
2008	2.3	2.2
2009	2.2	1.8
2010	2.2	2.4
2011	1.7	1.9
2012	1.2	1.4
2013	1.0	1.3
2014	0.9	1.2

SOURCE: Raw data from Bank Negara Malaysia's Monthly Statistical Bulletins (20017 – 2014)

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[1] The Joint Forum was established in 1996 under the aegis of the Basel Committee on Banking Supervision (BCBS), the International Organization of Securities Commissions (IOSCO) and the International Association of Insurance Supervisors (IAIS) to deal with issues common to/across the banking, securities and insurance sectors, including the regulation of financial conglomerates

According to Bank Negara Malaysia's (the Central Bank of Malaysia) reports on non-performing loans for the period 2007 - 2014, Islamic banks in Malaysia appear not different from the conventional banks in terms of the trend of their non-performing financing. This trend is presented in Table 1.1.

This implies that, in spite, of the theoretical inbuilt safeguards in Islamic banking and administrative and political supports, it receives particularly in Malaysia and Indonesia, it still exhibits the same characteristics as conventional banking in practice in terms of credit risk exposure. Figure 1.1 shows graphical presentation of the data in Table 1.1
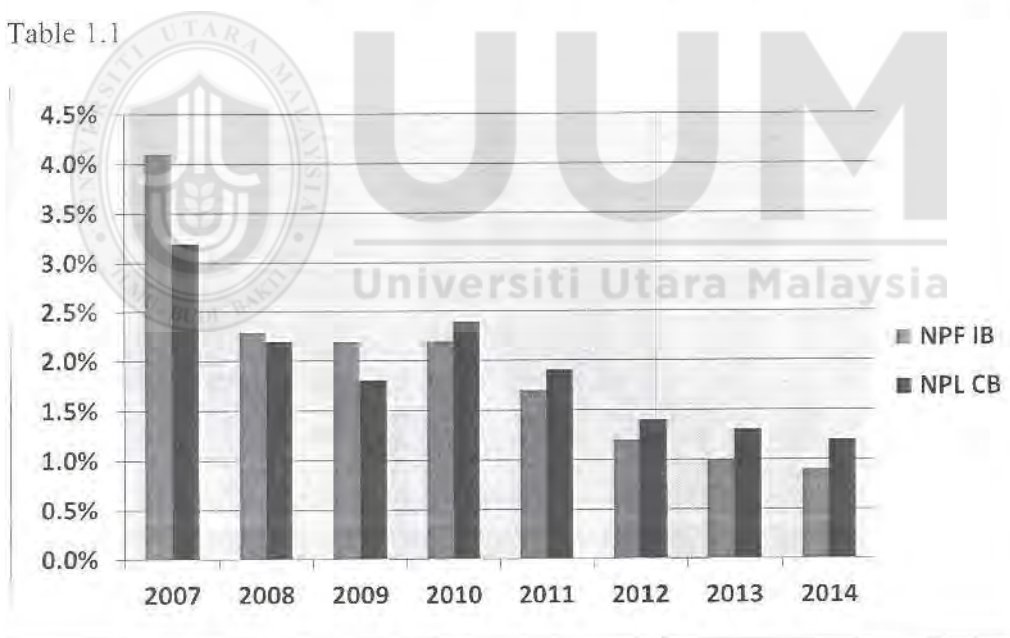
Figure 1.1
Non-performing financing of IBs and Non-performing loansofCBs in Malaysia

Note: NPF IB represents nonperforming financing of Islamic banks while NPL CBs indicates nonperforming loans of the conventional banks.

INDONESIA

The non-performing financing of Islamic banks in Indonesia has been higher than that of the conventional banks for most parts of the period under review. This is contained in Figure 1.2 presenting the reports from Indonesia Bank's (the Central Bank of Indonesia) Monthly Statistics and Monetary Policy Reports. For example, the report indicates that in 2009, the non-performing financing (NPF) of the Islamic banks (IB) in the country was 4.01% of the total financing while during the same period; the conventional banks (CB) recorded only 3.31 % as non-performing loans (NPL) of their total loans and advances.
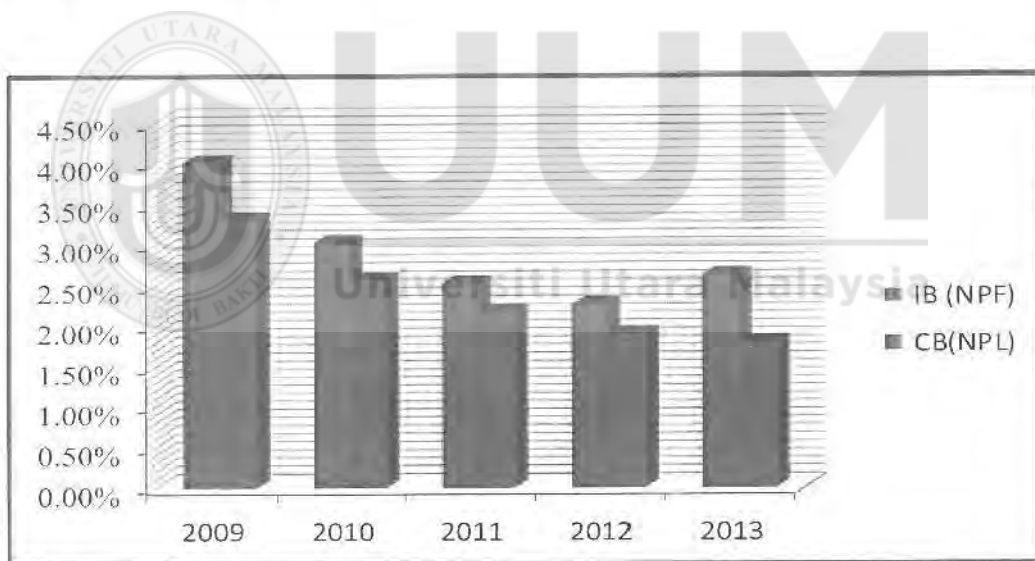
Figure 1.2
Non-performing financing of IBsand CBs' non-performing loans (Indonesia)

 Source: (1) Bank Indonesia's Indonesian Banking Statistics Vol. 11 No(1 & 12) and (2) Indonesia Bank's Monetary Policy Report for December 2013

The trend of the higher proportion of non-performing financing of Islamic banks in Indonesia against that of the conventional banks continued until 2013. For example, in

2013, even though, the trend was in the downward movement in the two segments of the banking spectrum, the proportion of the non-performing financing of the Islamic banks was 2.62% compared with 1.80% in the conventional banks.

BAHRAIN

The non-performing financing of the Islamic banks in Bahrain is much higher than that of the conventional banks' non-performing loans (Figure 1.3). Also when cross-country comparison is made. Islamic banks in Bahrain experienced higher non-performing financing than their counterparts in Malaysia and Indonesia. For example, in its financial stability report, Central Bank of Bahrain (2014) reports the non-performing financing facilities (NPFs) for Islamic retail banks (IRB) were 14.3%. 13.1% and 12.6% for the periods ended March 2013, September 2013 and March 2014 respectively. The figure of non-performing loans for conventional retail banks (CRB) for the same period under reference were 4.7%, 4.2%, and 3.8% respectively.
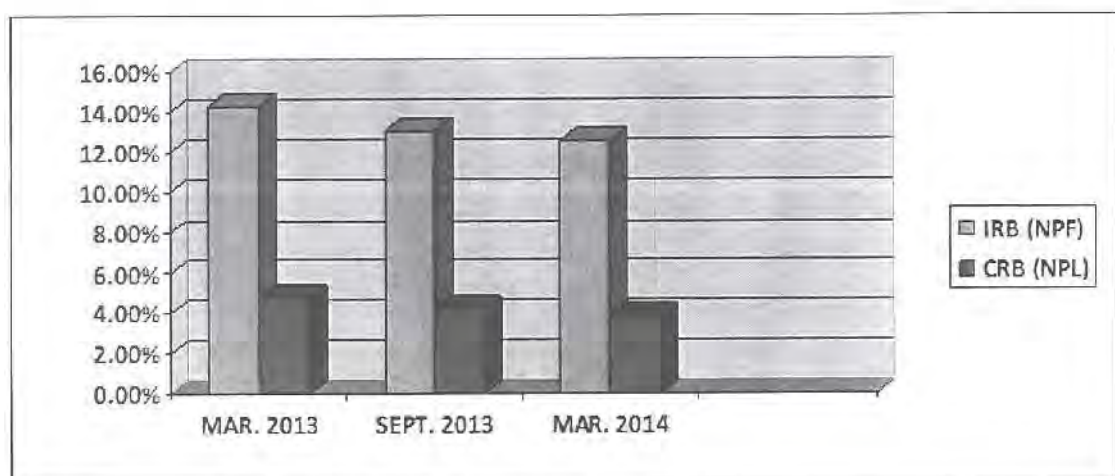
Figure 1.3
Non-performing financing of IRBs and Non-performing loans of CRB(Bahrain).
Source: CBB's Financial Stability Reports (2013 & 2014)

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Similarly, Islamic Financial Services Board (2013) in its Islamic Financial Services Industry Stability Report 2013 highlights the continuing higher ratio of non-performing financing of total financing of the Islamic banks compared to the ratio of non-performing loans by the conventional banks.

Islamic Financial Services Board (IFSB), in that report, evaluated the resilience of Islamic finance by comparing the performance of the Islamic banks from GCC[2] and Asian Countries with a sample of global conventional banks. The report concludes that though Islamic banks were resilience through strong capital ratios, nevertheless, the concern about their asset quality remain high due to the exposure to the property market and financing concentration (Figure 1.4).
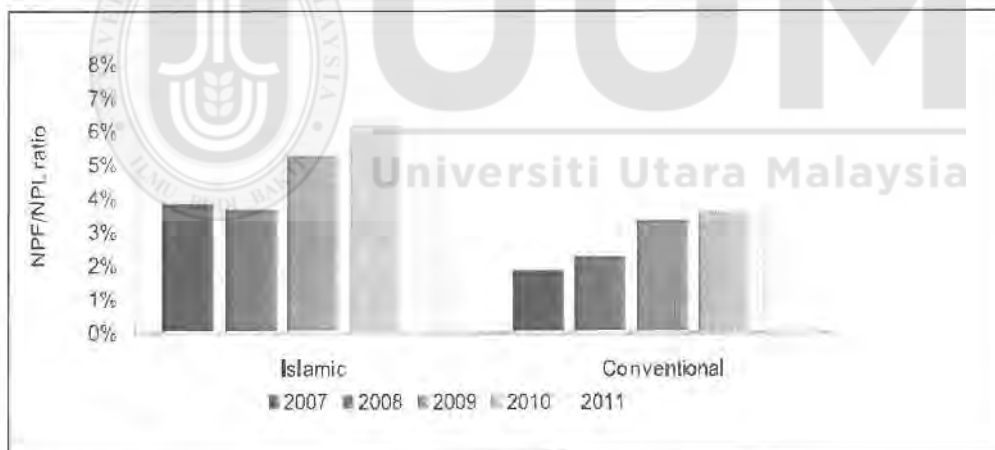
Figure 1.4

Global Non-performing financing/ Loans to Total financing / Loans

Adapted from IFSB: Islamic Financial Services Industry Stability Report 2013

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[2] Gulf Cooperation Council (GCC) Countries

The pertinent questions that may be agitating the mind of concerned individuals and authorities at various levels are:

1) Why do Islamic banks appear to be recording higher non-performing credit facilities than their conventional counterparts in the same environments?

2) Are there activities Islamic banks engage in that predispose them to a higher level of credit risk than conventional banks?

3) Are there unethical issues in the management of Islamic banks that need to be investigated?

1.1.1 Ethical issues in Islamic banking

Among the parameters often used to measure the health of an organisation and indeed its long run going concern is the level of business ethics managers of an organisation employ in running the organisation. Unethical behaviour in the context of Islamic banking is undertaking an activity contrary to the spirit of Sharia. Taking an excessive risk, for example, is incompatible with the spirit of Sharia. For doing so puts individual depositors in the bank, the shareholders of the bank as well the financial system at larger, into the future banking crisis and financial system instability. Ethical behaviour according to Jaseviciene (2012) is that act that does not violate the interest of others and is not capable of generating a crisis in the system. di Florio[3] (2011) asserts that the financial crisis is a reminder of the fundamental need for stronger ethical value, risk management, and regulatory compliance practices. Jaseviciene (2012) links the 2008 global financial crisis to failure to abide by the norms of ethics and lack of business transparency. di Florio (2011) affirms that good ethics is good

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[3] Carlo V. di Florio is Director, Office of Compliance Inspections and Examinations, US Securities and Exchange Commission (October, 2011).

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business and that effectiveness of risk management in an organisation cannot rise above the integrity and ethical value of its managers.

The purpose of the study is to investigate the determinants of non-performing financing of Islamic banking on a cross-country basis covering seleted Muslim countries. The approach will be focused on both bank-specific variables and macroeconomic factors. For the bank-specific factors, the effects of financing concentration creating moral hazard[4] will be particularly examined. Also, among the macroeconomic factors, market interest rate, even though, not considered as a relevant issue in Islamic banking; its effects on the formation of non-performing financing of Islamic banks will be investigated. The moral hazard will be looked at from the perspective of financing concentration in few or risky sectors.This becomes pertinent because Islamic banking is not only a business of trust but a business that must exemplify the highest degree of ethical values.

1.1.1.1 Financing concentration

The concentration of loans in few sectors or risky assets or sectors has been used as a measure of moral hazard in loan administration in banking (Bozovic, 2007; Hooks & Robinson, 2002). Moral hazard has been established as an important cause of many banking crises (Dow, 2000). This study will investigate how interest rate and the extent, moral hazard as represented by financing concentration in Islamic banks, have

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[4] Moral hazard arise from the trust and confidence depositors in Islamic banks (as the principal) have in the banks (as the agents) not only to ensure Sharia compliance in the management of their deposits but also and most importantly to safeguard security of the deposits.

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contributed to the observed non-performing financing (credit risk) among the Islamic banks in Malaysia, Indonesia and Bahrain.

The concentration of financing in few sectors of the economy or risky assets exposes banks to credit risk in a situation of external shock resulting from cyclical changes in some macroeconomic factors. Loan concentration and excessive risk-taking by banks are considered issues of moral hazard (Berger & De Young, 1997; Hooks & Robinson, 2002). These are, therefore, issues of unethical behaviour in Islamic banking. The following table and figures illustrate the financing of Islamic banks in Malaysia.

Table 1.2

Islamic banking system (Malaysia): Financing by purpose (December 2013)

PURPOSE	AMOUNT RM(MILLION)	PERCENTAGE
Vehicle	65,831	23%
Housing properties	82,515	30%
Personal use	28,359	10%
Fixed assets	2,563	1%
Credit cards	1,937	1%
Constructions	8,397	3%
Working capital	63,423	22%
Securities	18,431	6%
Other purposes	12,532	4%
TOTAL	283,988	100%

SOURCE: Malaysian Central Bank (Bank Negara Malaysia) Monthly Statistical Bulletin December 2013

It is important to note from Figure 1.2 that housing properties sector takes 30% and financing of personal use 10% of the total financing. These two sectors are highly correlated because they are subject to changes in income of individuals in the

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economy. If we add a proportion of 23% financing that goes to vehicle financing that may be for individuals then concentration becomes higher.

This indicates a concentrated financing. Any shock in a macroeconomic environment that affects household income could affect the property sector and financing of vehicles as well. If as much as 40% or more of financing is exposed to credit risk, then Islamic banking sector could face financial system instability and interest of various stakeholders in the system would have been exposed to avoidable risk and financial loss.
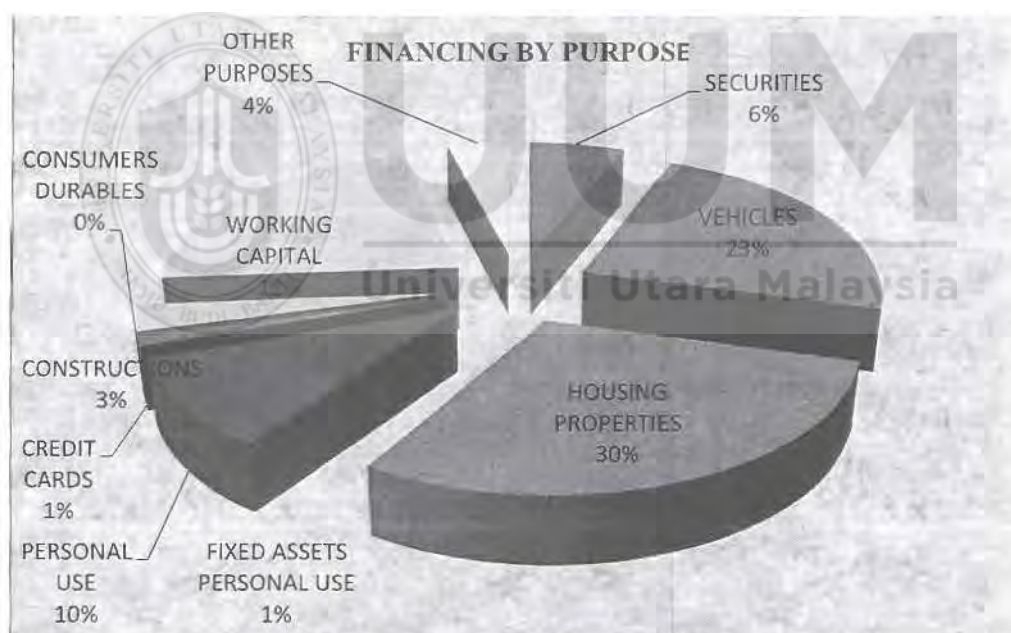
Figure 1.5

Financing by Purpose

SOURCE: Raw data as in Table1.2 from Malaysian Central Bank (Bank Negara Malaysia) Monthly Statistical Bulletin December 2013

1.1.2 Interest rate and credit risk in Islamic banking

The effect of interest rate on the performance of Islamic banking remains a critical issue that is yet to be resolved particularly its effect on the banks' credit risk. Unlike in the conventional banking in which the effects of the interest rate on banks' credit risk have been well documented, most studies in Islamic banking have always excluded interest rate from Islamic banking performance determinants equations (Sanwari & Zakaria, 2013). The exact role of interest rate in the operations of Islamic banking particularly credits risk is yet to be conclusively established.

The sensitivity of deposits of Islamic banks to the conventional interest rate in the dual banking system has been established byObiyathulla (2008)andZainol & Kassim (2012). Contrary to the expectation that deposit account holders in Islamic banks are not motivated by interest earning on their deposits, most of the depositors in Islamic banks are in fact, utility maximizers and also always behave "rationally" to move their deposit out of Islamic banks when market interest rate is rising and keep the deposits with Islamic banks when the market interest rate is falling (Haron & Ahmad, 2000).Volatility in deposit portfolio of Islamic banks resulting from the volatility of market interest rates could affect the capacity of Islamic banks in investing in more stable and better-diversified financing thereby creating potential credit risk.

The reality of the higher level of non-performing financing of Islamic banks compared to that of the conventional banks as reflected by the reports of the Malaysian, Indonesian and Bahrain's monetary authorities therefore, indicates that credit risk remains a critical issue in Islamic banking that requires the attention of all

stakeholders particularly researchers in the field of Islamic finance and banking to investigate the determinants of these risks and recommend appropriate solution to them. Therefore, early identification and accurate quantification of risk profile in Islamic banking are of critical importance for the sustenance of the growth and development of Islamic banking globally.

Understanding the determinants of credit risk in Islamic banking will particularly be of practical importance to Islamic banks in Malaysia and Indonesia, in view of the entry of Malaysia and Indonesia into ASEAN Economic Community in 2020. The economic community will, no doubt, bring new opportunities for Islamic banks in these countries, but also, create new challenges for risk assets management. The opportunities will come from free access to the larger market, but socio-cultural and political system heterogeneity among the member states will create new challenges and are, therefore, capable of increasing the credit risk of the banks.

1.2 Statement of the problem

Risks and credit risk, in particular, have become issues of serious concern in Islamic banking globally (IFSB, 2013). Reports from the central banks of countries such as Malaysia, Indonesia and Bahrain with well-developed Islamic banking system indicate a much higher credit risk in Islamic banking than in the conventional banking system. This contradicts the belief that Islamic banking system presents a superior operating environment than the conventional banking, as it is assumed theoretically, to have superior asset quality than the conventional banking system. This difference is premised on the asset-backed nature of Islamic financing (Hanif, 2011). The reality,

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however, is the fact that the non-performing credits of Islamic banking appear to be higher than the nonperforming loans of the conventional banks during the period under review.The question that needs to be answered therefore is: in spite of all the inbuilt safeguards in Islamic banking why is the Islamic banking not showing a more superior risk asset quality than the conventional banks? This, therefore, creates the motivation to investigate the determinants of non-performing financing of Islamic banking.

There have been several studies on various aspects of Islamic banking and finance particularly in the area of credit risk and its causes (Ahmad& Ariff, 2007; Al-Wesabi& Ahmad, 2013; Siddiqui, 2008).Effects of market interest rate, financing-deposit gap and financing concentration on the formation of non-performing financing of Islamic banking have not been subjected to critical empirical examination particularly, on a cross-country basis. Similarly, effects of macroeconomic variables such as real income (GDP), money supply and exchange rate on the credit risk of Islamic banking are yet to be empirically investigated on a cross-country basis. This has created a big gap that needs to be filled in order to safeguard the stability of the Islamic banking industry. For example, El-Hawary, Gais and Iqbal (2004) examine the risks and regulations for Islamic banking within the context of the prevailing practices and conclude that the prevailing practices in Islamic banking are in contrast to the principles of Islamic finance. However, El-Hawary, et al. (2004) did not consider the ethical perspective of such deviation from the principles of Islam.

Interest rate as a critical factor in the credit risk management process of the conventional banking system has been widely investigated and its effects on the credit risk of conventional banking are well documented. Ironically, it has either been largely ignored or not considered as a variable in the credit risk management of Islamic banks. Therefore, there is the need to investigate its effect on the credit risk of Islamic banks. Similarly, the relationship between deposits and financing portfolio of banks in terms of the relative size and the mix of the variables can have a great impact on the credit risk they face. A financing portfolio running faster than the deposit size of the bank means that the bank may be using more of other sources of the fund such as interbank money markets to fund its financing. As it usually the case, banks' deposits are largely short-term in nature, whereas, financing are usually medium and long-term in nature.A high financing deposit ratio implies a high proportion of deposit with no regards to liquidity reserve requirement could signal high credit risk. Effects of this factor on the credit risk of Islamic banking are yet to be empirically investigated on a cross-country basis. Furthermore, the effects of the concentration of financing in very few sectors on the credit risk of Islamic banking and its inherent moral hazard which hitherto, had not been given desired attention in the literature were empirically investigated.

Similarly, effects of macroeconomic variables and bank specific variables on the credit risk of conventional banks have also been well documented. Likewise, the relationship between credit risk and the interest rate has been well been established in the literature. Demirguc-Kunt and Detragiache (1998) establish an association between high-interest rates and systemic banking sector problems.

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Salas and Salas-Fumas (2002) also find GDP growth rate, rapid past credit expansion, management inefficiency, portfolio composition, size, and net interest margin and capital ratio among other variables having a significant relationship with the credit risk of banks. All these studies also identify interest rate among other variables as a determining factor of conventional banks' credit risk. However, most of the existing studies on the credit risk of Islamic banking focus more attention on bank-level factors. Studies that attempt to incorporate interest rate into factors that predict credit risk of Islamic banking are still very scanty (Al-Samadi, 2010; Al-Wesabi& Ahmad, 2013; Masood, et al. (2012).Therefore, empirical studies on the effects of interest rate, financing-deposit gap, loan concentration on the credit risk of Islamic banking remain scanty and thereby, creating a gap in the literature. This observed gap serves as the motivation for the present study to investigate the long run relationship between interest rate, financing-deposit gap and financing concentration and the credit risk of Islamic banks. In addition to these factors, the study also investigates the effects of some selected bank-specific and macroeconomic variables on the credit risk of Islamic banking.

1.3 Research questions

Banking as a business of financial intermediation faces different types of risks. The risks could be financial or non-financial. The risk could be systemic or non-systemic. The prevailing practice of modern banking is largely characterised by complex and complicated financial instruments which are mostly anchored on the interest rate. Contemporary Islamic banks in dual banking systems are operating in an inherently competitive environment with conventional banks. They are exposed to similar risks

as their conventional counterparts. One of such risks is a credit risk. Credit risk in a bank could arise from weak internal mechanism within the bank resulting from such factors as financing-deposit gap and financing concentration or as a result of shock from macroeconomic factors. One of such factors is the interest rate. The effects of the interest rate on the credit risk of conventional banks appear to have been settled in the literature, but it is not so for the credit risk of the Islamic banking. Gavin and Hausmann (1998) explain the relationship between interest rates, deposits and credit risks.

Gavin and Hausmann (1998) investigate the root causes of banking crises in the Americas particularly, Latin America, and postulate that when the rate of growth of deposits is lower than the interest rate on deposits, the bank will have to make the net transfer of funds to depositors. This can be either by extracting a transfer of resources from the borrowers through interest rate increase or run down the stock of their liquid assets. Whereby banks find it imprudent to do either, they resort to calling in loans as they become mature. The effect of this is credit crunch which leads to curtailment of further investments by the borrowers, reduction in capacity utilisation, loss of revenue, impaired capacity to repay the existing loans, thereby creating accumulating non-performing loans. Persistent non-performing loans in large scale lead to heightened credit risk which, if not addressed, usually leads to the systemic banking crisis. This postulation is predicated on the fact that financial intermediation function of the banking system is based on the continuous flow of deposits from the surplus units for the use of deficit units for consumption and investment purposes. The continuous flow of deposits (savings) is a function of many factors among which is

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investment purposes of earning interest income or rate of profit (rate of return). The nature of the flow of deposits to a banking institution and at what cost of the fund would determine the types of financing that would be undertaken and the degree of appetite for risk such a bank would have. In the final analysis, the cost of fund to the bank usually determines the financing structure of the bank and the riskiness of its credit portfolio. Therefore, the apparent deficit in the literature on the effects of interest rate and rate of return on deposits of Islamic banking on the credit risk of Islamic banking deserves the attention of researchers. This, therefore, provides the motivation to investigate the effects of conventional interest rate and rate of return on deposits of Islamic banking, in addition to other bank-specific and macroeconomic variables, on the credit risk of Islamic banks.

Similarly, the concentration of financing in few sectors could also expose banks to credit risk in case of external shocks. When a bank is exposed to credit risk leading to poor quality of risk assets; interests of the bank's depositors and the shareholders are at risk while the society, in general, suffers a financial crisis. It, therefore, becomes pertinent to investigate the extent to which financing concentration, financing-deposit gap, conventional interest rate, and selected macroeconomic factors can determine the non-performing financing of the Islamic banks in Malaysia, Indonesia and Bahrain.

The following questions emanating from the problems stated above are raised to which appropriate answers are provided by the results of the study:

1. Is there a relationship between deposit interest rate and rate of return on the deposits of Islamic banking and do they determine the size of the deposits of Islamic banking in Malaysia, Indonesia, and Bahrain?

2. Is there a long-run relationship between the financing-deposit gap, real income, money supply, exchange rate and the credit risk of Islamic banking in Malaysia, Indonesia, and Bahrain?

3. Is there a relationship between financing concentration, interest rate, money supply, credit expansion and inflation on the credit risks of Islamic banking in Malaysia, Indonesia, and Bahrain?

4. Does the relationship between financing concentration and the credit risk present the presence of moral hazard in Islamic banking financing in Malaysia, Indonesia, and Bahrain?

1.4 Research objectives

The primary objectives of the study are to investigate (1) the determinants of the credit risk of Islamic banking and (2) to determine the effects of moral hazard issues arising from financing concentration on the credit risk of Islamic banking in Malaysia, Indonesia and Bahrain. The specific objectives of the study are:

1. To examine the long-run relationship between interest rate and the rate of return on the deposits of Islamic banking and their effects on the size of deposit of Islamic banks in Malaysia, Indonesia, and Bahrain

2. To determine the long-run relationship between financing-deposit

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3. gaps, real income, money supply, exchange rate and the credit risks of Islamic banking in Malaysia, Indonesia, and Bahrain.

4. To determine the long-run relationship between financing concentration, interest rate, money supply, credit expansion and inflation and the credit risks of Islamic banking in Malaysia, Indonesia, and Bahrain

5. To determine the presence of moral hazard arising from the financing concentration in Islamic banking in Malaysia, Indonesia and Bahrain.

1.5 Scope of the research

The study, as a cross-country study, intends to cover all the Islamic banks currently operating (16)[5] in Malaysia, (12)[6] in Indonesia and (24)[7] in Bahrain. These study populations are considered unique in many ways, viz:

1) Malaysia, as at date, is considered the most developed centre of Islamic finance and banking in the world. Malaysia boasts of a very active market for Islamic securities (Ariff&Rosly, 2011).Also, in order to promote Islamic banking industry, according to Ariff and Rosly (2011). Malaysia has established a number of supporting institutions such as Malaysian Islamic Financial Center (MIFC), International Islamic Liquidity Management Center (IILMC), and the secretariat for Islamic Financial Services Board (IFSB).

2) Malaysia and Bahrain are considered the world largest international Islamic banking Hub. For example, Bahrain with 27 Islamic banks is considered to be having more than half the total number of Islamic banks in GCC countries (Al-Wesabi &

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[5] Bank Negara Malaysia' banks' statistics
[6] Bank Indonesia banks' statistics
[7] Central Bank of Bahrain Register

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Ahmad, 2013). According to Ariff and Rosly (2011), Bahrain is a major Islamic financial centre providing Islamic financial instruments for liquidity management and also, it accommodates the secretariat of the Accounting and Auditing Organization for Islamic Financial Institutions (AAOIFI).

3) Indonesia on its own has the largest Muslim population in the world with a very dynamic and growing Islamic finance and banking markets.

4) And most importantly, the three countries operate dual banking model.

The study applies quarterly data from 2007: Q1 to 2015: Q2 giving 34 observations and102 period.

1.6 Significance of the study

The study investigates the determinants of credit risk in Islamic banking. It examines the effects of some bank-specific and macroeconomic factors on the formation of the credit risk of the banks. In order to further establish the effects of conventional interest rates in the formation of the credit risk of Islamic banking, the study conducted different tests and made significant findings in this area. The concentration of financing in few sectors by Islamic banks is also examined as a possible determinant of non-performing financing in Islamic banks. The findings in these areas will make a significant contribution to the literature in the area of the credit risk of Islamic banking and also provide useful recommendations for policy implication for researchers, practitioners, and regulatory authorities. As Elgari (2003) postulates, the objective of studying risk is not to eliminate it, as that is not possible, but to acquire some control over it in order to be able to manage it.

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Credit risk has remained one of the most important risks banks and other financial institutions face in the course of their financial intermediations. The recognition of this importance has generated a lot concerns to financial institutions and regulatory authorities. This concern has also raised interests among researchers to investigate the determinants of the credit risks in financial institutions. However, research efforts at investigating the determinants of the credit risks of Islamic banking on a cross-country basis are still very low. The contributions of the present study in investigating the factors that determine the credit risks of Islamic banking are as follows:

First, studies on the investigation of the determinants of the credit risks in the conventional banking are diverse in the literature. However, in the Islamic banking system, studies on the determinants of credit risk have largely been concentrated on individual countries. The present study has, therefore, extended the argument by investigating the determinants of the credit risks of Islamic banking on a cross-country basis. The essence is to identify the response of the credit risk in Islamic banks to the same set of variables in different countries. The choice of the countries (Malaysia, Indonesia, and Bahrain) for the study is very significant in term of the strategic positions these countries occupy in the growth and development of the contemporary Islamic financial system. Also, and more importantly, the success or failure of Islamic banking and finance globally will largely be shaped by what happens in these countries.

The new finding is premised on the fact that the countries are subjected to the same parameters within the same study period. Conventional deposit interest rate is found

to explain the rates of return on the deposits of Islamic banks across the three countries. Changes in the size of deposits of Islamic banks in all the three countries are also found to be determined by conventional deposit interest rates. Similarly, conventional bank lending rate is also found to be an important determinant of the credit risks in all the three countries. Financing concentration is also found to be an important determinant of the credit risks of Islamic banks in Malaysia and Bahrain.

The study concludes that financing concentration, real income, conventional interest rates, money supply, credit expansion, financing-deposit gap and exchange rates are key determinants of the credit risks of Islamic banks in Malaysia, Indonesia, and Bahrain. However, there appear to be some factors not significant as determinants of the credit risk of Islamic banks in each of the countries. For example, the exchange rate was found not to play a significant role in the determination of the credit risk of Islamic banks in Malaysia, during the study period. In the case of Indonesia, the credit risks of Islamic banks could not be explained by financing concentration while the money supply could not explain the credit risk of Islamic banks in Bahrain.

Second, the contribution of the study is in terms of methodological approach. The earlier studies in this area have, in many cases, employed such methods as VAR (Vector Autoregressive) model and VECM (Vector Error Correction Model) to examine the long-run relationship between the credit risks of Islamic banks and a set of selected variables. However, these methods are only applicable if all the variables are integrated of the same order, usually; order1 (1). Where this condition is not met, i.e. where the data are integrated of different orders such as I (0) and I(1), these traditional methods become inefficient. Therefore, ARDL Bound Testing Approach to

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cointegration has been employed in this study because of its superiority over the other methods of analysing integration. ARDL is also considered more appropriate for this study because of the different orders of integration of the time series data employed.

In addition, the study employs Dynamic OLS approach to cointegration. Dynamic OLS, according to Masih and Masih (1996) is a robust procedure to model long-run relationships. Among the advantages of DOLS is that it is a single equation method of estimation with the ability to allow for variables integrated of alternative orders. It has the capacity to eliminate the problems of simultaneity amongst regressors. DOLS is considered to be very efficient in solving the problems associated with endogeneity and biases often experienced in small samples estimations (Stock & Watson, 1993; Masih & Masih, 1996; Jackman & Lorde, 2010)

Third, the few studies that have investigated credit risks of Islamic banking had neither considered financing concentration as an important predictor of the credit risk nor considered it as presenting evidence of moral hazard. The findings of the present study indicate financing concentration as a determinant of the credit risk of Islamic banks. Similarly, the study finds supportive evidence for the existence of moral hazard underlining the financing concentration in Islamic banks. This is a significant contribution to the literature on the effect of moral hazard incentive on the credit risk of Islamic banks. The study identifies the presence of moral hazard in the financing concentration and its effects on the credit risk of Islamic banks on a cross-country basis by examining the dual banking environments in Malaysia, Indonesia and Bahrain. The moral hazard presence in financing concentration emanates from two perspectives.

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First, the confidence and trust, Muslim depositors have in Islamic banks that they (Islamic banks) would not only be *Sharia* complaints in their operations but would also avoid any financing or investment activities that would expose them to financial crises. Even, banks, under the common laws, owe a fiduciary duty to their customers not only by protecting their assets but also to advising them on how to manage these assets where necessary. To this end, therefore, Islamic banks owe more to their customers by allowing *maslahah* as the guiding principle of their investments decisions. After all, the prohibition of usury (*riba*), excessive ambiguity or uncertainty (*gharar*) and gambling (*maysir*) is to ensure and protect the interests and benefits of the society (*maslahah*). Therefore, the concentration of financing to the household sector and on consumer goods by the Islamic banks in Malaysia and Bahrain respectively raises the issues of moral hazard as it (financing concentration) has been found to be positively and significantly related to the credit risk of the banks during the study period.

Secondly, incentives for moral hazard can be generated from the very nature of Islamic finance based on Profit and loss sharing (PLS) principle. Under the PLS rules; investment account (*mudarabah*) deposits are not principal-guaranteed. Rosly and Zaini (2008) observe that Islamic banks leverage on *mudarabah* deposits up to 80% of their capital. If any Islamic bank, therefore, suffers financial crisis arising from large scale repayment defaults, the first casualty would be the depositors. When theoretically, banks, as *mudarib*(fund manager), are not expected to share the loss, unless, a prima facie case of negligence is established against the bank. The very

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nature of *mudarabah* deposits, theoretically under *Sharia*, is non-principal-guaranteed and that in the case of loss; the depositors (*rabbul mal*) bear the entire loss, may, in fact, provide an incentive for moral hazard. This becomes more obvious because, under *Sharia*, according to Ariff and Rosly (2011), an Islamic bank as a *mudarib* is not required to hold capital. This is further supported by the moral hazard hypothesis by Berger and De Young (1997) who argues that moral hazard occurs when excessive risk-taking takes place when the party that bears the risk or loss from the risk cannot monitor or prevent that risk-taking by the other party. According to Berger and De Young (1997) under moral hazard hypothesis, banks with relatively low capital have higher incentive to increase the riskiness of their loan portfolio which usually results in nonperforming loans than the banks with a higher level of capital.

However, a well-diversified financing portfolio would not suffer defaults at the same rates a concentrated portfolio would, in event of a negative macroeconomic shock. This finding supports the finding of Hooks and Robinson (2002). Hooks and Robinson (2002) also argue that evidence of the existence of loan concentration by banks is consistent with the presence of moral hazard incentive. Private actions of the banks, therefore, generate information asymmetry and thus raising the issue of moral hazard and ethical questions in financing concentration by Islamic banks. Islamic banking as a brand of ethical banking should, at all times, be devoid of excessive ambiguity that is capable of leading to credit risks of the banks and instability of the whole financial system. The evidence that existence of financing concentration is established in Malaysia, Indonesia and Bahrain and that financing concentration is also found to have a positive relationship with the credit risk of the banks in Malaysia and Bahrain provide the evidence of the presence of moral hazard in Islamic banking.

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The result of the study is, therefore, significant and instructive to various stakeholders in the Islamic banking industry such as bank managements, supervisory authorities, researchers and investors to clearly identify the risks inherent in the credit of Islamic banking within a dual banking environment.

Since Islamic banking has become a growing phenomenon in the financial landscape of most parts of the world, research endeavours such as this would be of great importance to the stability of the international financial system. The selection of the Islamic banking in Malaysia, Indonesia and Bahrain as the study's case study is very important in many significant ways:

i.   Malaysia and Bahrain are the hubs of the global Islamic finance and banking. The two countries have and continue to put in place institutions and structures that provide supports for the growth and development of Islamic finance and banking

ii.   Indonesia, on the other hand, is the country with largest Muslim populations in the world and has also put in place strategic plans and institutional frameworks to enhance the growth and development of Islamic banking in the country.

The findings of the study will provide recommendations that would have far-reaching policy implications for Islamic financial institutions, individuals and institutional investors, researchers and regulatory authorities not only for the Muslim countries but also the emerging Islamic banking markets in Europe and Africa. And most importantly the study aims to make significant contributions to the body of knowledge

by presenting findings from an empirical investigation of the effects of conventional interest rates and the financing concentration on the credit risk of Islamic banking.

The study is also significant as it is taking place at a time when the ASEAN countries, with Malaysia and Indonesia as very important members, are gearing up for an economic integration by 2020. The ASEAN Vision 2020 aims to bring the member countries into a big economic block with a single market. Malaysia and Indonesia as strategic centres of Islamic banking and finance will no doubt, face new opportunities as well as many challenges in the operations of Islamic banking within the new operating environment. This will no doubt create a new risk profile and indeed, credit risk for Islamic banking. The results of this study will no doubt, generate a lot of awareness that will be relevant for policy implication.

On the global level, Malaysia, Indonesia and Bahrain will, for the foreseeable future, continue to be key centres of Islamic banking and finance. With increasing globalisation and internationalisation of Islamic banking, these countries are destined to play strategic roles in deepening inter-banking relationship among Islamic banks globally. Therefore, events affecting Islamic finance and banking in these countries will continue to be of interest and concern to researchers in the field of Islamic finance and banking. If Islamic banks are to take advantage of the huge potential opportunities available to them regionally and internationally, the relevant stakeholders of Islamic banking will need to collaborate to put in place robust risk management strategies for the credit risk that will come along with these

opportunities. The findings of the study will provide inputs into the new thinking of Islamic banking credit management policy.

1.7 Organisation of the Thesis

Chapter 1 presents the background and the motivation of the study. It also provides the statement of the problem, research questions, and the corresponding research objectives. The chapter further provides significance and the scope of the study.

Chapter 2 discusses the underlying theories, review of empirical evidence and the dual banking system. The chapter further presents the detail credit risks of Islamic banking with a particular focus on credit risk resulting from interest rate changes and financing concentration. The chapter also presents a discussion on the relevant related empirical studies. Various views and findings from the previous studies were synthesised and the chapter concludes with a summary.

Chapter 3 contains a methodology for the study. It details the research design and research framework. The chapter gives the population of the study and also shows data collection technique. The econometric models and estimation techniques are also presented.

Chapter four provides the results of the analysis and implications of the findings while chapter five presents the summary of the research. Conclusions from the study were discussed and appropriate recommendations were provided.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter consists of three sections: The theoretical framework presenting the underlying theories, empirical framework, and discussion of the dual banking system. The chapter contains discussions in detail of credit risks of Islamic banking with a particular focus on credit risk resulting from interest rate changes and financing concentration. The chapter also presents a comprehensive review of the relevant related empirical studies. Various views and findings from previous studies were synthesised and the chapter is concluded by a summary.

2.2 The Theoretical Framework

Theories of determinants of banking crises, the theory of the time value of money, portfolio theory and moral hazard hypothesis the underpinning theories that are used to explain the research questions and the behaviour of the variables used in the study. These theories have also been used in some previous studies (Adebola, et al., 2011; Demirguc-Kunt and Detragiache, 1998; Laeven, 2011; Wolfson, 2002)to investigate the causes of credit risk both of the conventional and Islamic banking.

2.2.1 Theory of Determinants of Banking Crisis

Theories of banking crises have been discussed through different approaches, namely, depositor panic approach, macroeconomic shock approach, "bad management" approach and moral hazard approach. The theory of determinants of the banking crisis

through the deposit approach was developed by Demirguc-Kunt and Detragiache(1998). The theory postulates that banks are financial intermediaries whose liabilities are mainly short term deposits and whose assets are usually short and long-term loans to business and consumers. When the value of their assets falls short of the value of their liabilities, banks are insolvents. The value of bank's assets may drop because borrowers become unable or unwilling to service their debts. The failure of borrowers to meet up with their liability obligations to their banks, therefore, leads to loan default (credit risk).

One of the earlier theories of banking crises according to Laeven (2011) is the theory that regards banking crises as depositor panics characterised by depositor's withdrawals that put undue pressure on the banks' liquidity position. "Such depositor runs can cause illiquidity at banks that are intrinsically solvent. When severe, such illiquidity pressure will render the banks insolvent" (Laeven, 2011. P.4.3). Bank runs occur when depositors fear others will withdraw as well or in an anticipation of economic downturn. Laeven further argues that depositors' panic is most damaging when it becomes contagious with liquidity pressure spreading through the banking system as a failure of individual banks creates systemic banking crises.

Gavin and Hausmann (1998) investigate the root causes of banking crises in the Americas particularly, Latin America, and postulate that when the rate of growth of deposits is lower than the interest rate on deposits, the bank will have to make the net transfer of funds to depositors. This can be either by extracting a transfer of resources from the borrowers through interest rate increase or run down the stock of their liquid

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assets. Whereby banks find it imprudent to do either, they resort to calling in loans as they become mature. The effect of this is credit crunch which leads to curtailment of further investments by the borrowers, reduction in capacity utilisation, loss of revenue, impaired capacity to repay the existing loans, thereby creating accumulating non-performing loans. Persistent non-performing loans in large scale lead to heightened credit risk which, if not addressed, usually leads to the systemic banking crisis. This postulation is predicated on the fact that financial intermediation function of the banking system is based on the continuous flow of deposits from the surplus units for the use of deficit units for consumption and investment purposes.

The focal point of the deposit approach to banking crises is the importance of deposit funds to the effective performance of the banks' financial intermediation functions. A blockade to the smooth and regular flow of deposit to the banking system creates credit crunch resulting from the inability of the banks to provide funds to their customers on a sustainable basis. The credit crunch, on the other hand, impairs the ability of business units to undertake new investments or continue on the existing line of investments. The resultant effects of these are impairment of the ability of the firms to repay their loans, thus creating non-performing loans and thus heightening the level and pace of the credit risk in the banking system.

Another approach to the theory of determinants of banking crises is the macroeconomic factors approach espoused by the Minsky's Domestic Theory of Financial Crisis. Minsky's theory according to Wolfson (2002), is set within the context of a growing economy. Minsky posits that as the economy expands, optimism

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increases, attitude to risk begins to change. Prices of financial assets rise and the general level of speculation increases. As attitude to risk changes the financial system becomes increasingly fragile. This leads to increasing non-performing loans and heightened credit risk in the system. Wolfson (2002) further states that in Minsky's view, the financial crisis leads to an increased unwillingness on the part of banks to finance new investments. The decline in investment spending negatively affects profit which only worsens the non-performing loans and increases the credit risk of the banking system.

Gavin and Hausmann's (1998) view on the roles of macroeconomic forces on the banks' credit risk and the financial vulnerability focus on the link between lending boom and financial fragility arguing that the link is very strong. According to Gavin and Hausmann (1998), lending booms tend to take place during periods of economic expansion, when borrowers are transitorily very profitable and, therefore, liquid. It is further argued that the speed at which credit grows during periods of economic expansion creates information asymmetry for bankers. This happens because as credit expands, banks bring in new credit customers about whose creditworthiness they have relatively little information. So, as the lending boom continues the riskiness of the credit portfolio rises, however when the economic downturn sets in, the lending boom slows and the ability of borrowers to meet their repayment obligations become impaired and the credit risk of the banking system becomes heightened.

The vulnerability of banking system resulting from weak management is another source of the banking crisis. Berger and De Young (1997) espoused a number of

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hypotheses to explain the occurrence of credit risk and there from banking crises as a result of weak management. Berger and De Young (1997) came up with "bad management" hypothesis, "bad luck" hypothesis, "Skimping" hypothesis, and moral hazard hypothesis. In this study, only the bad management and moral hazard hypotheses are discussed. The "bad management" hypothesis states that non-performing loans result from the failure of managers to undertake adequate loan underwriting and monitoring. These poor underwriting and monitoring problems eventually lead to a high number of non-performing loans and borrowers default in their loan repayments. "Bad managers may (1) have poor skill in credit scoring and therefore, choose a relatively high proportion of loans with low or negative net present value (2) be less competent in appraising the value of collateral pledged against the loans, and (3) have difficulty in monitoring the borrowers" (Berger and De Young, 1998, p.7). The consequence of bad management is to make the bank vulnerable to external shock which can precipitate credit risk of the banks thereby leading to the banking crisis.

2.2.2 Theory of Time Value of Money

In line with the thoughts of the Scholars of the Salamanca School who pioneered the theory of Time Value of Money, the interest rate has become the cornerstone of investments decision in finance. The Salamanca School was represented by Francisco de Vitoria, Francisco Suarez, Martin de Azplilcueta and Diego de Coarrubias. The core principle of finance is the theory of Time Value of Money. Because money can earn interest, any amount of money receivable at a future date, worth less the longer it

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is received. According to Bohn-Bawerk (1890), as a rule, present goods have a higher value than the future goods of like kind and number. According to him, this is the kernel of the interest theory. That is money received now worth more than the same amount received in a future time.

The central theme in the theory of time value of money is the role of interest. The argument for the role of interest in financial intermediation is anchored on three factors viz, Inflation, consumption time preference, and uncertainty.

    a. Inflation: Because of inflation, a certain amount of money today will buy more in terms of real goods than the same amount of money in a year from now.

    b. Consumption time preference: That is, an individual may prefer present consumption to future consumption. Therefore, to delay consumption, the bank or the borrower must offer the individual compensation in the form of interest rate, how much to offer will depend on how strong the individual preference for consumption is.

    c. Uncertainty: Because of the uncertainty about the rate of return on investment, interest serves as a premium for uncertainty.

This principle in many instances has been used by conventional banks in determining the rate of interest to charge on different types of borrowers. The riskier a borrower is considered the higher would be the rate of interest he/she would be charged. From the deposit side, interest serves as a return to depositors. Depositors as investors would always maximise their returns through higher rates of interests. High-interest rates

raise the cost of capital to borrowers. The high cost of capital can induce repayment burden on borrowers and therefore credit risk.

2.2.3 Portfolio Theory

Markowitz (1991) in his *Foundation of Portfolio Theory* emphasises that portfolio theory considers how an optimising investor would behave under uncertainty. Uncertainty is a critical and fundamental problem usually faced by investors such as banks. Uncertainty according to Markowitz is a critical factor that must be considered in the analysis of the behaviour of an optimising investor. Markowitz (1991) goes further to say that if an investor knows future returns with certainty; he would invest in only one security with the highest future returns. However, if there were several securities with the same highest returns, then the investor would be indifferent between any of these; or any combination of the securities. In this situation then, the investor would not prefer diversified portfolio. But because of the uncertainty in the future returns of any investment, a rational and optimising investor would prefer a diversified portfolio. A diversified loan portfolio of a bank, under portfolio theory, would reduce the credit risk such a bank faces. According to Elgari (2003), the theory of portfolio selection is an attempt at of maximising returns and minimising the risk associated with the investment. The theory has a significant influence on investors in the way they maintain an optimum diversified portfolio of investments. The objective of credit portfolio diversification by banks is to minimise the effects of risk particular, credit risk, in the case of a major shock to any of the macroeconomic variables. This is more so because banks are always confronted with the problems of asymmetric

information from their credit customers and uncertainty that always associated with the dynamics of macroeconomic conditions.

2.2.4 The Agency Theory

Due to the changes in the nature of firm resulting from mass production, multinational and transnational activities, ownership, and control of firms are in different hands (Azid et al., 2007). The separation of management from ownership in the modern corporation provides an ideal context for the operation of agency theory. Shareholders act as the principal with interests in deriving maximum utility (return on their investments) from the actions of the agent (management). The basic assumption of the agency theory is that some information exists between the principal and agent that the principal cannot directly observe or that the agent knows some other aspect of the contract which is unknown to the principal. Conflicts arise because of the separation of ownership and management and the inability of principals to observe the actions of the agent (Jensen& Meckling, 1979).

Agency theory, in the context of bank lending (financing), relates to a bank-borrower (investor) relationship. Also in the context of Islamic banking, on the asset side of the balance sheet, agency theory applies primarily to the relationship between an Islamic bank (*Rabul-mal*) as the principal and an investor (*Dharib*) as an agent. On the liability side of an Islamic bank, however, agency theory places the bank as the agent (*dharib*) while the depositors in the investment account as the principals (*rabul-mal*). Therefore, Islamic banks in the business of financial intermediation act both as agents

(*Dharib*) at one time and as principals (*Rabul-Mal*) at another; as reflected by their assets and liabilities composition.

Principals and agents have economic incentives to invest in various information systems and control mechanisms to reduce agency costs associated with information asymmetry (Fama & Jensen, 2003; Jensen & Meckling, 1979). These control mechanisms might offer maximum gains for all parties since the agent would otherwise bear agency costs that occur when principals discount the value of the firm, based on the likelihood of adverse selection, shirking and moral hazard (Jensen and Meckling, 1979).

2.2.4.1 Asymmetric information

According to Akerlof (2001), informational problems exist in most markets including credit market. The story of the market with asymmetric information was pioneered by Goerge Akerlof, Michael Spencer, and Joseph Stiglitz. James Mirrlees and Williams Vickery have also made fundamental contributions to the theory of information asymmetry. Asymmetric information exists when some parties to transactions have an information advantage over others. For example, the borrower may know more than the lender about his creditworthiness. Asymmetric information can bring about adverse selection and moral hazard. The issue of moral hazard, in particular, has been a critical issue not only for Islamic banks but also to conventional banks in the management of their risk assets.

2.2.4.2 Adverse Selection

Adverse selection describes an agency problem where asymmetric information exists before the contract between the agent and the principal is consummated. Adverse selection often leads to inefficient allocation of resources. According to Armendariz and Morduch (2010), the problem of adverse selection arises when banks lack full information about potential borrowers and could not discriminate among good and risky borrowers. The adverse selection comes to play when banks extend credits to customers about whose creditworthiness the banks have very little information. The consequence of this is non-performing loans and increased credit risk to the banking system.

2.2.4.3 Moral hazard

Moral hazard describes the agency problems which exist after a transaction is made which can lead to inefficient allocation of resources. In a shareholder-manager relationship, managers or directors of a company after been engaged may start acting in a way which benefits themselves but not the shareholders. A situation of moral hazard could also arise in a bank-borrower relationship with the debtor acting in an opportunistic manner which may be against the interest of his/her creditor. The issue of moral hazard has been emphasised by Hooks and Robinson (2002) when they look at banks taking excessive risk and loan concentration. The study finds that the presence of deposit insurance coverage provides banks with incentives of moral hazards to undertake excessive risk-taking. The result of Hooks and Robinson (2002) concludes that deposit insurance coverage generating moral hazard increased the likelihood of banks' failure.

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Hellmann, Murdock and Stiglitz (2000) argue that moral hazard plays significant roles in most of the banking failures. Hellmann, Murdock and Stiglitz (2000) provide theoretical perspective linking competition to moral hazard. They postulate that "Financial market liberalisation increases competition; competition erodes profits; lower profits imply lower franchise values (i.e., the capitalised value of expected future profits); and lower franchise values lower incentives for making good loans, increasing the moral hazard problem". This means competition in the banking sector creates an incentive for moral hazard. In order to reduce the incentive for moral hazard in banking, Hellmann, Murdock and Stiglitz (2000) make a number of recommendations, among which are, interest rate control as a prudential regulation and asset-class exposure restriction.

For Islamic banking, therefore, moral hazard effects can be generated from three peculiar sources. First, the trust by Muslim depositors, that the banks, in addition to screening their wealth from the effect of interest rates, would ensure the security of their investments by not engaging in such activities that can expose their investments to risk. Two, moral hazard can also be generated from the very nature of *mudarabah* (investment account) deposits. Under the profit and loss sharing (PLS) model, the return of the principal deposit is not guaranteed and that in the case of loss, the depositors bear the entire loss. This may provide an incentive for moral hazard. This becomes more obvious because, under *Sharia*, according to Ariff and Rosly (2011), an Islamic bank as a *mudarib* is not required to hold capital. "To require the bank, as a

mudarib, to use own equity to support risky assets is contrary to the principle of *mudarabah*" (Ariff & Rosly, p. 308).

Thirdly, moral hazard incentive can result from the competitive environments; Islamic banks operate in the dual banking system. Islamic banks in the dual banking system have to compete in the same market with the well-established conventional banks. Under a severe competition with already well established conventional banks, Islamic banks could come under pressure to lower the requirements to access their financing. In the process of doing these customers with poor credit quality may be granted credit which may eventually crystallise into non-performing financing. The postulation by Berger and De Young (1997) that relates the issues of moral hazard with banks that are thinly capitalised having greater incentive to take excessive risk further strengthens the argument by Ariff and Rosly (2011) that theoretically, Islamic bank as *mudarib* is not required to hold capital. This may provide an incentive for moral hazard. Under moral hazard incentives, banks can undertake high risk investments which, though, can yield a high profit but characterised by high credit risk.

2.2.5 Theory of Islamic Firm

Contrary to the profit maximisation objective of the firm under the classical economic theory, the business objective of Islamic firm is the attainment of *falah* (Alom & Haque, 2011; Chapra, 1992). Dusuki (2008) affirms that protection of Islamic norms and values and protection of social justice and societal welfare should take precedence over profit maximisation objectives of Islamic banks. Under the Islamic system, a

firm cannot undertake manipulative and unscrupulous transactions to make a profit and inflict loss on the buyers (Moniruzzaman, 2014).

Profit maximisation under the *Maqasid Sharia* (fundamental objectives of Islamic Laws) cannot be the only objective of Islamic finance rather; it has to incorporate other goals such as justice, fairness, equitable distribution of wealth and spiritual health of the society (ISRA, 2013). Unlike the conventional banks with the primary objective of shareholders' wealth maximisation, the *Maqasid Sharia* expects Islamic financial institutions to pursue *Maslahah* (the welfare of the society) as their primary business objective only to be followed by shareholders' wealth maximisation (Mansour, Ben Jedidia & Majdoub, 2015).

Imam Al-Ghazali, according to Yusof and Amin (2007) lays down three principles to guide the behaviour of Islamic firm. These are fairness, justice, and benevolence. In agreement with Al-Ghazali, Azid et al (2007) also argue that the main objective of an Islamic firm is to earn reasonable profit through just prices and with a view to establishing and promoting the welfare of the society. Firms are an integral part of the society and therefore, have moral and ethical obligation to the society (Azid, et al., 2007). Azid et al. (2007) went further to emphasise the ethical responsibility of an Islamic firm to provide its customers with full disclosure about its product. This affirms the fundamental principles of Islam on guiding the behaviour of the firm towards its customers and thereby the society.

According to Iqbal and Mirakhor (2004), the behaviour of an Islamic firm should reflect the general interest of the society. Metwally (1997), in his contribution to the theory of an Islamic firm, argues that Islamic firm should not engage in transactions that are forbidden under *Sharia.* In other studies, pursuance of utility maximisation should be the objective of Islamic firm (Amin & Yusof, 2003; Metwally, 1997). Yusof and Amin (2007) argue that utility or welfare maximisation objective of a firm would assume a trade-off between profit for the firm and beneficial activities (such as charity) to the society. "An Islamic firm must avoid all acts of exploitation, discrimination, and restrictive trade policies since all these are denounced by Islam" (Azid, et al. 2007, p13).

2.3 Empirical Evidence

Gavin and Hausmann (1998) in their investigation of the root causes of the banking crises in the Americas, employ descriptive analysis and ANOVA to examine the effects of macroeconomic variables as possible causes. The study concludes that macroeconomic shocks can adversely affect bank balance sheet and that if the shock is strong enough, can create insolvency within the banking system which can lead to the banking crisis. Some of the identified macroeconomic factors are volatile fiscal policy, high-interest rate, economic growth that creates lending boom and inappropriate monetary policy. Gavin and Hausmann (1998) further argue that banking crises usually occur from the interplay of both macroeconomic shocks and bank vulnerability. They also assert that many bank failures are due, in many cases the bad decisions of bankers. Banking crises resulting from such decisions can,

however, be predictable and preventable in a good and competent supervision and regulatory environments.

Tafri, AbdulRahman and Hamid (2012) also examine the sources of risk in both conventional and Islamic banks with a view to determining the major types of financial risk that face each type of the banks. The study conducted a survey using questionnaire within and outside Malaysia and employed descriptive statistical analysis. The study concludes that even though, Islamic banks are supposed to be different from conventional banks in terms of its guiding philosophy, they are nevertheless, exposed to similar risks as conventional banks.

2.3.1 Risks in Islamic banking

Banks perform financial intermediation by mobilising deposits from surplus units and extending loans to economic agents in a deficit of capital. "In the process of providing financial services, banks assume various kinds of financial risks"(Santomero, 1997, p. 2). Similar to Santomero (1997), Allen and Santomero (1998), argue further that banks by dealing in financial assets are essential, in the financial risk enterprise. And the major risk normally encountered by banks in the course of their financial services intermediation function is the credit risk. Credit risk has been defined by the Joint Forum[8] (2015, p. 1) as "the risk that counterparties will fail to perform fully its financial obligations, and can arise from multiple activities across sectors. For example, credit risk could arise from the risk of default on loan, or bond obligation, or

[8] The Joint Forum was established in 1996 under the aegis of the Basel Committee on Banking Supervision (BCBS), the International Organization of Securities Commissions (IOSCO) and the International Association of Insurance Supervisors (IAIS) to deal with issues common to/across the banking, securities and insurance sectors, including the regulation of financial conglomerates.

from the risk of a guarantor, credit enhancement provider or derivative counterparty failing to meet its obligations". Anytime a bank acquires an earning asset, the possibility of default by the borrower arises (Koch, 2003). What often makes the difference among banks is the quality of risk management strategies a particular bank puts in place.

According to Castro (2013), banking crises often arise when banks struggle with liquidity or insolvency problems which most often result from non-performing loans.In performing their primary functions of financial intermediation, Islamic banks also face risks like those encountered by conventional banks (Zainol & Kassim, 2012). Generally, banking institutions in the course of their intermediation roles are exposed to a number of risks common among them are credit risk, liquidity risk, operational risks, market risk, reputational risk and most importantly, for Islamic banks, the risk of *Sharia* non-compliance. Risks in Islamic banking include *Sharia* compliance, market, operational and reputational risks. Risks can be broadly classified into Sharia compliance, systemic, and non-systemic risks.

According to Akkizidis and Khandelwal (2008), Islamic banking emphasises asset-backed financing, unlike the conventional banking which is essentially debt-based. This fundamental difference, according to Akkizidis and Khandelwal (2008), makes risks in Islamic banking different from conventional banking. This is because the nature of functions performed by Islamic banks is, in many aspects, different. For example, risks such as credit risk, market risks, and operational risks are equally present in Islamic banking but their nature and effects are uniquely different.

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TYPOLOGY OF   RISK IN ISLAMIC BANKING INSTITUTIONS

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                                    TYPOLOGY OF   RISK IN ISLAMIC BANKING INSTITUTIONS

SHARIA COMPLIANCE RISK        SYSTEMIC RISK              NON-SYSTEMIC RISK

                        ECONOMIC CONDITIONS              BANK-SPECIFIC
                        AND MARKET RISKS          RISKS


    MACRO ECONOMIC                        MICROECONOMIC


           ┌ GDP                                    EQUITY PRICE

             INFLATION                            ┌ CREDIT RISK

             INTEREST RATE / RATE OF RETURNRISK     LIQUIDITY RISK

           └ EXCHANGE RATE RISK                      OPERATIONAL RISK

                                                   └ DISPLACED COM. RISK
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Figure 2.1
Typology of   Risks in Islamic Banking Institutions

2.3.2 Credit risk in banking

Of all the risks a bank is exposed to, credit risk remains the singular dominant global concern to domestic regulatory authorities and multinational and global financial regulatory authorities. In the Malaysian financial system, for example, loan (financing in case of Islamic banking) is regarded impaired where the principal or interest /profit or both is past due for more than 90 days or 3 months. In the case of revolving facilities, the facility becomes impaired where the outstanding amount has remained unpaid in excess of the approved limit for a period of more than 90 days or 3 months (Bank Negara Malaysia, 2007). These same parameters are used to define non-performing loans in Indonesia and Bahrain.

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Credit risk is considered as a very important financial risk in the business of banking (Khan, & Ahmed, 2001).A financial crisis occurs for a multitude of reasons; the major cause of serious banking problems continues to be directly related to credit related problems, (Dicevska, 2012). Banking crisis as presented by Benston and Kaufman (1995) could be in form of excessive credit expansion, asymmetric information, shocks originating outside the banking system and institutional and legal restrictions that weaken banks, making them unnecessarily prone to failure. It can be said that 2007 global financial crisis which has its root from USA credit market through excessive lending activities by banks to high-risk customers using financial engineering to create complex instruments. Several studies have been conducted to investigate determinants of credit risk in banking. Some of which are discussed briefly.

Demirguc-Kunt and Detragiache (1998) concerned with large scale severe banking sector crisis undertook the study to investigate the features of the economic environment that trigger a banking crisis. The study covers the period of 1980 to 1994. Demirguc-Kunt and Detragiache (1998) particularly investigated macroeconomic factors that are possible determinants of credit risks. According to Demirguc-Kunt and Detragiache, the Theory of determinants of the banking crisis states that shock that adversely affects the economic performance of bank borrowers and effects of which cannot be mitigated through diversification should be positively related to the banking crisis. The study finds that low GDP growth, excessively high

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real interest rate and high inflation are significant predictors of the systemic banking crisis.

Sinkey and Greenawal (1991, p.43) argue that "net loan charge-off and nonperforming loans reflect realised credit risks in banks. These risks arise from either external conditions (e.g., the energy and farm belts of the United States in the 1980s) or internal factors such as poor lending decisions (including fraudulent ones) or both"). Credit risks, therefore, could result from both exogenous factors (such as economic, political uncertainties and even, natural phenomenal conditions) and endogenous factors (such as poor managerial decisions and weak internal control systems).Credit risk in Islamic banking is also, measured as the proportion of non-performing financing to total financing.

Castro (2013) investigates determinants of credit risk in the banking system in five European countries of Greece, Ireland, Portugal, Spain, and Italy. The study finds that credit risk is significantly influenced by macroeconomic factors. The study concludes that credit risk increases when GDP growth rate declines. It is also found that credit risk is positively related to rising in the unemployment rate, interest rate, and excessive credit growth.

Saurina and Jimenez (2006) in their study of credit cycles, credit risk, and prudential regulation argue that credit expansion rises during the boom period and this provides fertile land for problem loans to grow. They examine the effects of such macroeconomic variables such as GDP and real interest rate and some bank-specific

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variables such as portfolio diversification. the size of the bank and collaterals on non-performing loans of banks. The study finds that acceleration of GDP as well as a decline in real interest rate effect decline in non-performing loans. This means that a rapid growth of credit expansion is positively related to increasing of non-performing loans. For the bank-specific variables, the study finds that the more concentrated the credit portfolio, the higher the problem loan ratio. The study also finds that collateralized loans to households are less risky. The study concludes that size of the bank does not have any significant impact on the problem loan ratio.

Dicevska (2012) in his investigation of the credit risk of Macedonian banks also agrees with the impact of changes in economic conditions on the credit risk of banks and argued that non-performing loans in banks are directly related to credit standards of borrowers and portfolio management by the banks.

Ahmad and Ariff (2007) investigate credit risk determinants across two types of banking systems. The banking system in the developed economic environment of Japan, the US and Australia were compared to the emerging economies of countries like Malaysia, Korea, and Mexico. The study incorporated eight variables to determine which variables contribute more to the credit risk in each of the two types of the banking systems. The study finds that credit risk in the emerging economies is higher than that in the developed economies of Japan, US, and Australia. The study concludes that the finding is informed by a large number of bank-specific factors in the emerging economies than in the developed economies. Specifically, the study finds management efficiency to be significant and negatively related to credit risk.

Loan loss provision to total loans was also found to be positively significantly related to credit risk particularly in countries like Australia, Japan, and Mexico. Ahmad and Ariff (2007) argue that higher loan loss provision signals potentially higher credit risk as banks need to make high provision against potential large non-performing loans. Other findings of the study area loan to deposit ratio, liquidity ratio and regulatory capital which are found to be significantly related to credit risk. The study predicts that the bigger the loan portfolio in relation to deposit size the higher the probability of credit risk. The study also finds that loan to deposit ratio is positively significant as a determinant of credit risk in Malaysia, US, and France.

Das and Ghosh (2007) using panel data to investigate determinants of nonperforming loans of state-owned banks in India between 1994 and 2005 find economic growth, credit expansion, bank size, operating expenses, high-interest rate and moral hazard as important determinants of nonperforming loans. Das and Ghosh argue that problem loans are closely associated with economic activities. They further argue that when there is an economic downturn, firms and households' incomes are negatively impacted thus making it difficult for them to meet their repayment obligations to their banks. The summary of the findings of Das and Ghosh (2007) are captured by their postulation that, "disaster myopia, herding behaviour, perverse incentives and principal-agent problems are the main factors that explain mistakes in bank credit policy in an expansionary phase".

2.3.3 Credit risk in Islamic banking

Many studies have shown good performance by Islamic banks in the past, however, only a few studies (Ahmad & Ahmad, 2004; Al-Wesabi & Ahmad, 2013; Chusaini & Ismail, 2013; Masood et al., 2012) have investigated the credit risk of Islamic banking. And from the emerging evidence that Islamic banks also face similar risk just like their counterparts in the conventional sub-sector, there is need to further investigate the causes of the observed non-performing financing of Islamic banks. This becomes important because if a bank suffers deterioration in the quality of its asset, particularly its risk assets over a period of time, its long-term survival will be jeopardised. If the non-performing financing of the Islamic banks continues to be persistent over a long time it, therefore, portends a clear danger signal to the long run financial crisis within the banking system sub-sector. Tafri, AbdulRahman and Hamid (2012) in their study of the sources of risks in commercial banks, conclude that though, in principle, Islamic banks are supposed to be different from conventional banks in terms of risk profile, they are in reality, exposed to the same types of risks.

Elgari (2003) in his study of the credit risk of Islamic banking and finance using exploratory approach and conceptual review of previous studies finds that most Islamic banks carry huge non-performing loans on their balance sheet. The study indicates higher credit risk in Islamic banks than in the conventional banks.

Ahmad and Ahmad (2004) investigate the factors influencing the credit of Islamic banks in Malaysia using data from the audited annual accounts of a selected Islamic banks and conventional banks for the period 1996 - 2002. The study employs

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regression analysis. The study finds management efficiency; risk-weighted assets and size of the assets are major determinants of credit risk in Malaysia

In a related study, Masood, AlSuwaidi and Thapa (2012) investigate the credit risk management in both conventional Islamic banks in UAE. The focus of the study is to determine the differences in conventional and Islamic banks in terms of credit risk management, using survey method and Binary Logistic regression method of analysis. The result of the study suggests that Islamic bank managers appear to use the more robust technique for their credit risk management than their conventional counterparts.

Al-Wesabi and Ahmad (2013) in their study focus on the credit risk of Islamic banks in GCC countries. The study investigates the factors associated with credit of Islamic banks in GCC countries. Regression analysis was conducted. The study finds management quality, liquidity, and GDP as the major determinants of the credit risk of Islamic banks in GCC countries. The study also concludes that concentration in high risk assets increases the credit risk of Islamic banks.

Similarly, Nursechafia and Abduh (2014) examine the credit risk of Islamic banks in Malaysia. Specifically, they investigate the effects of macroeconomic factors on the credit of Islamic banks. The study employs VAR, IRF (Input Response Function) and Variance decomposition as tools of analysis. The findings of the study show that exchange rate, supply side inflation, economic growth have a negative relationship

with the credit risk of Islamic banks while money supply and Islamic bank money market rates have a positive relationship with the credit risk of Islamic banks.

The few studies in the area of the credit risk of Islamic banks, concentrate more on the bank-level factors. Other studies that tried to investigate the effects of macroeconomic variables on Islamic banks include (Adebola et al., 2011). The study, however, focuses only on one country, Malaysia while, Al-Wesabi and Ahmad (2013) focus on GCC countries.

From the review of the literature; determinants of the credit risk of Islamic banks within a dual banking system on cross-country basis are to yet be seriously investigated. Particularly, effects of factors such as conventional interest rate, financing concentration on the credit risk of Islamic banks are yet to be resolved. To fill this apparent gap in the literature, the present study aims to investigate the effects of the conventional interest rate and financing concentration and its associated moral hazard. In addition, effects of macroeconomic variables such as GDP, money supply, inflation, and the real exchange rate on the credit risk of Islamic banking will also be examined.

2.3.4 Credit risk of Islamic banking and conventional interest rate

The interest rate, as a critical factor in the credit risk management by conventional banks, has been widely investigated and its effect on the credit risk well documented. Ironically, the interest rate has been either ignored or not considered as a variable in the credit risk management of Islamic banking. Since Islamic banks, in a dual banking

system are equally affected by the dynamics of interest rate within the national economy the need to examine its effects on the credit risk of the banks becomes inevitably important.

In order to investigate the relationship between conventional interest rate and credit risk of Islamic banking, there is a need to examine the connection and interaction among rates of return on deposits of Islamic banks, conventional interest rates and size of the deposits of Islamic banks. Effects of convention interest rates on the rates of return on Islamic banks' deposits and the size of the deposits can influence the flow of deposits to, and therefore, the liquidity of the banks and their capacity to meet their funding contractual obligations to their customers. Availability of deposit to a bank at economic cost would determine its capacity to finance less risky assets. A bank with the low level capacity to generate deposit would be more than willing to attract new deposit at a higher cost. These high-cost deposits can only generate higher returns if they are invested in high risk investments. High risk investments are potential sources of credit risk. Gavin and Hausmann (1998) explain the relationship between interest rates, deposits and banks' credit risks.

Gavin and Hausmann (1998) investigate the root causes of banking crises in the Americas particularly, Latin America, argue that when the rate of growth of deposits is lower than the interest rate on deposits, the bank will have to make the net transfer of funds to depositors. This can be either by extracting a transfer of resources from the borrowers through interest rate increase or run down the stock of their liquid assets. Whereby banks find it imprudent to do either, they resort to calling in loans as they

become mature. The effect of this is credit crunch which leads to curtailment of further investments by the borrowers, reduction in capacity utilisation, loss of revenue, impaired capacity to repay the existing loans, thereby creating accumulating nonperforming loans.

A number of studies have shown that in the countries like Malaysia, Indonesia, and Bahrain where both conventional and Islamic banking systems coexist in a dual banking system, interest rate, influence the rate of return on Islamic banking deposits, size of deposits and credit risk of Islamic banking (Haron & Ahmad, 2000; Haron &Wan Azmi, 2008; Kaleem &Md Isa, 2003; Kassim, Majid &Yusof, 2009; Obiyathulla, 2008; Zainol& Kassim, 2012). It has been postulated by Gavin and Hausmann (1998) that interest rates and deposits play significant roles in the formation of the credit risk of banks.

Obiyathulla (2004) investigates interest rate risk for Islamic banks operating in Malaysia as a dual banking system. The study employs Pearson Correlation and OLS regression to determine the link between interest rate and rate of return on the deposit of Islamic banks. The study also investigated the linkage between the deposits of the two banking systems. In order to ascertain the causality between the variables, the study employs Granger Causality tests. The study concludes that though, Islamic banks operate on interest-free principles, the economic environment in a dual banking system inevitably exposes them to the problems of interest rate risk as it affects the conventional banks. Obiyathulla (2004) finds that conventional interest rate Granger cause changes in rates of return on the deposit of Islamic banks. Similarly, the result

of the study indicates an inverse relationship between interest rates and size of deposits of Islamic banks.

In a similar study, Obiyathulla (2008) affirming the earlier study also concludes that Malaysian Islamic money market profit rates are highly correlated with conventional money market rates. Based on the correlation between ROR of Islamic banks and three-month interest rate of conventional banks, Obiyathulla (2008) argues that there is extensive interest rate exposure for the Malaysian Islamic banks.Obiyathulla (2008) in this study, therefore, concludes that Islamic interbank money market profit rates in a dual banking system such as in Malaysia are highly correlated with conventional money market rates.

Haron and Wan Azmi (2008) in their study of determinants of Islamic and conventional deposits in the Malaysian banking system find that macroeconomic variables such as BLR (Base Lending Rate), KLCI (Kuala Lumpur Composite Index), CPI (Consumers Price Index), M3 and GDP have significant long run relationship with deposits placed by customers of both Conventional and Islamic banks. They find that depositors in both Islamic banks and conventional banks are sensitive to the financial rewards whether the rate of profit or interest rate receivable on their investments. Haron and Wan Azmi (2008) conclude that any upward changes in the interest rate of the conventional banking system will have a negative impact on the deposit levels in the Islamic banking system.

Similarly, Kassim, Majid and Yusof (2009), investigate the impact of monetary shocks on the conventional and Islamic banks in Malaysia. The study was conducted using VAR and variance decomposition methods and concludes that both the Islamic banks' financings and deposits as well the conventional banks' loans and deposits are found to be sensitive to the changes in monetary policy as measured by the overnight policy rates determined by the Bank Negara Malaysia (BNM).

In another study, Kasri and Kassim (2009) examine the determinants of savings in Islamic banks in Indonesia between 2000 and 2007. The study employs VAR and impulse response functions analysis as an econometric technique to analyse the importance of real rate of return on deposit of Islamic banks, interest rates on deposits of conventional banks, real income and branch network in determining the level of savings in Islamic banks in Indonesia. The study finds that higher rate of return and lower conventional interest rate influence rise in deposits of Islamic banks and also in a converse situation, a lower rate of return and higher conventional interest could lead to a fall in the deposit of Islamic banks. This study concludes that this scenario could lead to displaced commercial risk between Islamic banks and conventional banks.

In the work of Zainol and Kassim (2012) sensitivity of Islamic banks to movements in the market interest rate was highlighted. The study synthesised the discussions among scholars on the issue of rate of return risk in Islamic banks. The study concludes that despite the fact that Islamic banking, theoretical supposed to be free from interest rates, it has a significant impact on the performance of Islamic banks. This is because according to the study, many Islamic banking products are benchmarked against the

conventional interest rate. Zainol and Kassim (2012) further conclude that changes in interest rate affect Banks' earnings and the underlying value of the banks' assets and liabilities.

Takayasu Ito (2013) studied Islamic rates of return and conventional interest rates in the Malaysian deposit market concludes that Islamic rates of return not only co-move with conventional interest but actually have more impact on conventional interest rates than conventional interest rates have on it.

In a related study, Cevik and Charap (2011) examine the behaviour of returns on the deposits of conventional and Islamic banks in Malaysia and Turkey from 1997 to 2010. The study finds a correlation between conventional bank deposit rates and Islamic banks' deposit rates of return were as high as 91% for Malaysia and 92% for Turkey. The study provides evidence that changes in Islamic banking deposit rates of return are caused by changes in conventional bank deposit rates. The study concludes that conventional interest rate actually Granger cause returns on PLS accounts in these countries.

Haron and Ahmad (2000) also find a negative relationship between the interest rate of conventional banks and the interest–free deposits in Islamic banks in Malaysia. This means that when market interest rate rises, deposit size of Islamic banks tends to fall. Kaleem and Md Isa (2003) in their study confirm the relationship between conventional interest rate and rate of return paid by Islamic banks on their deposit

accounts. The study concludes that conventional deposit interest rate granger causes deposit profit rate of Islamic banks.

However, there are other studies in the literature which do not see any relationship between interest rate and Islamic banking operations. Masood et al. (2012) consider credit risk management by Islamic and non- Islamic banks in UAE. The study finds out that cash flow and character are the significant variables of assessing credit risks between Islamic banks and non- Islamic banks in UAE. The interest rate was not considered as a variable.

In a study on Indonesia by Affandi and Tamanni (2010), it was found that Islamic banking deposits were not sensitive to the interest rate as an instrument of monetary policy changes in Indonesia. Similarly, Ascarya and Achsani (2008) examine the behaviour of monetary demand in the dual banking system in Indonesia using GDP and inflation among other variables but did not consider interest rate as a relevant determinant of the behaviour of money demand.Also, Al-Wesabi and Ahmad (2013) in their study of the credit risk of Islamic banks in GCC countries conclude that even though credit risk is affected by macroeconomic and some firm-specific factors, interest rate and inflation do not appear to be relevant. Along this line of the argument are Ariffin and Tafri (2014) who state that interest rate has no influence on the operations and particularly the quality of the assets of the Islamic financial institutions.

It is, therefore, clear from the literature that evidence of the role of interest rate in the Islamic banking in general and credit risk of Islamic banking is mixed and thus remain unresolved. The need for an empirical study on the relationship of conventional interest rate with the credit risk of Islamic banking in dual banking system on a cross-country basis has, therefore, become more imperative in view of the lack of definitive consensus in this area.

2.3.5 Credit risk and concentration of financing of Islamic banks

In addition to the issue of the interest rate as the factors of focus, the concentration of financing of Islamic banks on very few products or few sectors has also become an issue of concern to the banking regulatory authorities in many of the countries under review and therefore requires empirical investigation. Loan portfolio concentration in conventional banking and its effect on credit risk has been widely investigated, but findings have been very divergent. There are studies which are in agreement with the traditional portfolio theory and traditional banking theory. The traditional banking theory argues that if banks diversify their credit portfolio, the probability of default would reduce (Diamond, 1984). Herring and Watcher (1999) affirms that increasing concentration of banks' credit portfolio particularly in real estate has proved disastrous for banks in many countries in the past. The effects of a skewed financing structure on credit risk of Islamic banking are yet to be subjected to serious empirical investigation. Evidence of empirical investigation on effects of financing concentration on the credit risk of Islamic banking is very scanty in the literature. Al–Wesabi and Ahmad (2013) in their study of the credit risk of Islamic banks in GCC

countries find loan concentration in risky assets to be positively but not significantly related to credit risk of Islamic banking.

However contrary to the popular portfolio theory; Tabak, Fazio and Cajueiro (2010) find that loan concentration seems to improve the performance of Brazilian banks in both return and risk. They conclude that loan concentration indices were positively related to returns and negatively related to risk. However, the study does not consider the effects of macroeconomic shocks on the performance of the risk assets of the Brazilian banks given different characteristics of the sectoral distribution of loans in Brazil.

Behr, Kamp, Memmel and Ptingston (2007) in their study of diversification and banks' risk-return characteristics of German banks find out that more specialised banks (i.e. banks with high loan concentration) tend to have slightly higher returns. However, the higher return comes with higher risk. The risk is measured by the serial volatility of non-performing loan ratios. They conclude that banks with high loan concentration enjoy better performance, but their non-performing loans are a bit more volatile.

Other studies whose findings conclude that loan portfolio concentration reduces risk are (Ascharya & Achsani, 2008; Behr et al, 2007; Berger & De Young, 1997).The question, therefore, is, does the fact that most Islamic banks appear to concentrate their financing on few economic sectors such as household sector, real estate, and personal / consumer finance be one of the factors contributing to their non-performing

financing facilities? Most Islamic banks face limited financing outlets and as a result, tend to concentrate their financing also, largely on asset-based financing. As result of this, most Islamic banks appear to have a large proportion of their financing concentrated in household and property sectors. Any macroeconomic shock that tends to affect national GDP or household income could expose the banks to default risk.

In view of these opposing views on the effects of loan concentration on return-risk of banks in different countries, the effects of loan concentration on the credit risk of banks and particularly Islamic banks remain unresolved.

2.3.6 Ethical values in banking

Banking is a business built on public trust and confidence. The level of confidence people have in a bank determines the extent it can succeed (Jaseviciene. 2012). According to Jaseviciene (2012), ethical judgments create confidence in the public with respect to a bank's services and its reputation. People's confidence can be earned by a bank through honesty, fairness and reliability the performance of its duties. The ethical value of a bank requires banks to maintain a reasonable balance between depositors' and borrowers' interests by striking a harmony between their assets and liabilities. According to Iqbal and Mirakhor (2011), Islam greatly emphasises trust and trustworthiness as uncompromising attributes of Muslims both in private affairs and at the marketplaces. The ultimate effects of these are to reduce the risk associated with the problems of moral hazard in agent-principal relationships.

Jaseviciene (2012) addresses the ethics requirement of banks in the process of rendering financial services to the public. The study was conducted within the Lithuania environment. Jaseviciene (2012) argues that business success is a function of the moral standing of entrepreneurs. The researcher further asserts that ethical behaviour does not violate the interest of others or aggravate the situation.

In a similar study, Bozovic (2007) examine the role of ethics in banking. Bozovic (2007, p.175) states that "If an individual has a deficit of ethical morality it means that they put their interests before the collective and legal norms, and before the norms of customary business morality, which can damage the business environment". The business then concludes that for banks to maintain the high moral standard, they must avoid a high concentration of loans in one industrial branch.

2.3.7 Financing- Deposit Gap

This is the proportion of total financing assets of an Islamic bank relative to the total deposit (customers' investment accounts) liabilities it holds at a particular point in time. The financing-deposit gap is represented by financing-deposit ratio in the bank. According to Samad and Hassan (1999), a higher financing deposit ratio indicates that a bank takes more financial stress by making excessive financings. This implies that the bank's deposits are less that the size of its financing. A deposit profile of a bank that is falling below the financing activities of the bank necessarily puts the bank in a tight liquidity position. In order to supplement the shortfall in deposits a bank that is experiencing a high financing-deposit gap would have to source money from other sources, usually, short-term interbank money market. This inevitably forces the bank

to maximise its income from the available deposit. This can motivate such bank to direct the available funds to high yield but high risk investments. This situation would create high potentials for credit defaults. Therefore,the lower financing-deposit ratio is always favourable to higher financing/deposit ratio (Samad & Hassan, 1999).On the other hand, too low a financing-deposit ratio could also mean that the banks are not maximising their investment opportunities.

From the perspective of monetary policy, the government can influence the capacity of banks to make credit available to or curtail it from their customers through interest rate as a tool of monetary policy. Also from the perspective of deposit generation, banks compete by offering competitive interest rates to depositors. Availability of deposit to a bank at economic cost would determine its capacity to finance less risky assets. A bank with the low level capacity to generate deposit would be more than willing to attract new deposit at a higher cost. These high-cost deposits can only generate higher returns if they are invested in high risk investments. High risk investments are potential sources of credit risk.

2.4 Dual banking system and operation of Islamic banking

Historically, dual banking system according to Comptroller of the Currency Administrator of National Banks in the US (2003) refers to the banking system in the United State of America in which State and Federal banking system co-exist under different laws. The Federal banking system is based on a Federal Charter; the state banking system, on the other hand, is established under state laws.

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The dual banking system has been operating in the US since the Supreme Court's decision in M'Culloch v Maryland in 1819 (CCANB[9], 2003). Scort as cited in (CCANB, 2003), states that "the very core of the dual banking system is the existence of different regulatory options that are not alike in terms of statutory provisions, regulatory implementation, and administrative policy".

Burtler and Macey (1988) also writing in the context of the US experience, state that the American banking system operates under a dual system of the state and federal charters. Burtler and Macey (1998) further state that under the dual banking system, banks operating in any state are allowed to choose between the state and the federal charter. Whichever the charter a bank chooses would determine its powers and regulate its operations and its investment activities.

However, the dual banking system in the context of Islamic banking is different from the US's experience. In the context of Islamic banking, the dual banking system is a system in which Islamic banking system is running side-by-side with the conventional banking system (Tahir, 2007).

MALAYSIA

In Malaysia,the dual banking system is a banking environment in which Islamic financial system operates in parallel with the conventional financial system (Aziz, 2002). In Malaysia, according to BNM (2013), Islamic banking system operates under

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[9] Comptroller of the Currency Administrator of National Banks in US

the Islamic Financial Services Act 2013 (IFSA) while the conventional banking system is operating under the Financial Services Act 2013 (FSA).

INDONESIA

In Indonesia, the dual banking system is being operated under the Indonesian Banking Architecture (API). Under this system, Islamic and conventional banking systems operate side-by-side. According to Bank Indonesia (2015), the enabling law which has provided a solid base for the development of Islamic banking in Indonesia is the Act No 21 of 2008.

BAHRAIN

In Bahrain, all financial institutions are subject to the regulatory instruments contained in CCB Rulebook (Central Bank of Bahrain Rulebook).According to Central Bank of Bahrain, conventional banks are regulated under the rules and regulations contained in the CCB Rulebook volume 1 issued in July 2004 while Islamic banks are regulated by the rules and regulations under the CCB Rulebook volume 2 issued in January 2005.According to CCB (nd), CCB Rulebook Volume 2 (Islamic banks) covers Islamic bank licensees. It contains prudential requirements. These requirements are aimed at ensuring the safety and soundness of all CCB-licensed Islamic banks.

2.5 Summary of the Chapter

The chapter presents the underlying theories related to the study in line with the issues to be investigated. The chapter also presents empirical evidence on the credit risk in

Islamic banking. The chapter presents discussions on the effects of the conventional interest rate on the operations of Islamic banking particularly its effects on credit risk. There are divergent views on the effects of the interest rate on the credit risk of Islamic banking. What has come out clearly from the review of the literature is that investigations on the effects of the interest rate on the credit risk of Islamic banking are still largely unexplored.

The chapter also presents discussions on the essence of ethical value in banking and most importantly in Islamic banking.Unethical acts in banking were considered from the point of view of the extent financing concentration by Islamic banks can expose their depositors' and shareholders' funds to risk as well as endangering the stability of the whole financial system.

It is, therefore, clear from the literature that there is yet no consensus among scholars as to the exact role of the conventional interest rate on Islamic banking particularly on its credit risk. The issue of loan concentration or diversification with respect to risk-returns of banks has not been settled as well.

Based on the foregoing, this study is primarily motivated by the observed gaps in the literature. It is the objective of this study to fill the gap by investigating the role of the conventional interest together with other variables on the formation of the credit risk of Islamic banks. Effects of loan concentration on the credit risk of Islamic banks will also be investigated. To the best of the researcher's knowledge, these two issues remain unexplored intheIslamic banking within the dual banking system.

CHAPTER THREE

RESEARCH METHOD

3.1 Introduction

The chapter presents the research design and the methodology that were applied to carry out an empirical analysis of the data for the study. It also presents the nature and sources of the data. Detailed discussions of the variables and framework of the study were presented. The chapter also presents model specifications and the methods of analysis.

3.2 Research design

The study employs ARDL approach to cointegration otherwise called the Bounds Testing to determine the long-run relationship among the variables of the various models formulated to achieve the objectives of the study. ARDL was introduced by Pesaran and Shin (1999) and Pesaran et al. (2001).There are, however,different econometric models to investigate cointegration (the long-run relationship between and among economic variables) such as VAR (Vector Autoregression) model, VECM (Vector Error Correction Model) and ARDL (Autoregressive Distributed Lag) approach. The appropriate model is a function of the nature of the time series data in term of their stationarity. That is the level at which data become stationary would determine the appropriate model of estimation to be used. VAR analysis can be conducted to test for integration between the variables. If there is no integration of the data it means that the data are not cointegrated, VAR model can then be estimated. If on the other hand, there is integration among the variables, test for cointegration (i.e.

the long-run relationship among the variables) can be conducted using VECM (Asteriou & Hall, 2011).

However, the appropriateness of VECM approach depends on the levels at which the variables in the model become stationary. That is for VECM to be appropriate all the variables must be stationary at first difference i.e. I (1). Where this condition is not met, VECM becomes inappropriate. ARDL approach to cointegration becomes a more efficient model for testing for cointegration between variables that become stationary at different levels. Therefore, where a model consists of time series data that are stationary at I (0) and I (1), the appropriate model of estimation is ARDL approach to cointegration (Pesaran & Sin, 1999). Furthermore, once cointegration is established, causality between the variables is then investigated.

The ARDL involves four stages. The first stage is to investigate the existence of long-run relationship between the variables by computing the Bounds testing to obtain the F-statistics. F-statistics test the joint significance of the parameters. The computed value of F-statistics is compared with the two bounds I (0) and I (1) critical values. According to Pesaran et al. (2001), the null hypothesis of no cointegration is rejected if the calculated F-Statistics is more than the upper bound critical values. That is the existence of cointegration is established if the computed F-statistics is greater than the upper bound critical value. On the other hand, if the value of the F-statistics is lower than the lower bound critical value, non-existence of cointegration is therefore established. However, if the value of F-statistics falls between the two bound critical values, the result is inconclusive.

The second stage is to estimate the long-run relationship between the dependent variable and the selected explanatory variables. This will show the long-run relationship of the individual independent variables with the dependent variable. The third stage is to obtain the error correction model (ECM) which indicates the speed of adjustment of the model to the long-run equilibrium. And finally, the fourth stage is to conduct diagnostic and stability tests to determine the fitness and stability of the model.

In time series analysis, the stationarity of the variables is very important in order to avoid a spurious regression result from the model. The analysis of time series data is aimed at explaining the behavioural pattern of the data throughout the period of the observation. Unit root test is normally carried out to test for the stationarity of data. Unit root tests could be carried out by applying Augmented Dickey-Fuller (ADF) or Phillips-Perron (PP) unit root tests. To test for the unit root, we have applied ADF (Augmented Dickey-Fuller) with automatic lag length selection using SIC (Schwarz Information Criterion). The result of the unit root tests shows the level at which the data become stationary.

Research Framework

The research frame presented below shows the relationship between the dependent variable (Credit risk) and the independent variables.
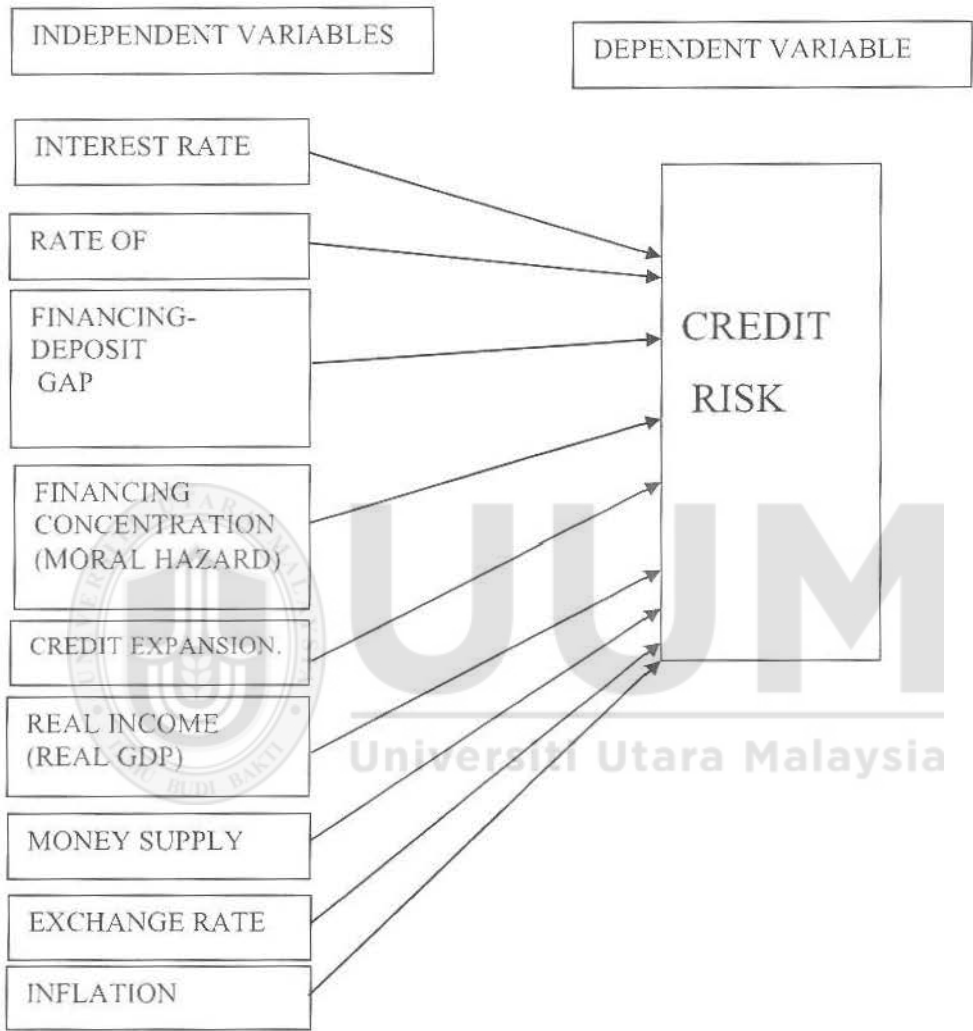
Figure 3.1

Research Framework

Other models used in the study particularly to achieve the objective four are the Hirschman-Herfindahl Index (HHI) and Dynamic Ordinary Least Square (DOLS). HHI is a measure of concentration. Other measures of portfolio concentration of

bank's credit in addition to Hirschman-Herfindahl Index (HHI). are Shanon Entropy (SE), an Absolute distance measure (Da) and Relative distance measure (Dr) (Behr, et al. (2007). According to Tabak et al. (2010), two traditional concentration measures that are normally applied are Hirschman-Herfindahl Index (HHI) and Shanon Entropy (SE). HHI is applied in this study because of its advantage of being sensitive to asymmetry (Calkins, 1983). It is also relatively simple in the calculation. Hirschman-Herfindahl Index is sometimes simply referred to as Herfindahl Index. These measures are used to estimate the effect of loan concentration in one or more economic sector on bank's return and risk. Once the HHI has been determined; regression analysis using Dynamic OLS (DOLS) approach to cointegration is conducted to estimate the long run relationship between credit risks and financing concentration and other selected variables.

In order to investigate the determinants of the credit risks of Islamic banking system, some selected bank-specific and macroeconomic variables which could influence the behaviour of Islamic Financial Institutions within the economies were identified. The variables include the ratio of non-performing financing to the total financing (proxied credit risk), rates of return on deposit of Islamic banks (ROR), interest rates on conventional banks' deposits (IRD), and lending interest rates of conventional banks (IR). Others are deposits of Islamic banks (DP), financing concentration (FC), the financing-deposit ratio (FDR) and credit expansion (FIN). Other variables are the macroeconomic factors such as real GDP representing real income, money supply (M2), and the general price level (INF) and currency exchange rates (EXC).Credit risk is represented by CR and it is the focus of the study.

The choice of the variables for the study is important for the determination of the credit risk in Islamic banks. The variables are made of bank-specific variables and macroeconomic variables. The way the bank-specific variables are managed would go a long way to determining the extent of the vulnerability of banks to crises. Banking crises are usually generated by the interaction of macroeconomic shocks with the banks' vulnerability (Gavin & Hausmann, 1998).

3.3 Variable definition and measurement

The following presents the definition of the variables within the context of the study as well as their measurements in many of the earlier studies.

3.3.1 Dependent variable

Credit risk (CR) is the dependent variable measured as the proportion of nonperforming financing (nonperforming loans) to total financing (total loan and advances) (Ahmad & Ahmad, 2004; Ahmad & Ariff; 2007; Al-Wesabi& Ahmad, 2013; Sinkey & Greenawalt, 1991; Tehulu& Olana, 2014).Credit risk, according to Louzis et al. (2012) is usually characterised by nonperforming loans. Also, credit risk is considered to be associated with the quality of individual assets and the likelihood of default by borrowers (Koch & MacDonald, 2010). Non-performing loans according to Berger and De Young (1997) has been generally agreed as the most acceptable proxy of problem loans. It has been postulated that "net loan charge-off and nonperforming loan reflect realised credit risks in banks. These risks arise from either external conditions; or internal factors such as poor lending decisions (including fraudulent ones) or both" (Sinkey & Greenawalt, 1991, p.43).

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Theoretically (theory of determinants of banking crises, moral hazard hypothesis), Credit risk has been postulated to be a function of both exogenous factors (such as economic, political uncertainties and even, natural phenomenal conditions) and endogenous factors (such as poor managerial decisions and weak internal control systems). Non-performing financing (non-performing loans) to total financing (total loan and advances) has been adopted in this study as it has been used in many other studies as it appropriately reflects the quality of the risk assets of the banking system. Non-performing loans/financing have been defined by Bank Negara Malaysia (2010) as:

i.   "Where the principal or interest/profit or both is past due for 90 days or 3 months. In the case of revolving facilities (e.g. overdraft facilities), the facility shall be classified as impaired where the outstanding amount has remained in excess of the approved limit for the period of more than 90 days or 3 months; or

ii.   Where the amount is past due or the outstanding amount has been in excess of the approved limit for 90 days or 3 months or less, the loan/financing exhibits weaknesses that render a classification appropriate according to the banking institution's credit risk grading framework".

iii. Where the repayments are scheduled on the interval of 3 months or longer, the loan/financing is classified as non-performing as soon as a default occurs. This is the same classification given to non-performing loans/financing in Indonesia and Bahrain (see Appendix F). Credit risk in Islamic banking is, therefore, measured as the proportion of non-performing financing to total financing.

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3.3.2 Independent variables

In establishing the linkage between banking crises, interest rates and bank deposits; Gavin and Hausmann (1998) postulate that when the bank deposit growth rate is lower than the deposit interest rate, there will be a net transfer of the fund to depositors. For banks to do this, they will either have to extract transfer of resources, through high interest, from borrowers or run down their liquid assets. Because, there is a limit to which they can run down their liquid assets, and also continue to raise interest rates which could negatively impact on the ability of the borrowers to repay their loans; the banks may resort to credit curtailment. If the credit curtailment is large and persistent, it leads to the credit crunch. The credit crunch will force the borrowers to cut back their investments and run down their inventories with an adverse effect on their revenue and eventually leads to repayment defaults and banking crisis.

3.3.2.1 Conventional Interest rate

Interest rate as an important tool of financial intermediation and a key source of market risk has been identified as a key determinant of the credit risk of conventional banking. High real interest rates are likely to adversely affect the banks' balance sheets as high lending rates may lead to large non-performing financings (Demirguc-Kunt & Detragiache, 1998).

For the returns on deposits, interest rates for three (3) months tenor deposits are used while investigating the relationship with the rate of return on deposits of Islamic banks. These interest rates are also applied when determining the relationship

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between deposit size of Islamic banks and interest rates on deposits of conventional banks. The rates are the averages of the various banks' rates for each deposit structure as given by central bank of each country (Kashif & Mohammed, 2013; Obiyathulla, 2004).However, for the estimation of the financing models in equations 10, 11, 12 and 15 the conventional interest applied is the average lending rate determined by the central bank of each country.

3.3.2.2 Rate of Return (ROR) on deposits of Islamic banks

The rates of return that are applied in the study are the rate of return or profit sharing rates on three-month *mudharabah* deposits (investment accounts) in Islamic banks. These are the average rates of return to depositors as computed by each country's central bank (Obiyathulla, 2004). This is the rate paid by Islamic banks as the rate of return or rate of profit on *mudharabah* deposits of three months' tenor. Three-month tenured deposits' rates are applied because of the deposits data and other variables applied in the study are on a quarterly basis.

3.3.2.3 Deposits of Islamic banks in Malaysia

Since the concept of deposit may vary in terms of its composition and statutory definition from one period to another in a particular country or even across countries, there is a compelling need to define the concept of deposit and the rate of return used in this study. Traditionally in conventional banking, money deposits are composed of Time or Term deposits, Demand deposits, and Savings deposits. Deposits in Islamic banking system are different from the conventional banking system, as it creates a totally different depositor-banker relationship. According to Naim and Zainol (2015),

"IFIs may be fund holders, 'a trustworthy hand' to the customers, a safe keeper, entrepreneurs in partnership-based deposit, or agents in agency-based deposits. In contrast, a commercial bank's relationship with its customers is a borrower to the depositors against small amounts of interest".Similar to the conventional banking system, money deposits in Islamic banking system can also be broadly classified into Demand deposits, Savings deposits and Investment deposits.

3.3.2.3.1 Demand deposits

Demand deposits sometimes referred to as current account deposits in the conventional banking can be in form of *Wadiah, Qard* or *Mudarabah* contracts in Islamic banking system.

3.3.2.3.2 Savings deposits

The major difference between demand deposits and savings deposits may be in the form of restrictions sometimes imposed on; and the kind of transactions allowed on savings accounts. Gift (*hibah*) may be given by banks on savings deposits in Islamic banking unlike the interest in conventional banking. Savings deposits can also be in the form of, *wadiah, mudarabah* or *qard.*

3.3.2.3.3 Investment accounts

Investment account deposits in Islamic banking system are the equivalent of Time, Term or fixed deposits in the conventional banking system. However, unlike in the conventional banking system, the relationship between the depositors in an investment (*Mudarabah*) account in Islamic banking is a contract where the depositor

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is a fund provider and the bank is an entrepreneur. The most important point to note here is legal relationship each type of the accounts creates between the bank and the depositor. These relationships are clearly defined for the Malaysian Islamic banking system by IBA (1983) and IFSA (2013).

3.3.2.3.4 Islamic Banking Act, 1983 (IBA) and Islamic Financial Services Act, 2013 (IFSA)

Pursuant to IFSA (2013), the Bank Negara Malaysia (BNM) issued a Transition Policy document in February 2014 to further clarify the Provision of section 288 of the Act with respect to Islamic deposit and Investment Accounts as defined under IFSA (2013). According to BNM (2014) because of the flexibility of the definition of Islamic deposits under the Islamic Banking Act, 1983 (IBA), the IFIs were able to structure their deposits into *wadiah, qard* and *tawaruq* to be principal-guaranteed. Deposits in the form of *mudarabah* and *wakalah* were non-principal-guaranteed. IFSA (2013) now provides separate definitions for Islamic deposits and investment accounts.

Under IFSA (2013), IFIs are required to classify their deposits into either Islamic deposits (which are principal-guaranteed) or investment accounts (which are non-principal guaranteed).Section 6.1 of the Transition Policy document states that an IFIs shall be allowed to continue to accept Islamic deposits on current accounts, deposit accounts and savings accounts under Shariah contract which are non-principal-guaranteed (hereafter referred to as "investment accounts") until June 2015. With effect from July 1, 2015, all deposits in Islamic banks in Malaysia, which are

principal-guaranteed, will be known as Islamic deposits and any deposits that are non-principal-guaranteed will be known as Investment accounts.

3.3.2.4 Deposits of Islamic banks in Indonesia

The enactment of Act No 21 (2008) provides the legal framework for the Islamic banking system in Indonesia. Deposits of Islamic banks in Indonesia are classified into three types viz, *Wadiah* demand deposits (Islamic demand deposits), *Mudharabah* savings (Islamic savings deposits) and *Mudharabah* deposits (Islamic time deposits). According to Bank Indonesia (BI) (2008), Islamic demand deposit is a type of deposit that can be withdrawn at any time using cheque, or any other banking instruments. The Islamic bank deposit contract can be in the form of *wadiah* or *mudharabah*. According to BI (2008), if demand deposit is based on *wadiah* contract, the bank shall be mandated to guarantee the return of the fund to the customer: and the customer shall have the right to withdraw the fund at any time. A deposit under the *mudharabah* contract, however, creates a partnership relationship between the depositor as the fund provider (*Sahibul mal*) and the bank as the manager of the fund (*mudharib*). Their benefit is the share of the business profit. These legal features of *wadiah* and *mudharabah* contracts are also, present and the same with savings and investment accounts deposits. The major distinguishing factor between *Wadiah* and *Mudharabah* however, the right or otherwise of the depositor to the return of fund and the liability to the bank to guarantee the principal.

3.3.2.5 Deposits of Islamic banks in Bahrain

The law that regulates the operations of Islamic banking in Bahrain is contained in the Central Bank of Bahrain Rulebook volume 2 (Islamic banking) (2005). According to the Rulebook, the Islamic bank deposit is made up of demand deposits, savings deposits and time deposits. The demand deposit is based on the *wadiah* contract whereas; the savings deposit could be based on *wadiah* or *mudharabah* contracts. The time deposit in Bahrain just like in Malaysia and Indonesia is based on *mudharabah* contract. *The mudharabah* based deposits are warehoused in investment accounts. With all intent and purposes, therefore, the deposits under Investment accounts up till June 2015 can be legally described as Islamic deposits in the three countries. For the purpose of this study, therefore, the deposits variable of the study is the investment account deposits which are non-principal-guaranteed and can, therefore, be appropriately classified as Islamic deposits.

3.3.3 Financing-Deposit Gap

This is the proportion of total financing assets of an Islamic bank relative to the total deposit (customers' investment accounts) liabilities it holds at a particular point in time. The financing-deposit gap is represented by financing-deposit ratio in the bank. According to Samad and Hassan (1999), a higher financing deposit ratio indicates that a bank takes more financial stress by making excessive financings. This implies that the bank's deposits are less than the size of its financing. A deposit profile of a bank that is falling below the financing activities of the bank necessarily puts the bank in a tight liquidity position. In order to supplement the shortfall in deposits, a bank that is experiencing a deposit gap would have to source money from other sources, usually,

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at a higher cost (Ariff & Rosly, 2011). This inevitably forces the bank to maximise its income from the available deposit. This can motivate such bank to direct the available funds to high yield but high risk investments. This situation would create high potentials for credit defaults. Therefore,the lower financing-deposit ratio is always favourable to higher financing/deposit ratio (Samad & Hassan, 1999).On the other hand, too low a financing-deposit ratio could also mean that the banks are not maximising their investment opportunities.

3.3.4 Financing concentration

The concentration of financing in few sectors, few products or risky assets is measured by the proportion of the financing on such products, assets or few sectors to the total financing. A number of methods are used to measure portfolio concentration of bank's credit. Some of these are Hirschman-Herfindahl Index (HHI), Shanon Entropy (SE), an Absolute distance measure (Da) and Relative distance measure (Dr) (Behr, et al. (2007). According to Tabak et al. (2010), two traditional concentration measures that are normally applied are Hirschman-Herfindahl Index (HHI) and Shanon Entropy (SE). HHI is applied in this study because of its advantage of being sensitive to asymmetry (Calkins, 1983). It is also relatively simple in the calculation. Hirschman- Herfindahl Index is sometimes simply referred to as Herfindahl Index. These measures are used to estimate the effect of loan concentration in one or more economic sector on bank's return and risk. The result is usually between 0 and 1. High values mean high concentration while low values indicate more diversification. Behr, et al. (2007), state that the lower limit for the HHI is 1/n when the exposure is diversified while the upper limit is 1 when all financings are granted to one sector,

region or on one product. HHI is also calculated by squaring the relative share of each product or sector of the total financing and summing the squares (Calkins, 1983). High values mean high concentration while low values indicate more diversification.

More concentration in this study is considered greater credit risk and is seen as a measure of moral hazard reflecting the existence of unethical behaviour in Islamic banking. The moral hazard arises from the incentive incompatibility between the deposits and the banks. Depositors primarily desire the security of their investments in addition with reasonable returns. However, the banks who are the agents of the depositors have a conflicting interest of maximising their profits, notwithstanding the inherent risks of putting most of their eggs in one basket. Because of the level of trusts reposed in the banks by the depositors and unequal access to information, the depositors cannot perfectly monitor the banks. Laldin and Furqani (2013) while discussing the fundamental principles of *Maqasid al-Sharia* contend that the essence of Islamic finance is to enshrine just and fair financial system which ensures equitable mobilisation and distribution of economic resources and promote fair and transparent financial practices with ethical stand.*Maqasid al-Sharia's* objective, according to Ariff and Rosly (2011), is to ensure that any product that is offered to the public has a positive impact not only on bank earnings but also, on consumer welfare and financial stability. Therefore, if the banks (as agents of the depositors) having information and knowledge of the risk inherent in financing concentration and choose to go ahead then, they are exposing the depositors (as the principals) to a high investment risk and general financial instability.

The very nature of *mudarabah* deposits theoretically under Sharia, that it is non-principal-guaranteed and that in the case of loss, the depositors bear the entire loss may, in fact, provides an incentive for moral hazard. This becomes more obvious because, under Sharia, according to Ariff and Rosly (2011), an Islamic bank as a *mudarib* is not required to hold capital. "To require the bank, as a *mudarib*, to use own equity to support risky assets is contrary to the principle of *mudarabah*" (Ariff &Roslyn, p. 308).

3.3.5 Real GDP and Non-performing financing

It has been found that economic expansion (GDP growth) is negatively related to non-performing loan (Adebola et al., 2011; Al-Wesabi& Ahmad, 2013; Louzis et al. 2012; Saurina& Jimenez, 2006). The hypothesis according to Louzis, et al. (2012) is that during the economic boom, non-performing loans become relatively low however when economy contracts non-performing loans increase. This is because, during the economic boom, borrowers have enough income to service their loans and banks are encouraged to expand their credit facilities. However, as the boom period continues, competition increases among banks and credit becomes easily available to low-quality borrowers. When the growth declines and recession set in, low-quality borrowers become quickly exposed and non-performing loans increase. This is in agreement with the conclusion of Saurina and Jimenez (2006). This finding is also confirmed by Al-Wesabi and Ahmad (2013) in their study of the credit risk of GCC countries. They also conclude that when GDP is declining, non-performing loans will go up.

Boduri (2014) asserts that for banks to guarantee their financial stability, maintain good quality assets and minimise credit risk, they have to constantly monitor economic circle carefully. In his studies on the effect of the growth of real Albanian economy, Boduri (2014) find an inverse relation between banks' non-performing loans and the growth of the real economy.

3.3.6 Inflation

Another factor that can trigger credit risk is inflation. Demirguc-Kunt and Detragiache (1998) find that increased risk of the banking sector could result as a consequence of a high rate of inflation. This is because high and volatile nominal interest rates associated with high inflation make it difficult for banks to perform maturity transformation. The increase in short-term interest rates may be due to various factors such as an increase in the rate of inflation. High real interest rates are likely to adversely affect banks' balance sheets as high lending rates may lead to large non-performing financings (Demirguc-Kunt & Detragiache, 1998). Adebola, et al.(2011) in their study of non-performing of financing of Islamic banking system in Malaysia between January 2007 and December 2009 find inflation to have a negative and significant effect on non-performing financing.

Also, the result of the study by (Rivi and Sheheryar khan, 2015) in Pakistan concludes that inflation has a negative impact on non-performing loans in Pakistan. Perry (1992) posits that the effects of inflation on a bank's performance depend on whether the inflation had been anticipated or unanticipated. He says that for anticipated inflation, banks can adjust the interest rate on their credit facilities and thereby keep the growth

of their revenue faster than the rate of inflation. Anticipated inflation is expected to have a positive relationship with banks' performance. In the same manner, an unanticipated inflation could have a negative impact on banks' performance. An unanticipated inflation redistributes wealth from creditors to debtors. If business firms are net debtors they would gain from inflation (De Alessi, 1964). This increases the capabilities of business firms to service their debts and thereby reduce the default possibilities. Therefore, when inflation is unanticipated we would expect inflation to have an inverse relationship with the credit risks of banks.

Table 3.1

Variables and their Measurement

VARIABLE	MEASUREMENT	PREVIOUS STUDIES THAT APPLIEDTHE SAME VARIABLE
Credit risk (DV)	Non-performing loans(Non-performing financing) / Total loan (Financing) amount	Tchulu, and Olana, (2014). Al-Wesabi and Ahmad (2013) Ahmad, and Ariff (2007) Ahmad and Ahmad (2004),
(IVs) Conventional Interest rate	3 months average deposit rate as given by Central bank	Kashif and Mohammed (2013) Obiyathulla (2004)
Rate of Return(ROR) or Rate of Profit	3-month average rate of return on deposit for the Islamic banking sector	Obiyathulla (2004) Haron and Wan Azmi (2008) Zainol and Kassim (2012)
Financing(loan)/ deposit Ratio	Total financing(loans) / Total deposits	Samad and Hassan (1999) Ahmad and Ariff (2007), Ahmad and Ahmad (2004) Al-Wesabi and Ahmad (2013)
Financing concentration (moral hazard)	Product or sector or regional financing concentration / Total financing	Hooks and Robinson (2002) Ahmad and Ahmad (2004), Cebenoyan and Strahan(2004).Ahmad and Ariff (2007)
Real Income	Real Gross Domestic Product (Real GDP)	Castro (2013) Haro and Wan Azmi (2008) Loayza and Shankar (2000)
Inflation	Inflation Rate Consumer Price Index	Al-Wesabi and Ahmad (2013)
Money Supply	$M2=M1^{10}$ + Quasi-money[11]	BNM (Bank Negara Malaysia)
Exchange Rate	Domestic currency exchange rate to US currency	BNM (Bank Negara Malaysia)
Credit Expansion	Loan/financing growth	Das and Ghosh (2007)

3.3.7 Real money supply

Money supply is an important instrument of monetary policy. The money supply

employed for the study is M2 which is defined as the sum of currency in circulation,

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[10] M1= Currency in circulation + demand deposits
[11] Savings deposits + fixed deposits + NIDs (Negotiable Instruments of Deposits) + Repos (Repurchase Agreements) + Foreign currency deposits + other deposits.

demand deposits, savings deposits, fixed deposits Negotiable Instruments of Deposits, Repos foreign currencies and other deposits. Monetary authorities can manage interest rates, inflationary rates, and credit creation through the expansion or contraction of money supply into the economy. According to Berry, Harrison, Thomas and Weymarn (2007), money is an important transmission mechanism from monetary policy to the economy.

In all these, the role of the banking sector, according to Berry, *et al.* (2007), is very important in creating broad money. They assert that the supply of money will depend on the behaviour of the banking sector because banks intermediate funds by taking deposits and lend to borrowers. They argue that monetary policy that reduces interest rates makes borrowing from the banks more attractive and thereby encourages credit expansion. On the other hand, a contractionary monetary policy has the effects of leading to higher bank lending rates. This discourages bank borrowing and for the existing borrowers, it increases their liabilities to the banks which often result into nonperforming loans.

3.4 Population and Data Collection

The population of the study consists of all the Islamic banks operating in Malaysia, Indonesia and Bahrain between the period 2007-2015: Q2.The data, therefore, cover the period 2007-2015: Q2. Malaysia has 16 Islamic banks; Indonesia has 12 while Bahrain has 24 Islamic banks as at second quarter of 2015 (see Appendix F for the comprehensive lists of the Islamic banks).

The selection of the Islamic banking in Malaysia, Indonesia and Bahrain as the study's case study is very important in many significant ways:

i. Malaysia and Bahrain are the hubs of the global Islamic finance and banking. The two countries have and continue to put in place institutions and structures that provide supports for the growth and development of Islamic finance and banking

ii. Indonesia, on the other hand, is the country with largest Muslim populations in the world and has also put in place strategic plans and institutional frameworks to enhance the growth and development of Islamic banking in the country.

The Islamic banking considered in the study is the Islamic banking operations by the full-fledged Islamic commercial banks in each of the three countries. The data used in the study are quarterly macro data for Islamic bank-specific variables such as Islamic banking deposits, total financing, impaired financing, financing-deposit ratios (FDR) and sectoral distribution of financing (showing the level of financing concentration). Other data are for macroeconomic variables such as real GDP, money supply, interest rates,the rate of return on deposits of Islamic banks, inflation and exchange rates. These data are obtained from secondary sources. The bank level data are quarterly aggregate data for Islamic banking collected from the statistical reports (Statistical Bulletins) of the Central banks of each country. The data for the macroeconomic variables are also quarterly data obtained from the statistical reports of each of the countries' central banks. In Malaysia for example, the data were collected from the monthly statistical bulletins of the Bank Negara Malaysia. In the case of Indonesia, the data were collected from Islamic banking statistics reports, financial stability review and Indonesian monthly statistics. Similarly, data for the Islamic banking in

Bahrain were collected from Statistical Bulletins, Economic indicator report and CCB Rulebook II.

3.5 Econometric Model specification

The study employs ARDL Bound Testing approach to cointegration otherwise called Bound Test to determine the long run relationship among the credit risk of Islamic banks, conventional banks' lending rates, financing concentration, financing-deposit gap, credit expansion, real income, money supply, and exchange rates. ARDL was introduced by Pesaran and Shin (1999) and Pesaran et al. (2001) for the bound testing of cointegration. However, it is important to note that there are other several approaches to cointegration. VECM (vector error correction model) is another econometric model that has been used by many studies to investigate cointegration among variables. However, for VECM to be applicable, all the variables must be integrated of order one, i.e. I (1). However, because of the different levels of integration of the variables having a mixture of I (0) and I (1), ARDL becomes the most appropriate method of estimation for the study. Figure 3.2 compares ARDL against VECM and VAR.

ARDL Bound Testing approach to cointegration has a number of advantages over many other cointegration analysis methods. For example, it is efficient for the estimation of a mixture of I (0) and I (1). That is, unlike VAR and VECM, ARDL can be applied whether the explanatory variables are integrated of order 1 or 0 (Pesaran et al., 2001). ARDL also possesses greater capacity than Engle and Granger (1987) and Johansen and Juselius (1990) to accommodate small samples (Narayan & Smith,

2005). Furthermore, ARDL allows different variables to be assigned with different optimum lags. This is not possible with other approaches of cointegration. According to Ozturk and Acararci (2010), ARDL involves just a single reduced form of the equation which makes it easy to implement.
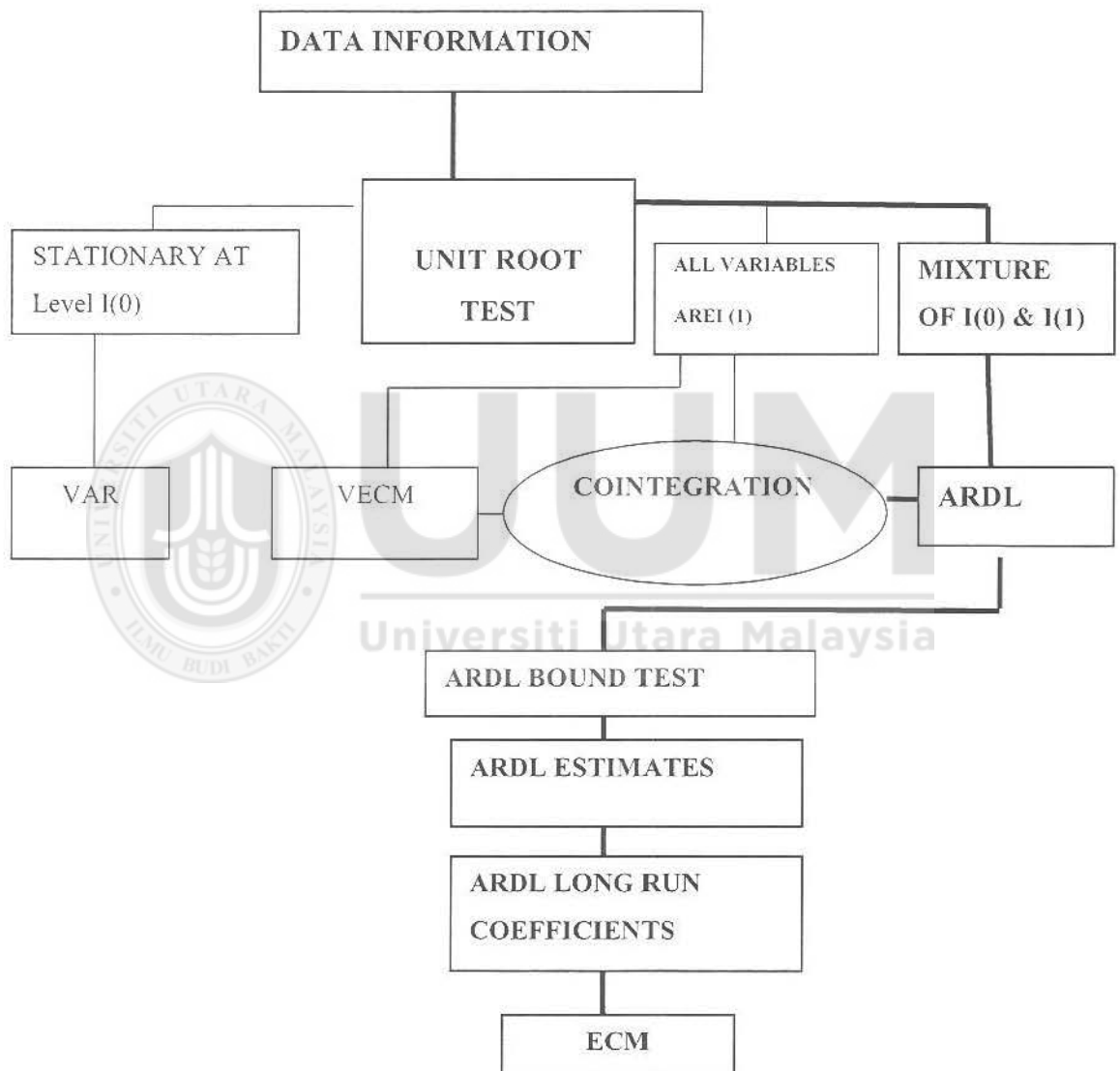
Figure 3.2
The flow of ARDL Model
Adapted from Affandi Mahfudz et al. (2016)

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The following general ARDL equation for two-variable Y_t and X_t is presented:

$$Y_t = \mu + \sum_{i=1}^{n} \alpha_i\, Y_{t-i} + \sum_{i=0}^{m} \beta_i\, X_{t-i} + U_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Equation (2) is a reparametrization of ARDL equation (1)

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{n} \beta_1\, \Delta Y_{t-i} + \sum_{i=0}^{m} \beta_2\, \Delta X_{t-i} + \alpha_1 Y_{t-1} + \alpha_2 X_{t-1} + U_t \dots\dots\dots (2)$$

According to Pesaran et al. (2001), ARDL BoundsTesting approach tests the null hypothesis that the variables are not cointegrated is stated as Ho: $\delta_1=\delta_2=\delta_3=\delta_4= 0$ against the alternative hypothesis that the variables have long run relationship, H1: $\delta_1\neq\delta_2\neq\delta_3\neq\delta_4\neq0$. The ARDL involves two stages. The first stage is to investigate the existence of long-run relationship between the variables by computing the F-statistics. F-statistics test the joint significance of the parameters. The computed value of F-statistics is compared with the two bounds I(0) and I(1) critical values. The existence of cointegration is established if the computed F-statistics is greater than the upper bound critical value. On the other hand, if the value of F-statistics is lower than the lower bound critical value, non-existence of cointegration is therefore established. However, if the value of F-statistics falls between the two bound critical values, the result is inconclusive.

After cointegration among the variables has been established through the F-statistic, error correction model is estimated. At this stage the coefficients of the long run relations are estimated and error correction model associated with the long-run estimates obtained. ECM indicates the speed of adjustment to the long-run equilibrium. That is, it determines how much of the adjustment to the long-run

equilibrium takes place in each period. The ECM must have a significant probability value with a negative coefficient (Raji, et al., 2014).

3.5.1 The Analytical Model

The empirical model specification for the study is

$$CR_{it} = \beta_0 + \beta_1 IR_{it} + \beta_2 FC_{it} + \beta_3 FDRit + \beta_4 GDP_{it} + \beta_5 LRMit + \beta_6 EXCit + \ldots\ldots(3)$$

Where CR represents credit risk defined as the ratio of non-performing financing to total financing and IR represents average lending rates of the conventional banks. IR is used here for a number of reasons. One, there is the need to investigate the effects of the conventional interest rates on the credit risk of Islamic banks. Also, base lending rates, LIBOR and KLBOR have been used as proxies for financing rates in some previous studies such as Al-Wesabi and Ahmad (2013). FC represents financing concentration in particular economic sector while FDR stands for Financing-deposit ratio which proxies financing-deposit gap. LGDP is the natural logarithmic form of GDP (at constant prices) represents real income, LRM for money supply and EXC stands for the exchange rate.

3.5.1.1 ARDL estimation: Rate of return on deposit of IBs and interest rate model.

To answer the research question 1, the corresponding objective is:

To examine the long-run relationship between the rates of returns on deposits of Islamic banks and interest rates on deposits of conventional banks in Malaysia, Indonesia, and Bahrain.

To achieve this objective, ARDL (Autoregressive Distributed Lag) approach to cointegration is used. ARDL model is used to examine the long-run association between rate of return on term deposit of Islamic banks and the interest rate on term deposit of conventional banks and real income and money supply as the control variable.

The specific model

$$ROR_{it} = \beta_0 + \beta_1 IRD_{it} + \beta_3 LRM_{it} + \beta_4 LGDP_{it} - \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(4)$$

The ARDL model specification is given as follows:

$$\Delta ROR_t = \beta_0 + \sum_{i=1}^{n} \beta_1 \, \Delta ROR_{t-i} + \sum_{i=0}^{n} \beta_2 \, \Delta IRD_{t-i} + \sum_{i=0}^{n} \beta_3 \, \Delta LRM_{t-i} + \sum_{i=0}^{n} \beta_4 \, \Delta LGDP_{t-i}$$

$$+ \alpha_1 ROR_{t-1} + \alpha_2 IRD_{t-1} + \alpha_3 LRM_{t-1} + \alpha_4 LGDP_{t-1} + U_t \dots(5)$$

In this model, ROR represents the rate of return on three-month tenure deposits of Islamic banks while IRD stands for the interest rate on three-month term deposit of conventional banks. LRM also represents a natural logarithmic form of the real money supply. The money supply used in this study is M2. LGDP represents a natural logarithmic form of GDP representing real income in the economy.

β_0, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and $\alpha_1 \alpha_2 \alpha_3, \alpha_4$ are Parameters

Δ= the first difference operator

u_t = error term

Therefore, the first step is to test each variable to determine its order of integration. Augmented Dickey-Fuller (ADF) approach of unit root testing can be carried out to investigate the series stationarity and order of integration. The result of the unit root

test would determine whether the variables are integrated or not and give the order of integration.

The test for unit root in time series data is very important. This is because regression equation of non-stationary data can only produce a spurious result. According to Asteriou and Hall (2011), if variables are integrated of different orders, regression equations are meaningless. Data are stationary if the mean and the variance of the time series data are constant over time. If the mean and the variance are increasing or trending with time, it means that the data is not stationary. Causality tests were also carried out to determine the causality between the variables and its direction.

3.5.1.2 The Toda-Yamamoto approach to Granger causality test

Once the existence of long run association (cointegration) has been established among the variables, we then conduct causality tests using a modified Wald test (MWALD) proposed by Toda and Yamamoto (1995). The procedure is found to be superior to the ordinary Granger causality tests, as it takes care of the problems associated with the non-stationary or cointegration between series when testing for causality (Farhani, et al., 2014; Wolde-Rufael, 2005). Toda-Yamamoto approach to causality test, according to Kassim and Abdul Manap (2008) has the advantage of being a very simple procedure at the same time able to overcome many problems associated with the traditional Granger causality approach. The basic idea of the Toda-Yamamoto approach according to Wolde-Rufael (2005, p.896), "is to artificially augment the correct VAR order, k, by the maximal order of integration, say d_{max}. Once this is done, a $(k + d_{max})$th order of VAR is estimated and the coefficients of the lagged

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d_{max} vectorare ignored". This means that in order to conduct theToda-Yamamoto test, the order of integration (d_{max}) and the optimal lag k have to be determined. The "simple method of adding extra lags intentionally in the estimation should be very useful in practice" (Toda & Yamamoto, 1995, p.246).

3.5.1.3 The causality model

$$ROR_t = \beta_0 + \sum_{i=1}^{k} \beta_{1i} ROR_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2j} ROR_{t-j} + \sum_{i=1}^{k} \beta_{3i} IRD_{t-i} + \sum_{j=k+1}^{dmax} \beta_{4j} IRD_{t-j} +$$

$$\sum_{i=1}^{K} \beta_{5i} LRM_{t-i} + \sum_{j=k+1}^{dmax} \beta_{6j} LRM_{t-j} + \sum_{i=1}^{k} \beta_{7i} \Delta LGDP_{t-i} + \sum_{j=k+1}^{dmax} \beta_{8j} LGDP_{t-j} \quad + \alpha 1t \ldots (6)$$

3.5.1.4 ARDL: Size of Islamic banking deposit – interest rate model

To achieve the objective 2 to investigate the long-run relationship between the conventional banks' deposit rates and the size of deposits of Islamic banks, ARDL model was also applied. The test was conducted to include other determinants of deposit size of Islamic banks.

The model is given as

$$LDP_{it} = \beta o + \beta_1 ROR_{it} + \beta_2 IRD_{it} + \beta_3 LGDP_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots(7)$$

Where LDP is natural logarithm form of deposits of Islamic banks and ROR is the 3-month rate of return paid on deposit accounts by Islamic banks. IRD is 3 month-tenured deposits rates of interest in conventional banks. LGDP, on the other hand, represents natural logarithm form of gross domestic products (GDP at constant prices).

From the general model, we then develop the ARDL model.

$$\Delta LRDPt = \beta_0 + \sum_{i=1}^{n} \beta_1 \Delta LRDP_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta ROR_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta IRDt - i + \sum_{i=0}^{n} \beta_3 \Delta LRGDP_{t-i}$$

$$+ \alpha_1 LRDP_{t-1} + \alpha_2 ROR_{t-1} + \alpha_3 IRD_{t-1} + \alpha_4 LRGDt - 1 + U_t \ldots\ldots\ldots\ldots (8)$$

3.5.1.5 Diagnostic tests

To ensure that the models are free from the problems of autocorrelation (serial correlation) Breusch-Pagan LM (Lagrange Multiplier) test will be performed on the results of the model estimation. The essence of the test is to detect the presence of problems of omitted variables, model misspecification, and systemic error measurements.

Another diagnostic test that will be carried out is the test for heteroskedasticity in the models. Heteroskedasticity problem occurs in a model when the CLRM assumption that the error terms should have constant (equal) variance independent of i is violated (Asteriou and Hall, 2011). Breusch-Pagan LM test and the ARCH test will be used to achieve this objective.

3.5.1.6 ARDL: Financing-deposit gap / Credit risk model

To achieve objective three of the study of investigating the long-run relationship between credit risk of Islamic banks and financing-deposit gap as measured by a financing-deposit ratio; we employ ARDL approach to cointegration.

$$\Delta CRt = \beta_0 + \sum_{i=1}^{n} \beta_1 \, \Delta CR_{t-i} + \sum_{i=0}^{n} \beta_2 \, \Delta FDR_{t-i} + + \sum_{i=0}^{n} \beta_3 \, \Delta LRGDP_{t-i} + \sum_{i=0}^{n} \beta_4 \, \Delta LRMt - i$$

$$+ \sum_{i=0}^{n} \beta_5 \, \Delta EXCt - i + \alpha_1 CR_{t-1} + \alpha_2 FDR_{t-1} + \alpha_3 LRGDt - 1 + \alpha_4 LRM_{t-1}$$

$$+ \alpha_5 EXC_{t-1} + U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

The analytical model is given as:

$$CR_{it} = \beta_0 - \beta_1 FDRit + \beta_2 LGDPit + \beta_3 LRM_{it} + \beta_4 EXC_{it} + \varepsilon it \ldots\ldots\ldots\ldots (10)$$

The estimation of the models was performed using E-view software packages

3.5.1.7 Model stability test

Test for the stability of the models will be conducted using the CUSUM (cumulative sum of recursive residuals) and CUSUM SQUARE (cumulative sum of the square of recursive residuals). Cumulative sum of recursive residuals was proposed by Galpin and Hawkins (1984) to check the assumption of normality and other aspects of model misfits. A model is considered fit and stable if the graph is in between the two straight lines, representing upper and lower bounds at the 5% significance level.

3.5.1.8 Financing concentration / Credit risk relationship

The model is aimed at ascertaining the relationship between credit risks in Islamic banks and financing concentration in few economic sectors. The model is applied to achieve the objective four of the study. The study adopts the model in Tabak, et al (2010) to measure the degree of diversification by using Hirschman-Herfindahl-Index (HHI).According to Behr et al (2007) and Tabak et al (2010), the HHI has been commonly accepted a measure of market concentration.

The relative exposure of bank b at time t to different economic sectors is measured by:

$$HHI = \sum r_i^2 \dots\dots\dots\dots\dots\dots\dots\dots\dots(11)$$

$$r_i = \frac{Nominal\ exposure}{Total\ exposure}$$

HHI index indicates a value ranging from near zero to 10,000 if the relative share of each sector is considered in percentage term. However, if each sector's share of the

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total financing is considered in decimal terms, HHI will range from 0 to 1. Therefore, the nearer HHI to the maximum of 1 (or 10,000), the more concentrated is the loan portfolio. If, however, the index gives figures tending towards zero then, it shows a more diversified portfolio. As a rule, an HHI less than 0.100 (1,000) is considered to indicate a diversified portfolio; if HHI is between0.1000 − 0.1800 (1,000-1,800) is considered to indicate a moderately concentrated portfolio. If, however, HHI is above 0.1800 (1,800) is then, considered to indicate a highly concentrated portfolio.

3.5.1.9 Dynamic OLS: Financing concentration / Credit risk model

Once the HHI has been determined, regression analysis is conducted using Dynamic OLS (DOLS) approach to cointegration to estimate the long run relationship among credit risks, financing concentration, lending rates of conventional banks, money supply, credit expansion and inflation. The Dynamic OLS, according to Jackman and Lorde (2010) was developed by Saikkonen (1991) and generalised by Stock and Watson (1993).

DOLS, according to Masih and Masih (1996) is a robust procedure to model long-run or cointegrated relationships. Among the advantages of DOLS is that, it is a single equation method of estimation with the ability to allow for variables integrated of alternative orders. It eliminates the problems of simultaneity amongst regressors. DOLS is efficient in solving the problems associated with endogeneity and biases often experienced in small samples estimations (Stock & Watson, 1993; Masih & Masih, 1996; Jackman & Lorde, 2010).

The general DOLS model is given as:

$$C_t = BX_t + \sum_{j=-k}^{k} \partial_t \, \Delta X_{t-j}^l + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (12)$$

Where X = [FC, IR, LMR, LFIN, INF], X^l is the subset of I (1) variables and B is the vector of long-run coefficients.

The analytical model is given as:

$$CR_{it} = \beta_0 + \beta_1 FC_{it} + \beta_2 IR_{it} + \beta_3 LRM_{it} + \beta_4 LFIN_{it} + \beta_5 INF_{it} + \varepsilon_{it}\dots\dots(13)$$

Where CR represents the credit risk of Islamic banks, FC represents financing concentration (HHI), IR average lending interest rate of conventional banks, LRM and LFIN are the natural logarithmic form of money supply and credit expansion respectively. INF represents inflation rate.

In view of the non-availability of data of the distribution of financing of Islamic banks to the various economic sectors in Bahrain until 2013, we applied correlation method to estimate the relationship between credit risk and portfolio concentration. The correlation method is usually used to measure the strength of the relation between two variables. According to Gujarati (1992), if the interest is to find the strength of the relationship between two variables, it can be determined by the coefficient of correlation. The coefficient of Correlation is defined as:

$$P = \frac{\text{Cov(X,Y)}}{\sigma x \; \sigma y} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(14)$$

Where ρ (rho) denotes the coefficient of correlation. Gujarati (1992) further defines correlation as a measure of linear relationship between two variables. Correlation is

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the ratio of the covariance between two variables divided by their respective standard deviations.

3.6 Summary of the Chapter

The chapter discusses the research methods and design used in the study. The chapter also explains the types and sources of the data. The research framework was discussed and the variables were explained. The chapter describes how the variables were measured and past studies that have equally applied the same variables. Econometric models used to achieve the various objectives were presented. The chapter also presents the software packages used for the model estimations.

CHAPTER FOUR

EMPIRICAL RESULTS AND ANALYSIS

4.1 Introduction

The chapter presents the results of the analysis conducted providing empirical evidence of the relationship between interest rates on deposits of conventional banks and rates of return on deposits of Islamic banks. It also presents the empirical evidence of the influence of conventional interest rates on the deposit size of Islamic banks. The effects of financing concentration on the credit risk of Islamic banks were examined and the empirical results are presented in the chapter. The chapter presents the results of the unit root tests on the variables, results of the tests of cointegration among the variables. Also presented are the results from the various estimations to investigate the relationship between the non-performing financing (credit risk) of Islamic banks and variables, such as conventional interest rates, financing-deposit gap, financing concentration, real income, money supply, credit expansion, exchange rate, and inflation. The chapter is finally concluded by the summary of the findings.

4.2 Empirical findings

4.2.1 Unit root test

In order to implement the cointegration test between the time series, there is the need to establish their order of integration. Accordingly, ADF (Augmented Dicky Fuller) test was applied to test for unit root in each of the variables. Automatic lag length selection using Schwarz information criterion was applied. The Null hypothesis (Ho) is that the time series has unit root (i.e. not stationary). We compare the calculated

ADF t-statistic with Test Critical Value at 5% significance level. If the ADF t-statistic value is less than the critical value at 5% level of significance, we cannot reject the null hypothesis. This means that the variable has a unit root, meaning that it is not stationary at level.

Table 4.1

Unit Root Test

Country	Variable	Model Type	Level ADF	Level Critical Value @5%	First ADF	Difference Critical Value @5%
alaysia	ROR	C	-2.439952	-2.957110	-3.747277***	-2.957110
	IRD	C	-2.354896	-2963972	-5.354275***	-2.991878
	LRM	C	-0.753961	-2.954021	-5.022815***	-2.957110
	LGDP	C	-1.006528	-2.954021	-5.308613***	-2.957110
Indonesia	ROR	C	-2.059354	-2.954021	-5.077066***	-2.957110
	IRD	C	-3.587217**	-2.957110	-	-
	LRM	C	-2.507054	-2.960411	-4.766713***	-2.967767
	LGDP	C	-0.210166	-2.963972	-7.938290***	-2.963972
Bahrain	ROR	C	-2500738	-2.963972	-7328042***	-2.963972
	IRD	C	-4.688939***	-2.954021	-	-
	LRM	C	-4.099516***	-2.981038	-	-
	LGDP	C	-0.568965	-2.954021	-5.864698***	-2.957110

Note: critical values are at 5%. Also, ** and *** represent the critical value at 5% and 1% level of significance respectively. Also, ROR represents Rate of return on IB's deposits, IRD indicates Interest Rate on Deposits of conventional banks. LRM and LGDP stand for the Logarithmic form of Real Money supply and Real income respectively.

We then proceed to the first difference and conduct the test on the variable at first difference. If on the other hand, the calculated ADF t-statistic is greater than the

critical value and is significant at 5%, we then reject the null hypothesis meaning that the variable has no unit root and thus stationary. If a variable is stationary at the level, it is labelled I (0). If on the other hand, it becomes stationary only at first difference, it is labelled I (1). Table 5 shows the result of unit root test for ROR, IRD LRM and LGDP in Malaysia, Indonesia and Bahrain.

For Malaysia, the result shows that ROR, IRD, LRM and LGDP are not stationary at level. The ADF statistics for each of the variables are lower than the critical values at 5% significance level. Therefore, the null hypothesis that the variables have unit root at level cannot be rejected. However, they became stationary at first difference I(1). In the case of Indonesia, ROR, LRM, and LGDP all became stationary only at first difference while IRD is stationary at level. As for Bahrain, IRD and LRM were found to be stationary at the level, I(0) while ROR and LGDP became stationary at first difference, I(1). The fact that the variables are integrated of different orders suggests ARDL as the appropriate approach to cointegration in this study.

4.3 ARDL Bound Tests for the long run relationship between ROR and IRD

To answer the research question one and achieve the corresponding objective of determining the long run relationship between the rates of return on deposits of Islamic banks and interest rates on deposits of conventional banks in Malaysia, Indonesia, and Bahrain, ARDL approach to cointegration was conducted. The results of the ARDL estimations are presented in Table 4.2. The relationship is further illustrated by graphical representations showing co-movement between the rates paid

on the two types of deposits. These are presented in Figure 4.1 and 4.2 for Malaysia, Figure 4.4 and 4.5 for Indonesia and Figure 4.6 and 4.7 for Bahrain.

4.3.1 Results of the ARDL Bounds tests for the ROR models (Malaysia).

Results of Bound test showing the long run relationship (co-integration) between the variables in the models for Malaysia, Indonesia and Bahrain are presented in Table4.2. Four different models were run for each of the countries. Each of the models has each of the variables as the dependent variable. The results show the existence of the long run relationship or otherwise for each model in which each of the explanatory variables takes a turn as dependent variables. However, the model that is important to the study is the model in which ROR stands as the dependent variable. To establish the existence of cointegration, the computed F-statistic must be greater than the upper bound critical value at a particular significance level. On the other hand, if the F-statistic is lower than the lower bound critical value, non-existence of cointegration is therefore established. However, if the F-statistic falls between the two bound critical values, the result is said to be inconclusive.

In case of the model for the Islamic banks in Malaysia the result shows the existence of the long-run relationship (cointegration)between the rate of return (ROR) on deposits of Islamic banks, and interest rates (IRD) on deposits of conventional banks, real money supply (LRM) and real income (LGDP). For example, in the equation of ROR as the dependent variable and conventional interest rate (IRD), real money supply (LRM) and real income (LGDP) as explanatory variables, the F-statistic value is 5.13 which is higher than the upper bound critical value 4.35 at 5% significance

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level. This means that interest rate, real money supply, and real income are jointly integrated with ROR i.e. that is they jointly have long run relationship with the rates of return paid on the deposits of Islamic banks.

Table 4.2

Result of Bounds testing

F-Statistics				Critical Bound Value			
		10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
	2.72	3.77	3.23	4.35	4.29	5.61	
Malaysia							
F_{ROR} [ROR|IRD, LRM, LGDP]		5.13**					
F_{IRD}[IRD|ROR, LRM, LGDP]		4.29*					
F_{LRM} [LRM|ROR, IRD, LGDP]		13.09***					
F_{LGDP} [LGDP| ROR, IRD, LRM]		13.98***					
Indonesia							
F_{ROR} [ROR|IRD, LRM, LGDP]		4.86**					
F_{IRD}[IRD|ROR, LRM, LGDP]		6.50***					
F_{LRM} [LRM|ROR, IRD, LGDP]		8.93***					
F_{LGDP} [LGDP| ROR, IRD, LRM]		14.30***					
Bahrain							
F_{ROR} [ROR|IRD, LRM, LGDP]		5.79***					
F_{IRD}[IRD|ROR, LRM, LGDP]		46.82***					
F_{LRM} [LRM|ROR, IRD, LGDP]		3.49*					
F_{LGDP} [LGDP| ROR, IRD, LRM]		3.71*					

NOTE: ***, ** and * represent 1%, 5% and 10% level of significance respectively
Also, ROR represents Rate of return on IB's deposits, IRD indicates Interest Rate on Deposits of conventional banks. LRM and LGDP stand for the Logarithmic form of Real Money supply and Real income respectively.

The existence of the long-run relationship between the rate of return on Islamic deposits and the explanatory variables as indicated by the results of the bound tests in Table 4.2 is also complimented by the ECM (Error-Correction Mechanism) with a negative coefficient of -0.223679 and significant at 10% with a PV 0.071. The ECM indicates the speed of adjustment in which the variables attain the long-run

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equilibrium. In addition to the results of bound tests, the long-run relationship between the rates of return on Islamic deposits and interest rates on deposits of conventional banks in Malaysia is further confirmed by the long-run coefficients of the explanatory variables presented in Table 4.3. Interest rates on conventional deposit (IRD) have a coefficient that is positive and significant at 5% level.

This finding, therefore, answers the research question number one that interest rate on conventional banks' deposits does not only have a long-run relationship with the rate of return on deposits of Islamic banks, it does indeed influence the behaviour of the rate of return of deposits of Islamic banks. The result shows the conventional interest rate (IRD) with a positive coefficient and significant P-value. This indicates the capacity of the interest rate to predict the movement and direction of the rate of return on deposits of Islamic banks in Malaysia along its own direction. That means the interest rates on deposits of conventional banks have a positive and significant relationship with the rates of return on deposits of Islamic banks in Malaysia. The finding of the existence of the long run relationship between interest rate on deposit of conventional banks and rate of return on deposits of Islamic banks in this study supports the findings of some previous studies (Obiyathulla, 2004; Obiyathulla, 2008; Haron & Ahmad, 2000; Takayasu, 2013; Ergec & Kaytanci, 2014; Anuar, et. al, 2014).

4.3.1.1 Implications of the effects of IRD on ROR to depositors of Islamic banks

Depositors keep their monies with banks either for safe keeping, transaction or investment purposes. Each type of the deposits has legal implications within the context of Sharia as espoused in IBA 1983 and IFSA 2013 in the case of Malaysia for

example, in terms the guarantee of return of the capital sum. Depositors whose objective is safekeeping of their deposits can utilise *wadiayaddhamanah*. This type of deposit contract with the bank; guarantees the return of capital to the depositor. This does not impose an obligation on the bank to pay any return except gift (*hibah*), which is at the discretion of the bank. The depositors, who desire a return on their funds, keep their funds in investment accounts (*mudarabah*).

Under the IBA, 1983 and particularly IFSA, 2013 deposits in investment accounts are non-principal guaranteed contracts. This means that unlike deposits under *wadia* and *wakala* contracts, deposits under *mudarabah* contracts are based on profit sharing concept with no guarantee for return of the capital.

Deposits in investment accounts (*mudharabah*) according to Rosly and Zaini (2008) make the bulk of the total deposits of the Islamic banks in Malaysia. To benchmark, the returns on these deposits on the interest rates of the fixed deposits of the conventional banks which are usually very low are to subject the investment account holders to low yield with the risk of no guarantee of return of their capital. This is in contrast with deposits with conventional banks in which the banks guarantee depositors fixed returns as well their capital (Rosly & Zaini, 2008). Whereas, in line with the principle of *Sharia*, Muslim holders of investment accounts under *mudharabah* contract aim to achieve two objectives viz, (1) to screen their wealth from *riba* and (2) to earn optimum returns on their investment through profit or loss sharing arrangements.

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Table 4.3

ARDL cointegration and the long-run coefficients

	ROR	IRD	LRM	LGDP
ROR		1.341195***	0.088399	0.045645
	-	(0.281500)	(0.090690)	(0.055874)
		[4.764458]	[0.974731]	[0.816930]
IRD	O.497867**		-0.202088**	-0.116727*
	(0.177059)	-	(0.090952)	(0.056119)
	[2.811867]		[-2.221913]	[-2.079994]
LRM	-5.009532	-0.705121		-0.683782***
	(3.035214)	(1.263850)	-	(0.030227)
	[-1.650471]	[-0.557915]		[22.621851]
LGDP	7.363298	1.041958	1.217941***	
	(4.263410)	(1.707872)	(0.062357)	-
	[1.727091]	[0.610091]	[19.531620]	
C	-42.622435*	-7.272453	-5.228903***	6.181316***
	(24.337884)	(9.645567)	(0.859738)	0.336111)
	[-1.751279]	[-0.753967]	[-6.081972]	[18.390688]

NOTE: ***, ** and * represent 1%, 5% and 10% level of significance respectively.

Also, ROR represents Rate of return on IB's deposits, IRD indicates Interest Rate on Deposits of conventional banks. LRM and LGDP stand for the Logarithmic form of Real Money supply and Real income respectively.

To achieve the objectives of screening their income from interest and safeguarding their investments, Muslim investors repose implicit trust in the managers of the Islamic banks with their funds. The implicit trust of the depositors in the banks creates moral hazard in the management of the deposits of Islamic banks. The moral hazard arises from the action of the banks to benchmark the rates of return on Islamic banks' deposits on conventional deposit interest rates and pay the depositors sub-optimal returns in the name profit-sharing. Under the *Sharia* principles, the rate of return on Islamic deposits (investments) can only be determined ex-post on the basis of the actual profit realised from business activities (Naim & Zainol, 2015). According to Anuar et al. (2014), there is a gap between the theory of Islamic banking theory and practice. Anuar et al. (2014, p.46) conclude that the "disparity in the expectation and

practice of Islamic banks will increase the reputational risks and negatively impact the future of Islamic banking industry globally".

Examination of the long-run relationship that exists when each of the other explanatory variables takes a turn as dependent variable shows the results as contained in Table 4.3. By considering interest rates on deposits of conventional banks (IRD) as the dependent variable, the bound result also shows the existence of a long-run relationship (cointegration) between IRD and ROR, LRM, and LGDP with F-statistic 4.29. Also, cointegration is observed when money supply(LRM) takes a turn as the dependent variable with an F- statistic value of 13.09.Similarly, in the model in which real income LGDP becomes dependent variable. the F-statistic is 13.98 which is greater than the critical value even at 1% level. For each of the four models. cointegration among the variables is therefore established.

The long run relationship between the rates of return on deposits of Islamic banks and interest rates on deposits of conventional banks in Malaysia is also illustrated graphically in Figures 4.1 and 4.2 as represented by their co-movement throughout the study period. From the graphs in Figures 4.1 and 4.2. it is clearly observable that both ROR and IRD rise and fall together throughout the period of the study (2007: Q1 – 2015: Q2).
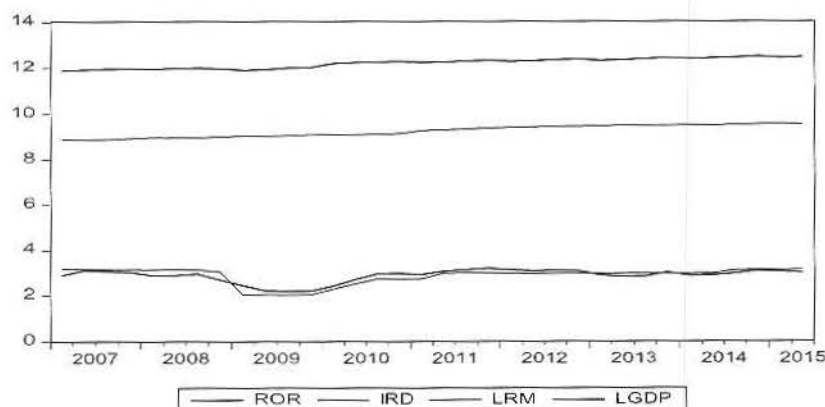
Figure 4.1
Co-movement between rate of return on deposits of IBs and interest rates (Malaysia)
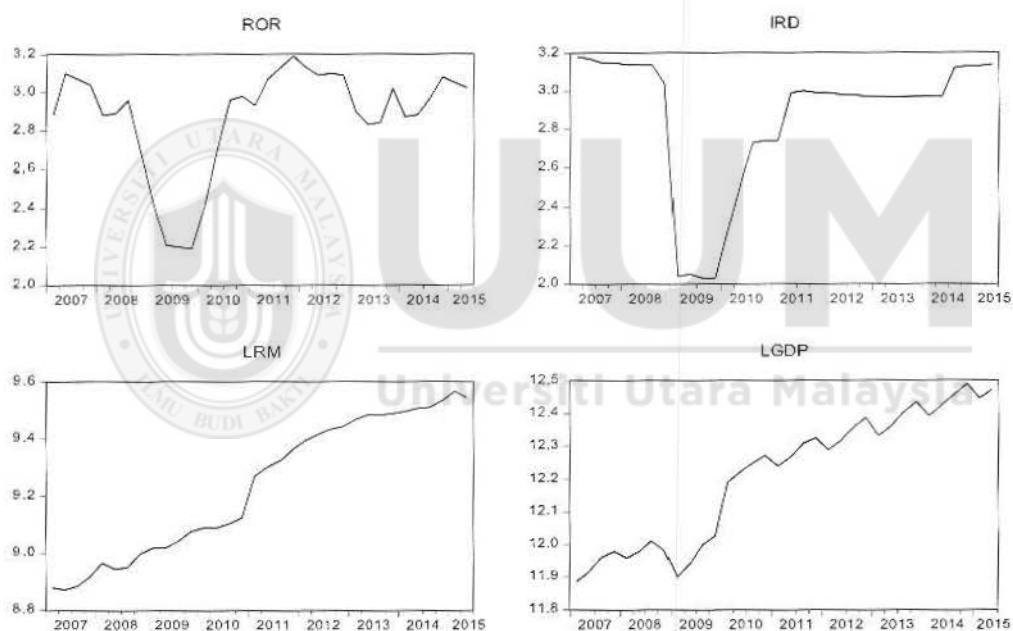
Figure 4.2
Graphs of ROR, IRD, LRM and LGDP (Malaysia)

Figures 4.1and 4.2 show the trend in the movements of the variables. From the figures, it could be observed that ROR (Rate of return on the deposit of Islamic banks) and IRD (interest rate on deposits of conventional banks) were on the downward movement from the third quarter of 2007 until the second quarter of 2009 and started upward movement again in the last quarter of 2009. The changes in the trend of IRD

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appears to precede that ROR; suggesting that the changes in ROR are caused by the changes in IRD.

4.3.1.2 Diagnostic tests of the model

A number of diagnostic tests were conducted on the ARDL model to ensure that it is free from problems of serial correlations of the disturbance terms in the ARDL estimators. Test of heteroskedasticity demonstrates independence of the errors term from the explanatory variables. The results of the tests confirm that the model is fit and stable. The results of the tests are presented in Table 4.4

Table 4.4

Diagnostic tests on ARDL of ROR model (Malaysia)

Country	Test statistics	LM Tests
	Serial correlation	CHSQ (1) 0.3673 [0.2158]
	Heteroscedasticity	CHSQ (1) 0.8097 [0.9996]

The probability values are reported in the parenthesis [ ]

The result of the test for serial correlation of the residuals of the model as represented by the chi-squares of the Lagrange Multipliers (LM) statistic shows that the model is free from serial correlation.

In conclusion, the results of the bounds testing, the ARDL long-run coefficients estimates, and the results from causality tests conducted to investigate the long-run relationship and causality between the rates of return on deposits of Islamic banks and

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interest rates on deposits of conventional banks in Malaysia, all complement each other in confirming the long-run relationship between the two variables.

4.3.2 ARDL Bound testing results for the OR- IRD model (Indonesia).

The bound testing results in Table 4.2 report rate of return (ROR) on deposit of Islamic banks in Indonesia having an F-statistic value of 4.86 which is greater than the upper bound critical value 4.35 at 5% significance level. This gives the evidence of the existence of cointegration between the rates of return (ROR) on deposit of Islamic banks and interest rates on deposits of conventional banks (IRD), money supply (LRM) and real income (LGDP) in Indonesia. The result of the bound test for the existence of the long-run relationship is further corroborated by the ECM of the model with a negative coefficient (-0.568956) and significant at 1% level with a P-value of (0.0025). Both the bound test and ECM confirm the existence of the long-run relationship between interest rates on deposits of a conventional bank, monetary policies through money supply and real income within the economy with the rates of return on deposits of the Islamic banks in Indonesia.With the analysis of the results of the bound tests to investigate the existence of cointegration in the equations in which the explanatory variables stand as dependent variable, we have the following findings: When the model with IRD as the dependent variable is considered, the F- statistic is 6.50 which is greater than the upper bound critical value 5.61 at 1% significance level. This implies a strong long-run relationship between IRD and ROR, LRM, and LGDP jointly in Indonesian Islamic banking system.

The bound test result is also corroborated by the model ECM with a negative coefficient (-0.130413) and significant at 10% significant P-value of (0.061). The long run relationship between LRM as the dependent variable and ROR, IRD, and LGDP exhibits the same characteristics of the existence of cointegration as was observed in Malaysia. The F-statistic is 8.93 greater than the upper bound critical values 5.61 at 1%. Similarly, by considering LGDP as the dependent variable, it gives a high level of cointegration with ROR, IRD, and LRM with an F-statistic value of 14.30 greater than the Bound critical value of 5.61 at 1% level of significance.

The findings from these results indicate the existence of the long-run relationship between the rates of return on deposits of Islamic banks (ROR) and interest rates on deposits of conventional banks (IRD) in Indonesia are similar to the findings in Malaysia.Similarly, the co-movement relationship between the two rates in Indonesia is graphically presented in Figures 4.4 and 4.5.
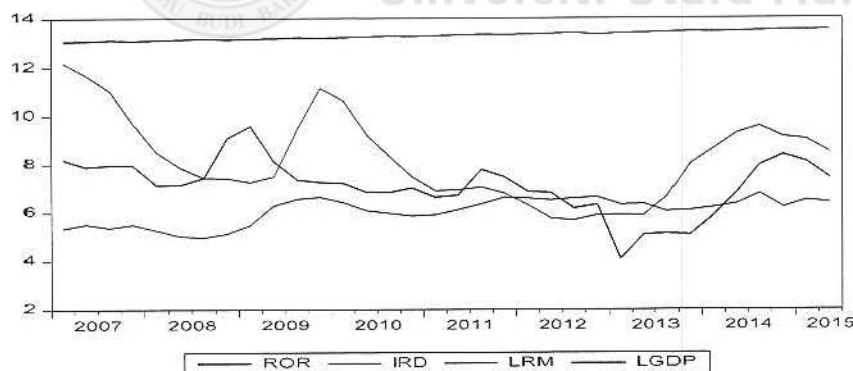
Figure 4.3
Co-movement between ROR, IRD, LRM and LGDP (Indonesia)
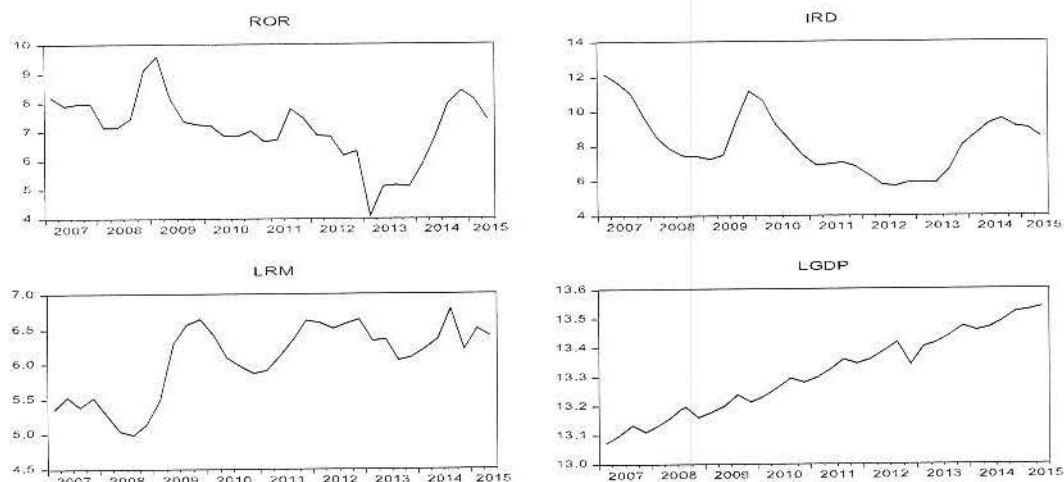
Figure 4.4
Graphs of ROR, IRD, LRM and LGDP (Indonesia)

Diagnostic tests

Table 4.5
Diagnostic tests on ARDL of ROR model (Indonesia)

Country	Test statistics	LM Tests
Indonesia	Serial correlation	CHSQ (1) 0.2603 [0.379]
	Heteroskedasticity	CHSQ (10) 0.2448 [0.2600]

The probability values are reported in the parenthesis [ ]

The results of the diagnostic tests in Table 4.5 confirm that the model is free from the problem of serial correlation and heteroskedasticity.

4.3.3 ARDL Bounds test result for the ROR model (Bahrain)

The results of the bounds tests for the models of cointegration between the rates of return on deposits of Islamic banks in Bahrain and the selected explanatory variables are presented in Table 4.2. The variables of the models are rates of return on the

deposits of Islamic banks (ROR) as the dependent variable; interest rates on deposits of conventional banks (IRD), money supply (LRM), and real income (LGDP) are the explanatory variables. The results, similar to the findings in Malaysia and Indonesia, also show the very strong relationship between ROR and IRD. For example, the model in which ROR is the dependent variable, the F-statistic from the bound test is5.79 which when compared with the upper bound critical value 5.61 at 1% is greater.

Also, when the equation with IRD as the dependent variable is tested for cointegration, the F-statistic is 46.85. This is far greater than the upper bound critical value of 5.61 at 1% level. This implies that ROR, LRM, and LGDP are also jointly cointegrated with the interest rates on deposits of the conventional banks. This clearly underscores the linkage between the rates of return on deposits of Islamic banks and interest rates on deposits of conventional banks in Bahrain as well. We also find the existence of cointegration among the variables when the bound tests were carried out on the equations with LRM and LGDP as dependent variables. The equation of LRM as the dependent variable gives an F-statistic of 3.49 which indicate the existence of cointegration at 10% level.

Similarly, with the real income (LGDP) as the dependent variable, the F-statistic is 3.7 indicating the existence of cointegration at 10% level. The results of the bound tests, therefore, confirm the long-run relationship between the interest rates on deposits of the conventional banks and the rates of return paid by the Islamic banks on their customers' deposit accounts in Malaysia, Indonesia, and Bahrain. These results

present empirical findings of the actual practices of the Islamic banks which, for all intents and purposes, run contrary to the expectation of no- interest under whatever form or guise in the conduct of Islamic banking in accordance with Sharia principle of interest prohibition in all its ramifications.The relationship between rates of return on deposits of Islamic banks and interest rates on deposits of conventional banks in Bahrain is further captured graphically in Figures 4.5 and 4.6. The co-movement between ROR and IRD observed in Malaysia and Indonesia is also observed in Bahrain.
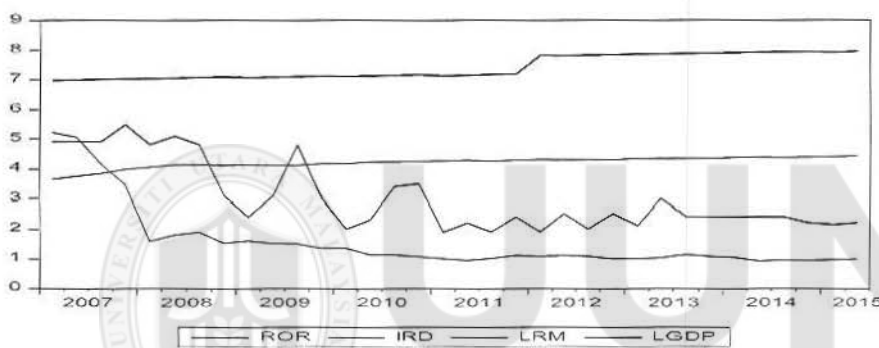
Figure 4.5
Co-movement between ROR and IRD (Bahrain)
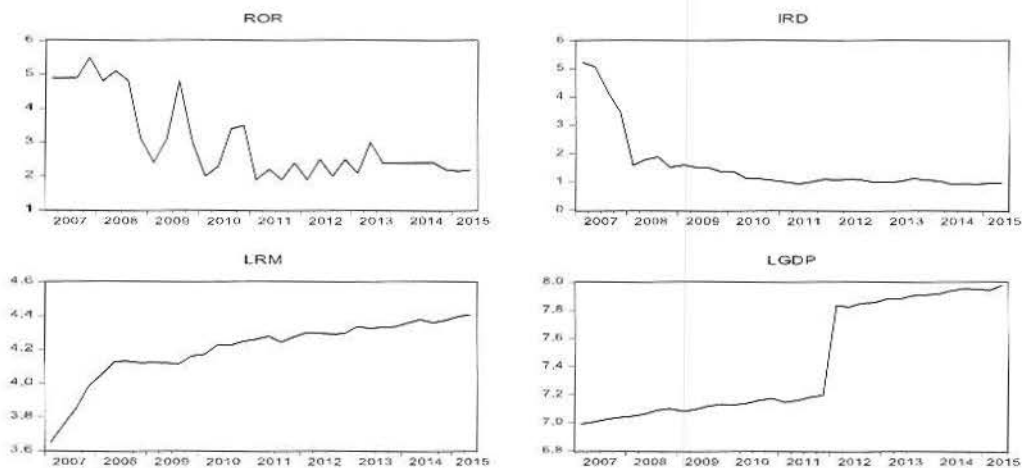
Figure 4.6
Graphs of ROR, IRD, LRM and LGDP (Bahrain)

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Table 4.6

Diagnostic tests on ARDL of ROR model (Bahrain)

Country	Test statistics	LM Tests
Bahrain	Serial correlation	CHSQ (1) 0.5562 [0.652]
	Heteroscedasticity	CHSQ (10) 0.2244 [0.233]

The probability values are reported in the parenthesis [ ]

ARDL long run coefficients

The results of the ARDL estimation to determine the long-run coefficients of the independent variables are presented in Table 4.7. In the models, ROR is the dependent variable for each of the countries. The signs of the coefficients show the direction of the relationship between the dependent variables and the rates of return of the deposits of Islamic banks while the value of the P-value indicates the significance level.

For the Malaysian Islamic banks, the results of the long run coefficients estimation show that conventional interest rate is positively related to the rates of return of Islamic banks and significant at 5% level. This implies that an increase (or decrease) in the rates of interest on the deposits of conventional banks in Malaysia, causes an increase (or decrease) in the rates of return on the deposits of Islamic banks. The statistical significance of the coefficient of the conventional interest rate further confirms the result of the bound test and the graphical representation of the co-movement between the interest rates and the rates of return on the deposits of Islamic banks. This result supports the findings of Haron and Wan Azmi (2008) in their study which investigates the impact of selected economic variables on deposit level in the

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Islamic and conventional banking systems in Malaysia. Similarly, this result supports the findings in (Obiyathulla (2008) which investigated the Islamic Interbank Money Market (IIMM) in Malaysia. Furthermore, the result also confirms the findings in Ergec and Kaytanci (2014) in their study of conventional interest rate and Islamic bank's deposit rate of return in Turkey. For the model of the Islamic banking in Malaysia in which ROR is the dependent variable, the other independent variables apart from the interest rate such as money supply and real income are not significant but have the expected signs.

Money supply, though not significant, is negatively related to the rates of return on the deposits of Islamic banks. This means that high liquidity brought about by excess money supply lowers the rates of return on deposits. However, during tight monetary policy which reduces the money supply and therefore, the deposit inflow, banks will be forced to increase the rates of return on deposits to attract new deposits and retained the existing deposit customers.

Table 4.7

ARDL: Long-run relationships (Rate of Return / Interest Rate models)

Variable	Malaysia	Indonesia	Bahrain
IRD	0.497867**	0.295723*	0.543103**
	(0.177059)	(0.155092)	(0.240808)
	[2.811867]	[1.906750]	[2.255332]
LRM	-5.009532	-2.366222**	-1.909923
	(3.035214)	(0.902368)	(2.705260)
	[-1.650471]	[-2.622235]	[-0.706004]
LGDP	7.363298	31.470709*	1.081500*
	(4.263410)	(17.562239)	(0.545334)
	[1.727091]	[1.791953]	[1.983187]
C	-42.622435*	-393.957143	-0.866764
	(24.337884)	(229.170178)	(12.048945)
	[-1.751279]	[-1.719059]	[-0.071937]

NOTE: ***, ** and * represent 1%, 5% and 10% level of significance respectively. Also, ROR represents Rate of return on IB's deposits, IRD indicates Interest Rate on Deposits of conventional banks. LRM and LGDP stand for the Logarithmic form of Real Money supply and Real income respectively.

The real income is positively signed, though, not significant. This means that the changes in the rates of return during this period could be explained by the changes in real income as represented by real GDP. Nevertheless, the sign of the coefficient indicates the direction the influence of the changes in real income could be. That means that real income is positively related to the rates of return of the deposits of Islamic banks in Malaysia. This means that during an economic expansion, investment activities will increase, banks will need more deposit inflow from the deposit market and with stiff competition among banks, and depositors will have to be attracted a with a higher rate of returns on their deposits. This explains the positive relationship between the rate of return on deposits of Islamic banks and the real income in the economy.

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For the Islamic banks in Indonesia, interest rates, money supply and real incomes are significantly related to the rates of return on the deposit of Islamic banks. Both the interest rates and real income are positively related to the rates of return on the deposits of Islamic banks and significant at 10% level. This, therefore, confirms the results of the bound tests. This means that the observed changes in the rates of return on the deposits of Islamic banks in Indonesia were influenced by the vagaries of the conventional deposit interest rates as well the changes in aggregate income in the economy.

Similar to the situation in Malaysia, money supply also exerts pressure on the rates of return on the deposit of Islamic banks. Money supply is significant at 5% and negatively related to the rates of return on the deposits of Islamic banks in Indonesia. This implies that expansionary monetary policy creates excess liquidity in the market. The effect of excess liquidity is to lower the rates of return banks would be willing to pay on deposits. On the contrary, a contractionary monetary policy creates a tight money supply to the market by mopping up liquidity in the system. The effect of this is to create fund scarcity and thereby raising the rates on deposits.

In the case of Bahrain, for the ARDL long run estimation, the results give the same relationship that was observed among the variables of Islamic banks in Malaysia. In particular, interest rate and real income are significantly related to the rates of return on deposits of Islamic banks. Money supply has the appropriate sign but not significant. Therefore,the money supply could predict the changes observed in the rates of return on the deposits of Islamic banks.

4.3.4 Causality test

The results of the causality tests between the variables in the ROR models for Islamic banks in Malaysia, Indonesia and Bahrain are presented in Table 4.8. In order to complement the results of the tests of long-run relationship from the bounds tests and long run coefficients, causality tests were also conducted using Toda-Yamamoto modified Wald (MWALD) procedure.

Table 4.8

Granger causality test results based on Toda-Yamamoto procedure

Country	Variable	ROR	IRD	LRM	LGDP
Malaysia	ROR	-	11.27605**	4.18680	3.711876
		-	[0.010]	[0.242]	[0.294]
	IRD	8.534421**	-	1.404239	2.286498
		[0.036]	-	[0.705]	[0.515]
	LRM	22.69680***	7.627230*	-	14.64174***
		[0.000]	[0.054]	-	[0.002]
	LGDP	7.194750*	2.652796	1.27612	-
		[0.066]	[0.448]	[0.735]	-
Indonesia	ROR	-	9.371558*	9.117829	6.006167
		-	[0.095]	[0.105]	[0.306]
	IRD	6.173708	-	4.019136	11.44609**
		[0.290]	-	[0.547]	[0.043]
	LRM	16.59064***	21.60996***	-	16.85656***
		[0.005]	[0.001]	-	[0.005]
	LGDP	4.400459	3.554299	3.801864	-
		[0.493]	[0.615]	[0.578]	-
Bahrain	ROR	-	7.546982*	4.727230	0.711153
		-	[0.056]	[0.192]	[0.870]
	IRD	11.06719**	-	10.51916**	6.761629*
		[0.011]	-	[0.015]	[0.080]
	LRM	0.707448	9.479559**	-	3.610806
		[0.872]	[0.024]	-	[0.306]
	LGDP	5.087720	1.247520	5.422520	-
		[0.166]	[0.742]	0.143]	-

P-values are reported in [ ]. Also, *, ** and *** represent 10%, 5% and 1% significance levels respectively. Also, ROR represents Rate of return on IB's deposits, IRD indicates Interest Rate on Deposits of conventional banks. LRM and LGDP stand for the Logarithmic form of Real Money supply and Real income respectively.

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The results of the causality tests for the model for Islamic banks in Malaysia, shows a bidirectional causality running between IRD and ROR implying that movements of the rates of return on the deposit of Islamic banks are caused by the trend in the movements of the interest rates on the deposits of conventional banks. Similarly, the direction of the movements of the conventional deposits interest rates is also found to be caused by the direction of the rates of return on deposits of Islamic banks. This suggests that both the Islamic banks and their conventional counterparts compete for funds in the same deposit market, even though, it has dual characteristics.

This, therefore, means that in addition to the existence of a long-run relationship between the two rates as confirmed by the bound tests, there is also a bidirectional causality running from the two rates in the Malaysian banking sector. This suggests that the players in both the Islamic and conventional segments of the Malaysian banking sector do respond to changes in interest rates and rates of return on the deposit accounts in the two segments of the banking sector. This means that deposit customers and banks in the conventional segment of the Malaysian banking industry react to and are also influenced by the movement of rates of return on deposits in the Islamic banking segment. Similarly, deposit customers and banks in Islamic banking sector also, react to and are influenced by interest rate movements in the conventional segment of the banking sector. This contradicts the theoretical expectation of Islamic banking and finance based on profit and loss sharing principles.

The profit-loss sharing principles where returns obtained through *mudharabah* (profit-loss sharing principle), *musharakah* (partnership) or any other *Sharia* compliant investments would largely depend on the performance of such investments. Returns on deposits of Islamic banks could be more volatile than the conventional

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interest rates that are fixed ex-ante but in most cases yield higher returns. In reality, if Islamic banks undertake a carefully selected portfolio of investments, the returns on the *mudharabah* based deposits in Islamic banks, would be higher than the interest rates on deposits in conventional banks. This is because the risks associated with the two types of deposits are different. The *mudharabah* deposits are non-principal guaranteed whereas, deposits in conventional banks are. This result supports the findings of Anuar et al. (2014).

Also, review of the results of the causality tests from the other explanatory variables reveals a unidirectional causality running from rates of return on deposits of Islamic banks to the real income (LGDP). The implication of this is that ROR is a critical factor that can be used as an instrument of economic and monetary policies in Malaysian economic management. It also underscores the importance of Islamic banking in the overall economic performance measurement in Malaysia. Also, found is the unidirectional causality running from the rate of returns on Islamic deposits (ROR), interest rates on conventional banks' deposits (IRD), and real income (LGDP) to money supply (LRM). This means that rates of return on deposits of Islamic banks and interest rates on deposits of conventional banks cause the changes in the money supply in Malaysia during the period of the study.

Similarly, the results of the causality test to determine the causal relationship between ROR, IRD LRM and LGDP in Indonesia, as presented in Table 4.8. The result of the causality tests shows a unidirectional causality running from IRD to ROR. This

implies that interest rates on deposits of conventional banks seem to have greater causality impact on the rates of return on deposits of Islamic banks.

Malaysia: ROR ⬅ BIDIRECTONAL ➡ IRD

Indonesia: IRD UNIDIRECTIONAL ➡ ROR

Bahrain: ROR ⬅ BIDIRECTIONAL ➡ IRD
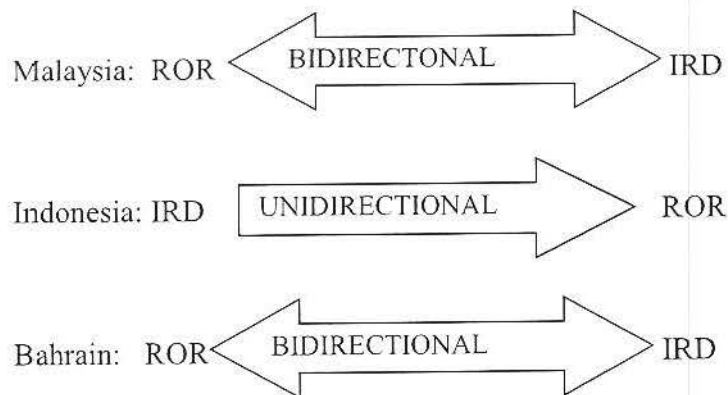
Figure 4.7
Summary of causality relationship between ROR and IRD

A further review of the results of the causality tests between other variables of the ROR model for Islamic banks in Indonesia and money supply indicates unidirectional causality running from rates of return on Islamic banks' deposits, interest rates on deposits of conventional banks and real income to the money supply in Indonesia.

Like in Malaysia, the causal relationship between ROR and IRD in Bahrain is bidirectional. This implies that both the rates of return on deposits of Islamic banks and interest rates on deposits of conventional banks have a causal effect on each other in Bahrain deposit market. However, no causality was observed running from either money supply or GDP to ROR in Bahrain during the period of the study. The result, therefore, establishes a very strong causal relationship between ROR and IRD in Malaysia, Indonesia and Bahrain both in the short and long run. The practical implication of the findings on the direction of the causality between the rate of return on the deposit of Islamic banking and interest rate, money supply and GDP is that it

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provides the monetary authorities in these countries a great insight into the effectiveness of both rate of return on the deposits of Islamic banking and conventional interest rate as very powerful instruments to achieve monetary policy objectives of the governments. Governments through their monetary authorities can lower credit risk of Islamic banking by creating a rate of return (profit rate) that truly rewards the depositors (investment account holders) in Islamic banking. The implication of this, if it is achieved, is to provide Islamic banks with deposits that match their financing mix and structure. When this happens, Islamic banks will be able to undertake such financing portfolio that will optimise the risk-return trade-off of the banks and thus minimise their credit risk.

In conclusion, the bound tests, the ARDL long-run coefficients estimates, and the causality tests conducted to investigate the long-run relationship and causality between the rates of return on deposits of Islamic banks and interest rates on deposits of conventional banks, all complement each other in confirming the long-run relationship between the two variable in Malaysia, Indonesia and Bahrain.

4.3.5 Model stability test

Cumulative sum of recursive residuals and the cumulative sum of the square of recursive residuals present how stable and fit models are. A model is considered fit and stable if the graph is in between the two straight lines, representing upper and lower bounds at the 5% significance level. The results of the cumulative sum of recursive residuals and the cumulative sum of the square of recursive residuals for the

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models for RORare presented inFigures 4.8 and 4.9 for Malaysia, Figures 4.10 and 4.11 forIndonesia and Figures 4.12 for Bahrain.

Malaysia
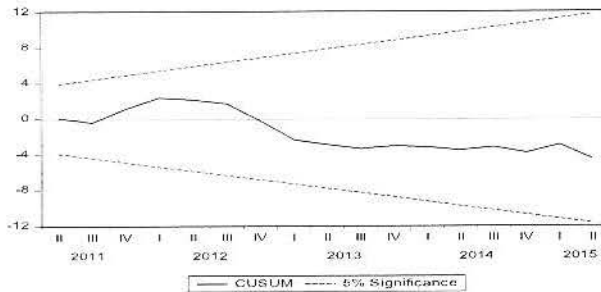
Figure 4.8
CUSUM Test for ARDL of ROR model (Malaysia)
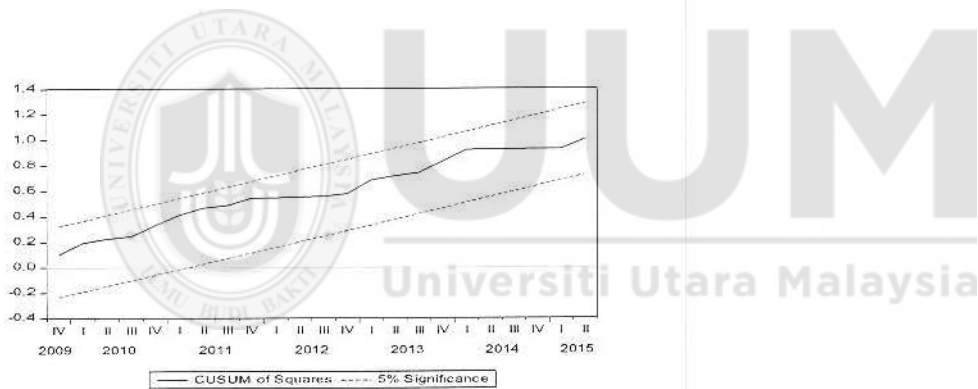
Figure 4.9
CUSUM of SQUARES of ARDL of ROR model (Malaysia).

Figures 4.8 and 4.9 confirm the fitness and stability of the model in which ROR is used as a dependent variable for Malaysia. This is confirmed by having the graphs in between the two straight lines. The stability of the ROR model for Islamic banks in Indonesia was also confirmed. This is presented in Figures 4.10 and 4.11.

Indonesia
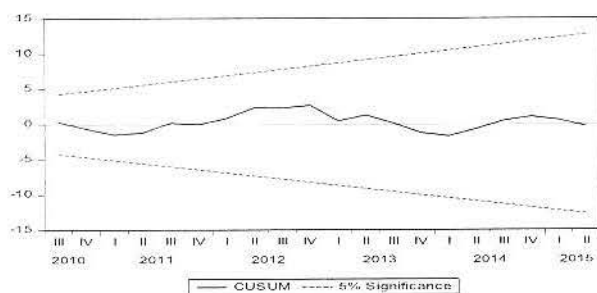
Figure 4.10
CUSUM Test for ARDL of ROR model (Indonesia)
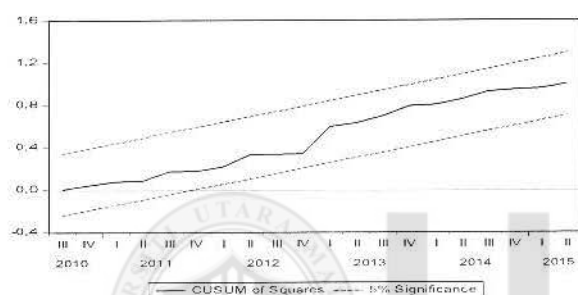
Figure 4.11
CUSUM of SQUARES of ARDL of ROR model (Indonesia).

The stability and fitness of the ROR model for Islamic banks in Bahrain are also

considered appropriate as shown in Figure 4.12

Bahrain
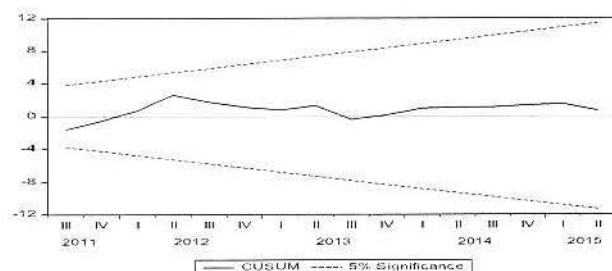
Figure 4.12
CUSUM Test for ARDL of ROR model (Bahrain)

The implication of these findings is that despite the clear differences in the rules guiding the operations of Islamic banks in these countries and the distinct principles and philosophies which underlie the operations of Islamic banks; there appear to be no barriers on the influence both Islamic and conventional banks have on each other. These findings also support Takayasu (2013) who concludes that both Islamic banks and conventional banks are in the highly competitive market particularly at deposit end. Takayasu (2013) argues that development in Islamic banking, particularly in Malaysia, is exerting great influence on the formation of short-term interest rate than before. These findings also corroborate the conclusions in Anuar, et al. (2014) that profit rates of Islamic banks are significantly linked with interest rates of the conventional banks. They further assert that the findings establish the gap that continues to exist between the *Sharia* principles and the practices of Islamic financial Institutions. Similarly, Cevik and Charap (2011) in their study of Malaysia and Turkey find the existence of a long-run relationship between conventional banks' deposit rates and rates of return on the deposits of Islamic banks. They also, find causality running from conventional interest rates to the rates of return on the deposits of Islamic banks.

4.4 ARDL: Deposit size of Islamic banking / Interest rate model.

To answer the research questions two of the study; tests were conducted to investigate the determinants of deposit size of Islamic banks using ARDL model. The tests investigated the long run relationship between deposit size (LDP) of Islamic banks and conventional deposit interest rates (IRD), rates of return on deposits of Islamic banks (ROR) and real income (real GDP) are used as the control variables. The

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deposits and GDP variables in the model are in the natural logarithm form. The results of ARDL bound tests are presented in Table 4.9.

4.4.1 ARDL Bound testing: Deposit size of Islamic banking / Interest rate model

The results of the bound tests of cointegration between deposits of Islamic banks and interest rates on deposit of conventional banks in Malaysia, Indonesia and Bahrain indicate a long run relationship. The ARDL bound test results are presented in Table 4.9

MALAYSIA

The results of the bound tests presented in Table 4.9 establish the existence of cointegration between deposit size and rates of return on deposits, conventional deposit interest rates and real income in all the three countries. In Malaysia for example, when deposit (LDP) stands as the dependent variable, the result of the bound testing gives an F-statistic of 11.95 which is higher than the upper bound critical value of 4.35 at 5% significance level. Therefore, the Null hypothesis (Ho) of no cointegration is rejected at 5% level of significance. Also, when we consider the result of the test when interest rate stands as the dependent variable, the F-statistic is 5.14 which is higher than 4.35 at 5% significance level. This, therefore, reveals the existence of the long run relationship between deposits of Islamic banks, interest rates, rates of return on deposits of Islamic banks and real income in Malaysia. Similarly, when rates of return on Islamic banks stand as the dependent variable, the result of the bound test gives an F-statistic of 7.56 also greater than the upper bound critical value of 4.35 at 5% level of significance. This also further confirms the

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existence of the long run relationship between deposits of Islamic banks and interest rates, rates of return on deposit and real income. Similarly, when real income takes a turn as the dependent variable, the result indicates the existence of cointegration among the variables. Therefore, the result of the bound tests indicates the existence of a long-run relationship between deposit of Islamic banks and conventional deposits interest rates.

The practical implication of these results is that conventional interest rates and rates of return on deposits are determinants of the size of deposits of Islamic banks in Malaysia. These results support the findings of Haron and Ahmad (2000) and Haron and Azmi (2008) which conclude that rates of return on Islamic bank deposits and interest rates on deposits of conventional banks have a significant influence on the behaviour of customers of Islamic banks. For example, according to Haron and Azmi (2008), an increase in conventional interest rates attracts depositors to conventional banks thereby increasing the deposits of conventional banks and leading to decrease in the size of the deposit of Islamic banks. This could be expected perhaps partly because; a significant number of depositors in Islamic banks are either non-Muslim individuals or institutional investors who may have no restraints by the *Sharia* principles on interest rate prohibition.

Table 4.9

ARDL Bound Testing: Deposit / Interest rate model

F.STATISTICS	BOUND CRITICAL VALUES					
	@ 90%		@ 95%		@ 99%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.72	3.77	3.23	4.35	4.29	5.61

Malaysia
$F_{LDP}[LDP|ROR, IRD, LGDP] = 11.95***$
$F_{ROR}[ROR|LDP, IRD, LGDP] = 7.56***$
$F_{IRD}[IRD|LDP, ROR, LGDP] = 5.14**$
$F_{LGDP}[LGDP|LDP, ROR, IRD] = 6.93***$

Indonesia
$F_{LDP}[LDP|ROR, IRD, LGDP] = 8.67***$
$F_{ROR}[ROR|LDP, IRD, LGDP = 6.92***$
$F_{IRD}[IRD|LDP, ROR, LGDP = 6.74***$
$F_{LGDP}[LGDP|LDP, ROR, IR = 7.66***$

Bahrain
$F_{LDP}[LDP|ROR, IRD, LGDP] = 6.12**$
$F_{ROR}[ROR|LDP, IRD, LGDP] = 6.16***$
$F_{IRD}[IRD|LDP, ROR, LGDP] = 121.92***$
$F_{LGDP}[LGDP|LDP, ROR, IRD] = 8.16***$

NOTE: ***, ** and * represent 99%, 95% and 90% level of significance respectively
Also, ROR represents Rate of return on IB's deposits, IRD indicates Interest Rate on Deposits of conventional banks. LDP and LGDP stand for the Logarithmic form of Deposit and Real income respectively.

Since these depositors can move freely within the two segments of dual banking system, a lower interest rate regime in the conventional banking segment while the rate of return in Islamic banking segment remain higher often leads to increase in the deposits level of the Islamic banks in Malaysian banking system.

4.4.2 Graphical representation of the relation

Graphical presentation of the long run relationship between deposits of Islamic banks and interest rate in Malaysia is presented in Figures 4.13 and 4.14 showing co-movement between the deposit size of Islamic banks and conventional deposit rates.
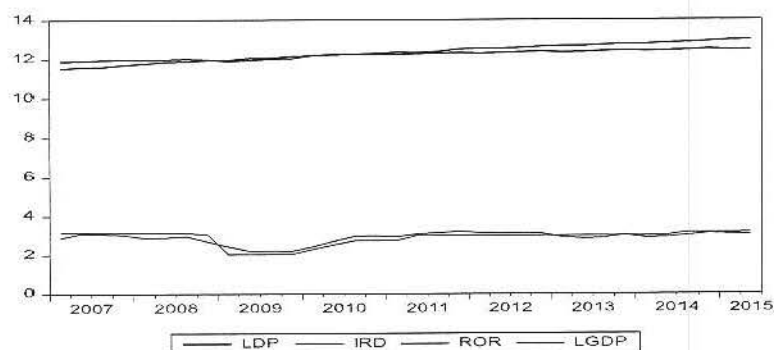
Figure 4.13
Co-*movement between Deposits of IBs and IR (Malaysia)*
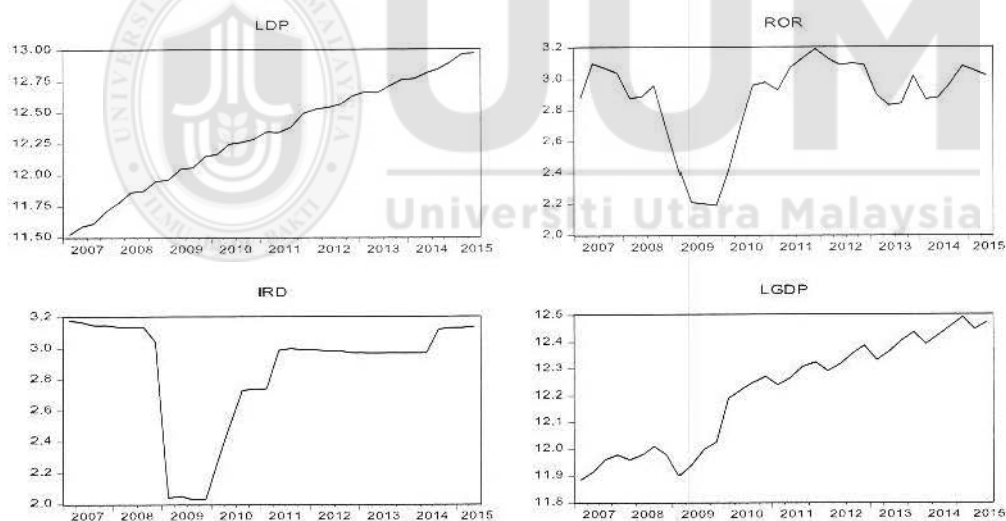
Figure 4.14
Graphs of LDP, IRD, ROR, and LGDP (Malaysia)

The graphs show an increasing trend of the deposits against a declining interest rate between the first quarter of 2007 and the first quarter of 2009 which became more relatively steady thereafter till shortly after the third quarter of 2009. By the fourth quarter of 2009, it started an upward movement again till the third quarter of 2011.

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From the fourth quarter of 2011, interest rate became relatively stable again until the second quarter of 2014. It is observed that even though, the rates of return on deposits of Islamic banks co-move with the conventional interest rate for a fairly long period particularly from the third quarter of 2008, it is, however, higher than the conventional interest rate. This may explain the steady increase in Islamic bank deposits over this period of time.

INDONESIA

A review of the results of the bound test (Table 4.9) on the long run relationship among the deposits of Islamic banks, interest rates, rates of return on deposits of Islamic banks, and real income in Indonesia shows a similar pattern to the results obtained from the test conducted on the Malaysian deposit market. For example, when conventional deposit interest rates, rates of return on Islamic banks' deposits and real income were regressed against the deposits of Islamic banks in Indonesia, the results of the bound test gives an F-statistic value of 8.67 which is greater than the upper bound critical value of 4.35 at 5% level of significance. The null (Ho) of "No cointegration" was, therefore, rejected. This means that there exists a long run (cointegration) relationship between deposit of Islamic banks and conventional deposits interest rates, rates of return on deposits of Islamic banks and real income in Indonesia. Equally, when conventional deposit interest rate stands as the dependent variable, there is also an evidence of a long run relationship with an F-statistic 6.74 which is also higher than the upper bound critical value 4.35 at 5% level of significance.

Similarly, when ROR stands as the dependent variable, the result of the bound test produces an F-statistic of 6.92 which lie above the upper bound critical value of 4.35 at 5% significance level. This again, confirms the existence of the long-run relationship between the variables. The finding of the existence of a long-run relationship between deposits of Islamic banks and conventional interest rates in Indonesia supports the findings of Kasri and Kassim (2009) in their study of the determinants of savings deposits in Indonesia. The implications of the findings in this study are that customers of Islamic banks who cut across Muslims and non-Muslims individuals and institutional investors are, according to Kasri and Kassim (2009) "rational" investors who are more motivated by return on their investments than fulfilling a particular religious obligation. This motivation runs contrary to the implicit objective of interest prohibition in Islamic economic and financial transactions.

The graphical representation of the relationship between deposits of Islamic banks in Indonesia and conventional deposit interest rates, rates of return on deposits of Islamic banks and real income is also presented in the graph in Figure 4.15.
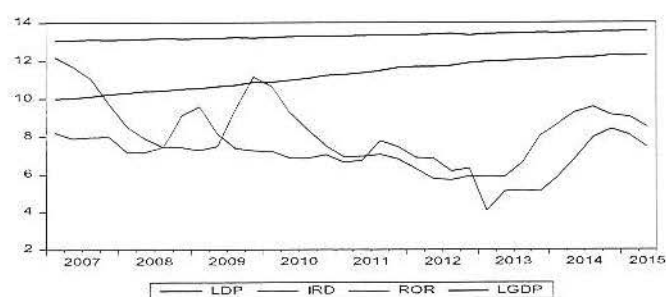
Figure 4.15
Co-movement between deposits of IBs, ROR and IRD (Indonesia)

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The graphs in Figure 4.15 show a long run relationship of deposits of Islamic banks with ROR, IRD, and LGDP (real income). Also observed in Figure 4.16 is the negative relationship between deposits of Islamic banks and interest rates (IRD) on the deposits of conventional banks in Indonesia. Implying that when; interest rates on deposits of conventional banks are falling, the deposits of the Islamic banks would be going up.
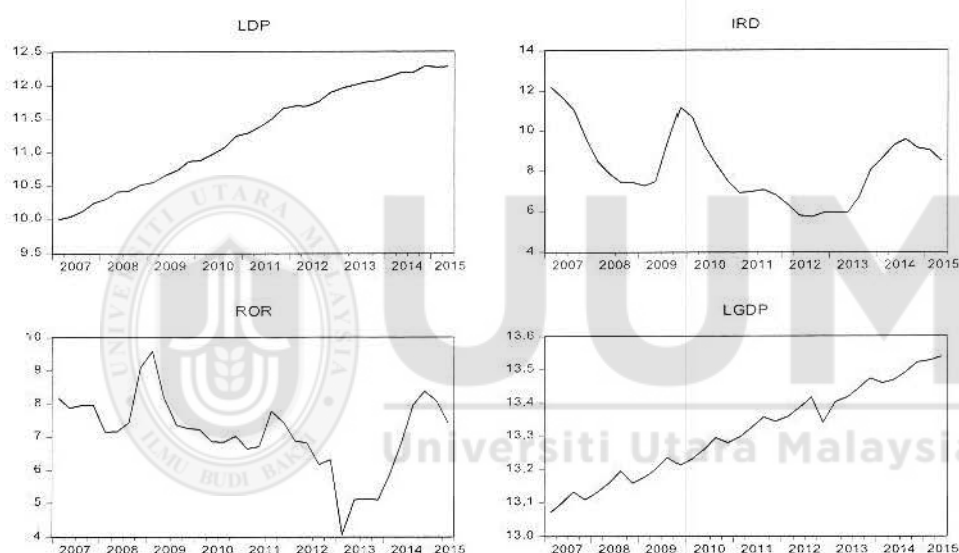
Figure 4.16
Graphs of LDP, IRD, ROR and LGDP (Indonesia)

From the Figures 4.15 and 4.16, it was observed that the deposits of Islamic banks were on the increasing trend during the period 2007 – 2012 while IRD was having a declining trend. It generally maintains an inverse relationship with the deposits. From the second quarter of 2013 however, when IRD shows a significant rise above ROR, the increasing trend of deposits of Islamic banks appears to be sluggish. This trend is

observed till the second quarter of 2014 when IRD starts downward trend again (Fig. 4.16).

BAHRAIN

The result of the bound test to investigate the existence of the long run relationship between deposits of Islamic banks and conventional interest rate in Bahrain is also presented in Table 4.17. The result of the bound test on the deposit-conventional interest rate model confirms the existence of a long-run relationship between the deposit and other explanatory variables. This is established by the F-statistic of 6.12 which is higher than the upper bound critical value of 4.35 at 5% significance level. The null (Ho) hypothesis of no cointegration was therefore rejected at 5% level of significance.

The graph in Figure 4.18 clearly shows an increasing effect of conventional interest on deposits of Islamic banks in Bahrain. This trend between deposits of Islamic banks and conventional deposit interest rate in Bahrain is similar to the situations in Malaysia and Indonesia where the increasing trend of deposits noticeably observable for a greater part of the study period.
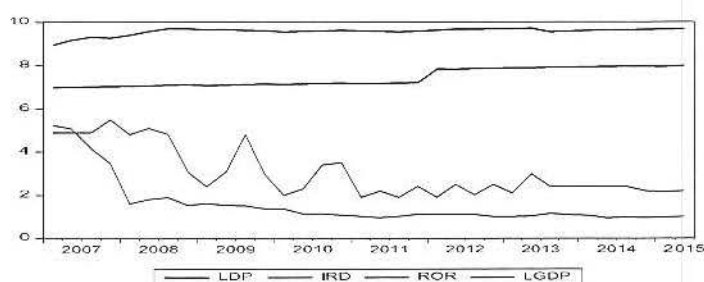
Figure 4.17
Co-movement between deposits of IBs' and interest rate (Bahrain)

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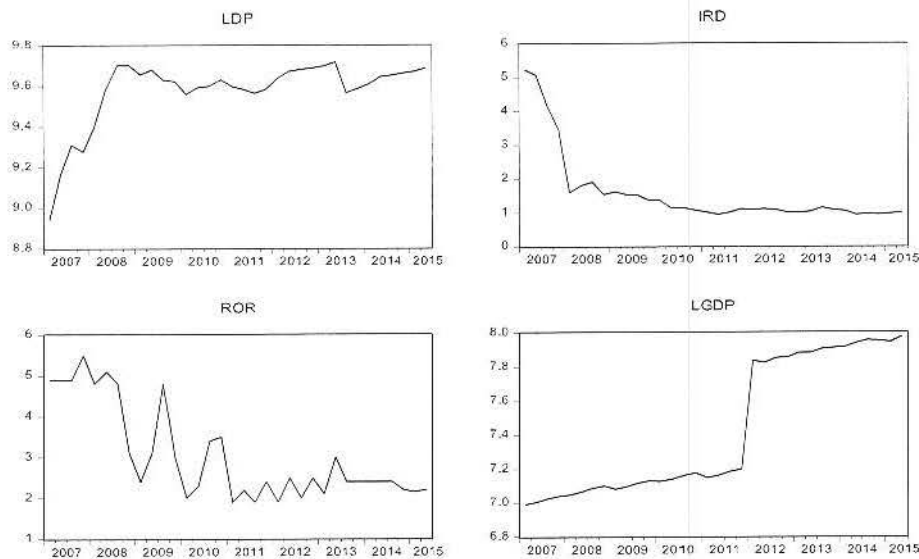
Figure 4.18
Graphs of LDP, IRD, ROR and LGDP (Bahrain).

The graph in Figures 4.17 shows a consistent rise in the rates of return on deposit of Islam banks (ROR) over and above conventional interest rate (IRD). The higher margin of ROR over IRD had the effect of influencing customers switching their deposits from the conventional banks to Islamic banks. The inverse relationship between deposits of Islamic banks and conventional interest rates underscores the linkage between the two segments of the banking system. The trend clearly creates an opportunity for arbitrage within the two segments of the deposit market in Bahrain. This finding leads to the conclusion that customers of Islamic banks in Bahrain are also motivated by the return on deposits to forming their investment decisions. Many of the banks' customers particularly the institutional investors are assumed to place a high premium on return on their deposits.

It is also important to note that in spite of the fact that the regulatory framework upon which Islamic banks operate in Bahrain is not under separate and distinct laws as is

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the case in Malaysia and Indonesia, the influence of conventional interest rates on the deposits of Islamic banks is significant. The long-run relationship and the causal effect of conventional interests on deposits of Islamic banks are further confirmed by the long-run coefficient of conventional deposit interest rate on the Islamic Banks' deposits size (Table 4.10). This relationship found in Bahrain is similar to the situations in Malaysia and Indonesia.

4.4.3 ARDL: Long-run relationships (Deposit / Interest rate model)

Table 4.10 presents the long-run coefficients of the relationship of the individual variables with the deposit size of Islamic banks in Malaysia, Indonesia, and Bahrain. The long-run coefficients further confirm the results of the bound tests (Table 4.9) which established the existence of cointegration among the variables.Analysis of the results of the estimation of deposit size (LDP) equations presented in Tables 4.10 show that interest rates on conventional bank deposits, rates of return on deposits of Islamic banks and real income are significant determinants of the size of deposits of Islamic banks in the three countries of Malaysia, Indonesia and Bahrain.

For example, deposit size of Islamic banks in Malaysia has an inverse relationship with the interest rates on conventional banks' deposits.

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Table 4.10

ARDL: Long-run relationships (Deposit / Interest rate model)

	LDP	IRD	ROR	LGDP
Malaysia				
LDP		-5.162976***	-2.28693***	-0.241032
	-	(1.327972)	(0.351137)	(0.321763)
		[-3.887866]	[-6.512931]	[-0.749098]
IRD	-0.190725***		-0.001640	-0.172040
	(0.051100)	-	(0.106546)	(0.067285)
	[-3.732367]		[-0.015395]	[-2.556882]
ROR	0.255896***	0.761137***		0.287333***
	(0.079872)	(0.229236)	-	(0.069581)
	[3.203826]	[3.320316]		[4.129481]
LGDP	0.270619	3.445263*	5.883599***	
	(0.337520)	(1.689188)	(0.882432)	-
	[-0.801787]	[2.039717]	[6.667481]	
C	14.703367***	18.939799	-41.116189***	14.431000***
	(3.938456)	(18.216306)	(6.379773)	(3.748028)
	[3.73328]	[1.039717]	[-6.444773]	[3.855435]
Indonesia				
LDP		-10.783821***	-12.129033***	0.189252***
	-	(3.053591)	(2.648215)	(0.004049)
		[-3.531521]	[-4.580079]	[46.739936]
IRD	-0.032512***		0.039304	0.011951***
	(0.004771)	-	(0.109654)	(0.002189)
	[-6.814624]		[0.358442]	[5.458598]
ROR	-0.074187***	-0.340436		0.004913**
	(0.008464)	(0.332133)	-	(0.001879)
	[-8.765447]	[-1.024999]		[2.614896]
LGDP	5.131452****	55.101115***	66.313488***	
	(0.083591)	(16.410073)	(15.439923)	-
	[62.722644]	[3.357762]	[4.294937]	
C	-56.083591***	-601.719581***	-739.647455***	11.061368***
	(1.155080)	(183.131634)	(175.446914)	(0.064183)
	[-48.553878]	[-3.285722]	[-4.215791]	[172.341070]

Chi-square in is [ ] and t-statistics in ( ). Also, *, ** and *** represent 10%, 5% and 1% significance levels respectively. Also, ROR represents Rate of return on IB's deposits, IRD indicates Interest Rate on Deposits of conventional banks. LDP and LGDP stand for the Logarithmic form of Deposit and Real income respectively.

Table 4.10 (continued

	LDP	IRD	ROR	LGDP
Bahrain				
LDP		2.950909***	4.082242*	-9.763303
	-	(0.433180)	(2.123280)	(8.597956)
		[6.812199]	[1.922611]	[-1.135538]
IRD	-0.255818***		1.371310***	8.165600
	(0.054695)	-	(0.435535)	(4.893647)
	[-4.677191]		[3.148563]	[1.668613]
ROR	0.043692*	0.647095***		-3.111920*
	(0.024165)	(0.056627)	-	(1.661176)
	[1.808080]	[11.427264]		[-1.873323]
LGDP	0.209353**	0.286746***	-0.056137	
	(0.0866685)	(0.059550)	(0.249972)	-
	[2.415090]	[4.815188]	[-2.224574]	
C	8.46983***	-30.735776***	-37.998119*	101.508714
	(0.565599)	(4.424164)	(20.216612)	(82.153089)
	[14.975095]	[-6.947251]	[-1.879549]	[1.235604]

Chi-square in is [ ] and t-statistics in ( ). Also, *, ** and *** represent 10%, 5% and 1% significance levels respectively. Also, ROR represents Rate of return on IB's deposits, IRD indicates Interest Rate on Deposits of conventional banks. LDP and LGDP stand for Logarithmic form of Deposit and Real income respectively

The long-run coefficient of the interest rates on deposits of the conventional banks (IRD) is negative and significant at 1% level in each of the three countries. Similarly, the result also established the long-run relationship between deposit and rate of return on deposit of Islamic banks by the positive sign of the coefficient of the rate of return on deposits of Islamic banks (ROR) In Malaysia and Bahrain (Table 4.10). Meaning that deposits of Islamic banks rise when the conventional deposit rate falls and rate of return on deposit in Islamic banks remain positive. This means that when the interest rates on deposits in the conventional banks are falling, depositors switched their deposits to Islamic banks to take advantage of the positive returns on deposits in the Islamic banking system.

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The result supports the findings in some previous studies (Obiyathulla, 2008; Zainol & Kassim, 2012) which find the influence of conventional interest rates on the operations of Islamic banking in Malaysia. Furthermore, real income is found to have a positive and significant relationship with the size of deposits of Islamic banks in Malaysia, Indonesia, and Bahrain. This further underscores the existence of the arbitrage in the deposit markets, within the dual banking system.

In the context of Indonesia, we also find interest rates on conventional banks' deposits (IRD) as a very important determinant of deposit size of Islamic banks. Similar to the findings in Malaysia, the interest rate on conventional banks' deposit has an inverse relationship with the Islamic banks' deposit and is also significant at 1% level (Table 4.10). This suggests that increases in the size of the deposits in Islamic banks were explained in part, by the fall in the conventional banks' deposit rates. The result also supports the finding of Kasri and Kassim (2009). Income is also found to have a positive and significant relationship with the deposit size in Indonesia.

In the case of Bahrain, analysis of the long-run coefficients of the explanatory variables of the deposit equation reveals similar findings to those found in Malaysia. The long-run relationship between deposit size of Islamic banks and the interest rates on conventional banks deposits exhibits the same characteristics similar to those found in Malaysia and Indonesia. Interest rate (IRD) is significant at 1% significant level with a negative coefficient (Table 4.10). This means that when the interest rates on conventional bank's deposits are falling the deposits of Islamic banks were then

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increasing in size. In addition to the interest rate, the rate of return on the deposit of Islamic banks (ROR) and real income (LGDP) both have positive coefficients and significant at 1%. Meaning that increase in the rates of return on deposits of Islamic banks would motivate depositors to keep their monies with the banks and thereby grow the size of the deposits. Similarly, the growth of the real income had a positive effect on the growth of the deposit size as well.

The conclusion from the results of the ARDL long-run coefficients further establishes the fact that interest rates on conventional banks' deposits, the rate of return on deposit of Islamic banks and real income are important determinants of the deposit size of Islamic banks in Malaysia, Indonesia, and Bahrain.

4.4.4 Causality tests

The results of the causality tests between the variables for the equation of the deposit size of Islamic banks in Malaysia, Indonesia, and Bahrain are presented in Table 4.11. The significance of the p-values of the MWALD statistics is indicated by the number of the sign (*) on the Chi-square value. The p-value significance also indicates the direction of the causality from a variable to the corresponding variable. For the Islamic banks in Malaysia, the results (Table 4.11) show causality running from conventional interest rate (IRD) to the size of the deposits (LDP) of Islamic banks. The chi-square obtained from IRD in the modified Wald test from LDP equation is 12.28556 with the significance level at 5%. This implies that variations in the deposit size of the Islamic banks in Malaysia were caused by changes in the interest rates on deposits of the conventional banks within the Malaysian banking sector. Another

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variable that is found to have causality with deposit size of the Islamic banks in Malaysia is the aggregate level of the real income (LGDP). This is in line with the prior expectation that the real income of individual would determine the levels of savings and investment in an economy.

Table 4.11

Granger causality test results based on Toda-Yamamoto procedure

DEPENDENT VARIABLE	LDP	IRD	ROR	LGDP
Malaysia				
LDP	--	12.28556** [0.015]	6.671142 [0.154]	21.18028*** [0.000]
IRD	2.506197 [0.646]	--	8.365453* [0.079]	1.798650 [0.773]
ROR	3.240681 [0.518]	7.974061* [0.093]	--	0.855956 [0.931]
LGDP	3.513127 [0.476]	8.18023*** [0.000]	9.529579** [0.049]	--
Indonesia				
LDP	--	8.723110** [0.033]	8.418928** [0.038]	7.835505** [0.049]
IRD	3.674551 [0.299]	--	20.19735*** [0.000]	13.16450*** [0.004]
ROR	6.466724* [0.091]	7.179005* [0.066]	--	8.00012** [0.032]
LGDP	7.963162** [0.047]	2.826537 [0.419]	3.869883 [0.276]	--
Bahrain				
LDP	--	12.09986** [0.033]	16.26060*** [0.006]	10.84073* [0.055]
IRD	21.09334*** [0.001]	--	8.928531 [0.112]	10.19379* [0.070]
ROR	5.3145611 [0.379]	3.60704** [0.018]	--	7.727116 [0.172]
LGDP	1.556497 [0.907]	10.03106* [0.074]	10.71502* [0.057]	--

P-values are reported in [ ]. Also, *, ** and *** represent 10%, 5% and 1% significance levels respectively. Null Hypothesis: there is no Granger Causality. Also, ROR represents Rate of return on IB's deposits, IRD indicates Interest Rate on Deposits of conventional banks. LDP and LGDP stand for the Logarithmic form of Deposit and Real income respectively.

Causality is found to be running from real income (LGDP) to size of deposits in Islamic banks in Malaysia. The causality running from these two variables to the deposit size of the Islamic banks is unidirectional.

The practical implication of this finding is that depositors in Islamic banks are also sensitive to the trends in the conventional deposit markets and do always adjust their deposit portfolio in the two banking systems. Since deposits are major sources of funds for Islamic banks; the banks also react appropriately by keeping the rates of return on deposits of the Islamic banks to reflect the changes in the interest rates of deposits in the conventional banks. The results of the causality tests, therefore, further support the results of the ARDL bounds testing and the long run coefficients which show the long-run relationship between the size of the deposits of Islamic banks and, conventional interest rates in Malaysia.

INDONESIA

In Indonesia, the results from the causality tests (Table 4.11) also establish the existence of causality running from the conventional interest rate, rates of return on deposits of Islamic banks and real income to the size of deposits of Islamic banks. The chi-square obtained from the modified Wald (MWALD) test on IRD in the equation of LDP is 8.723110and significant at 5% level. The chi-square values for ROR and LGDP are 8.418928 and 7.835505 and significant at 5% levels respectively. This means that conventional interest rates, rates of return on deposits of Islamic banks and real income granger cause variations in the size of deposit of Islamic banks in Indonesia. Like in the Malaysian Islamic banks' deposit market where the causality

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between conventional interest rate and the size of the deposits of Islamic banks is unidirectional; the causality between them in Indonesia is also unidirectional. However, causality between the deposit size (LDP) and rates of return (ROR) and LGDP is bidirectional.

The implication of these is that there is a high level of interdependence among the size of the deposits of Islamic banks, the rates of return on the deposits and real income in Indonesia. It also suggests that while conventional interest rate granger causes Islamic bank deposits, Islamic bank deposits has no causality power over the conventional interest rates in Indonesia. To this extent, while Islamic bank managers would need to always pay attention to the trends in the movements of conventional interest rate on deposits, rates of return on Islamic bank deposits and the GDP, the government, and the monetary authorities in their pursuit of monetary policy and objective of economic growth, would need to pay serious attentions to the happenings in Islamic banks particularly the trend of the rates of return on deposits of Islamic banks (ROR). These results support the findings of (Kasri & Kassim, 2009).

Malaysia: IRD → Unidirectional → LDP

Indonesia: IRD → Unidirectional → LDP

Bahrain: IRD ← Bidirectional → LDP
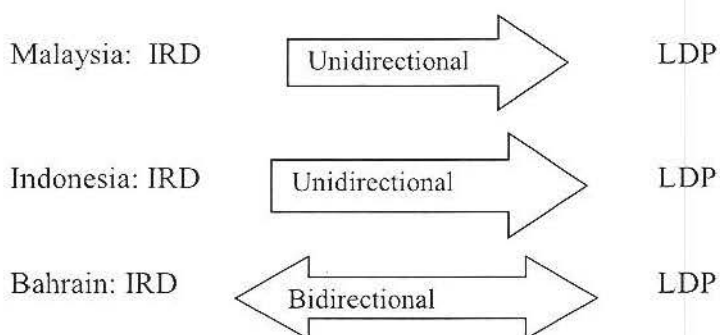
Figure 4.19
Summary of causality between LDP and IRD

BAHRAIN

The results of causality tests between the deposit size of Islamic banks and interest rates on conventional banks' deposits in Bahrain (Table 4.11) also show a bidirectional causality running between the two variables (i.e. LDP and IRD).

The result also indicates a unidirectional causality running from the rates of return on deposits of Islamic banks to the deposit size of the banks. This implies that depositors in Islamic banks are also motivated by the changes in the rates of return on deposits. As it expected, the size of deposits in Islamic banks in Bahrain is also granger caused by the changes in the levels of the aggregate real income within the economy.

4.4.5 Diagnostic tests

Diagnostic tests were conducted on the ARDL estimates to ensure that the models are free from problems of serial correlations of the disturbance terms in the ARDL estimators and the problem of heteroscedasticity (Table 4.12).

Table 4.12

Diagnostic tests

Country	Test statistics	LM Tests
Malaysia	Serial correlation	CHSQ (1) 0.3667[0.5905]
	Heteroscedasticity	CHSQ (17) 0.7789 [0.9508]
Indonesia	Serial correlation	CHSQ (1) 0.7512 [0.8282]
	Heteroscedasticity	CHSQ (14) 0.9220 [0.9757]
Bahrain	Serial correlation	CHSQ (1) 0.7226 [0.7726]
	Heteroscedasticity	CHSQ (8) 0.7910 [0.8508]

The probability values are reported in the parenthesis [ ]

The results of the tests of serial correlation of residuals of the models as represented by the chi-squares of the Lagrange Multipliers (LM) statistic show that the models are

free from serial correlation. The test of heteroscedasticity also demonstrates independence of the errors from the explanatory variables. The models are found to be fit and stable. The results of the tests are presented in Table 4.12.

4.4.6 Model stability tests

Stability and Fitness of the models are also tested by the Cumulative sum of recursive residuals and the cumulative sum of the square of recursive residuals which normally presents how stable and fit models are. The fitness of the model is represented by having the residual lie in-between the straight lines. The graphs in Figures 4.20, 4.21, 4.22, 4.23, 4.24, and 4.25, satisfy the rules. The following figures present the graphs showing the residuals of the models in which deposits of Islamic banks stand as dependent variables in each of the countries. The stability tests confirm that all the models are fit and stable.

Malaysia
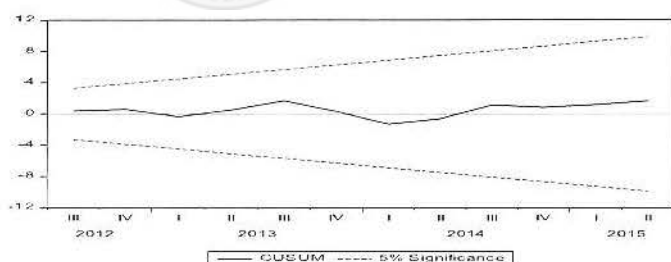
Figure 4.20
Cumulative Sum of Recursive Residuals test for LDP model (Malaysia)
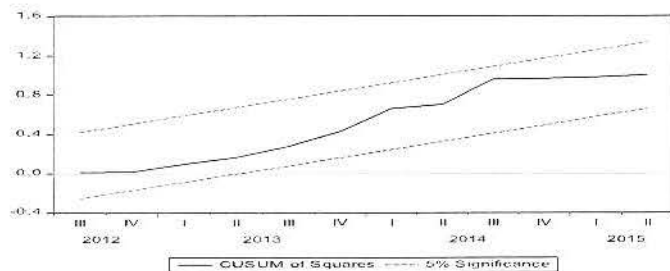
Figure 4.21
Cumulative Sum of Squares of Recursive Residuals for LDP model (Malaysia)

INDONESIA
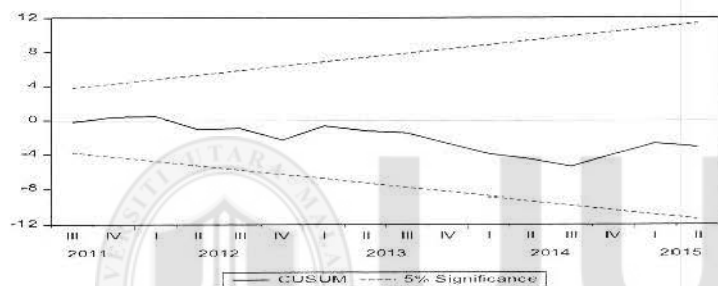
Figure 4.22
Cumulative Sum of Recursive Residuals test for LDP model (Indonesia)
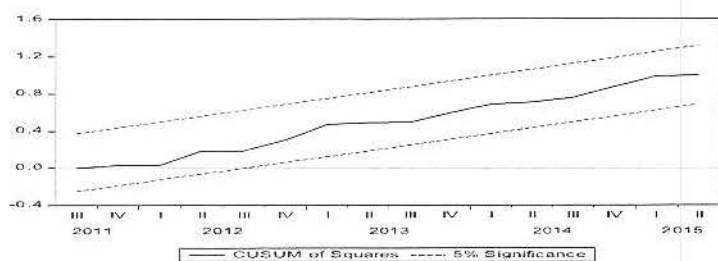
Figure 4.23
Cumulative Sum of Squares of Recursive Residuals for LDP model (Indonesia)

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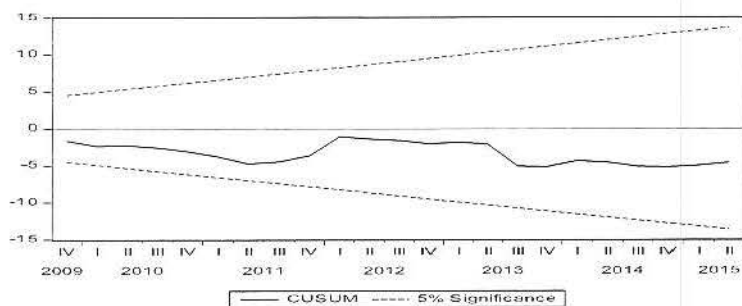
BAHRAIN

Figure 4.24
Cumulative Sum of Recursive Residuals test for LDP model (Bahrain)
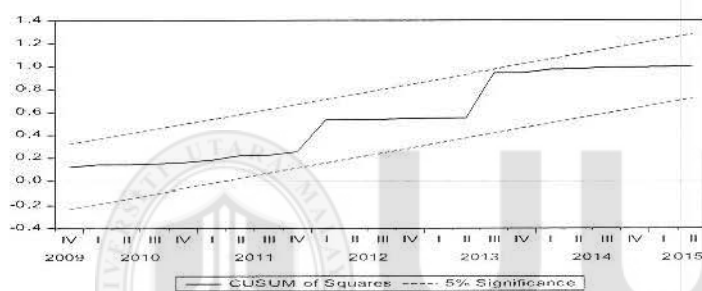
Figure 4.25
Cumulative Sum of Squares of Recursive Residuals for LDP model (Bahrain)

4.5 The result of the ARDL estimation of the financing- deposit gap and credit risk models.

To achieve the objective three aimed at investigating the relationship between financing- deposit ratio and credit risk of Islamic banks; ARDL approach to cointegration was also employed. The Bound test for cointegration was conducted to investigate the existence of the long-run relationship between the credit risks and the explanatory variables of the models. This is done by ascertaining whether the F-statistics from the model is significant at 5% significance level and higher than the

corresponding critical value. However before the bound test is carried out, it is appropriate to investigate the level at which the variables are stationary. This investigation is carried out by performing the unit root tests on each of the variables and then followed it up with the bound tests. After the bound test, if the existence of cointegration is established, ARDL long-run estimation of the coefficients was then performed. After the estimation of the long-run coefficients, the causality tests among the variables were performed and thereafter, diagnostic tests were also performed on the models.

4.5.1 The Result of the unit root tests

The results of the unit root tests presented in Table 4.13 indicate that CR (credit risk), FDR (financing-deposit ratio), LGDP (income) for Malaysia, Indonesia and Bahrain are stationary at first difference. That is, they are I(I). The values of their ADF statistics are higher than their critical values at 5% level of significance. Also, LRM (money supply) for Malaysia and Indonesia are also stationary at first difference. Therefore, the null hypothesis of the presence of unit root can be rejected and accept the alternative hypothesis of no unit root for the variables. However, LRM for Bahrain is found to be stationary at level, I (0). Also, the null hypothesis can be rejected at this level.

Table 4.13

Unit root test

Country	Variable	Model Type	Level ADF Value	Level Critical @ 5%	First difference ADF value	First difference Critical @ 5%
Malaysia						
	CR	C	-1.398412	-2.960411	-5.630914***	-2.957110
	FDR	C	-0.374735	-2.957110	-4.765573***	-2.960411
	LGDP	C	-1.006528	-2.954021	-5.308613***	-2.957110
	LRM	C	-0.753961	-2.954021	-5.022815***	-2.957110
	EXC	C	-0.688202	-2.954021	-4.379733***	-2.957110
Indonesia						
	CR	C	-2.842634	-2.960411	-3.900880***	-2.960411
	FDR	C	-2.126997	-2.954021	-6.009548***	-2.957110
	LGDP	C	-0.120166	-2.963972	-7.938290***	-2.963972
	LRM	C	-2.507054	-2.960411	-4.766713***	-2.967767
	EXC	C	-0.012348	-2.954021	-5.661539***	-2.957110
Bahrain						
	CR	C	-1.227240	-2.954021	-4.664815***	-2.957110
	FDR	C	-2.047633	-2.954021	-4.730437***	-2.957110
	LGDP	C	-0.568965	-2.954021	-5.864698***	-2.957110
	LRM	C	-4.099516***	-2.981038	-	-
	EXC	C	-0.214574	-2.954021	-3.784511***	-2.957110

Note: critical values are at 5%.*, ** and *** represent the critical value at 10%, 5% and 1% level of significance respectively. Also, CR represents Credit Risk of IBs, FDR indicates Financing-Deposit Ratio. LRM and LGDP stand for Logarithmic form of Real Money supply and Real income respectively. EXC represents exchange rate of domestic currency for US dollar.

The difference in the levels of integration of the variables, therefore, recommends the use of ARDL as the appropriate technique of estimation for this model.

4.5.2 ARDL Bound testing: Financing-Deposit gap / Credit Risk model

After, having satisfied the condition for the adoption of ARDL, investigation of the existence of the long-run relationship among the variables using ARDL Bound testing procedure then follows. Results of the Bound testing showing the long run relationship (co-integration) between the variables in the models for Malaysia, Indonesia and Bahrain are presented in Table 4.14. Four different models are run for

each of the countries. The results show the existence of a long run relationship or otherwise for each model in which each of the explanatory variables takes a turn as dependent variables.

Table 4.14

ARDL Bound Testing: Financing-Deposit gap / Credit Risk model

F-Statistics	Bound CV:90%		Bound CV:95%		Bound CV:99%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.45	3.52	2.86	4.01	3.74	5.06
Malaysia						
CR	7.779***					
FDR	3.322*					
LGDP	7.189***					
LRM	7.364***					
EXC	4.541**					
Indonesia						
CR	7.3945***					
FDR	4.4137**					
LGDP	17.0445***					
LRM	5.7982***					
EXC	4.1183**					
Bahrain						
CR	6.65605***					
FDR	4.091**					
LGDP	5.270***					
LRM	13.010***					
EXC	5.584***					

NOTE: *, ** and *** represent 90%, 95% and 99% level of significance respectively. Also, CR represents Credit Risk of IBs, FDR indicates Financing-Deposit Ratio. LRM and LGDP stand for the Logarithmic form of Real Money supply and Real income respectively. EXC represents exchange rate of domestic currency for US dollar.

In Malaysia for example, the result shows a high level of cointegration between the credit risks (CR) of Islamic banks and the explanatory variables of liquidity (FDR), real income (LGDP), real money supply (LRM) and exchange rate (EXC). For

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example, in this model with CR as the dependent variable and liquidity (FDR), real income (LGDP), real money supply (LRM) and exchange rate (EXC) as explanatory variables, the F-statistic value is 7.779 which is higher than the upper bound critical value of 4.01 at 5% significance level. This means that bank liquidity, real income, real money supply and exchange rates in the economy all jointly have a very strong long-run relationship with the credit risks of Islamic banks in Malaysia.

Each of the other explanatory variables is thereafter made to take a turn as the dependent variable to determine the level of cointegration with the other variables. By considering FDR as the dependent variable, the result shows a non-conclusive result for the existence of cointegration with the explanatory variables of the model. The F-statistic for the model is 3.322 which lies in-between the lower and upper bounds of the critical values at 5% significance level. Also, cointegration is observed when LGDP, LRM, and EXC take a turn as dependent variables with F- statistic values of 7.189, 7.364 and 4.541 respectively.

The existence of the long-run relationship between the credit risks of Islamic banks in Indonesia and FDR, LGDP, LRM and EXC as explanatory variables of the model is also established by the results of the bound testing. From the results of the bound test, the F-statistic for the model of CR of Islamic banks in Indonesia is 7.3945 which higher than the upper bound of the critical value of 4.01 at 5% significance level. This, therefore, establishes the existence of cointegration among the variables when CR stands as the dependent variable. Also, the result of the bound test on the CR model for Islamic banks in Bahrain gives an F-statistic of 6.656 which is much higher

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than the upper bound critical value of 4.01 at 5% significance level. By the results of the bound test, it is concluded that liquidity, real income, money supply and exchange rate all jointly have a long-run relationship with the credit risk (CR) of Islamic banks in Malaysia, Indonesia, and Bahrain.

4.5.3 The results of the ARDL estimation of the long-run relationship.

The result the ARDL estimation of the long-run coefficients of the explanatory variables shows the effects and relationship of the individual variables with the credit risks (CR) of the Islamic banks in each of the countries. The signs of the coefficients show the direction of the relationship. The long-run coefficients of the variables with their standard errors, t-statistics, and p-values are presented in Table 4.15.

The results presented in Table 4.15 show that financing-deposit gap, as represented by the financing-deposit ratio (FDR), is an important predictor of credit risks in Malaysia, Indonesia and Bahrain. The coefficients of the FDR for the models of Islamic banks in Malaysia and Bahrain are positive and significant at 1% level of significance. This means that FDRs of Islamic banking in Malaysian and Bahrain have a positive relationship with the credit risks (CR) of the banks. It, therefore, follows that when the financing portfolios of the banks are rising relative to their deposits size, the credit risks were on the increase. It means the banks are engaged in credit expansion faster than the inflow of loanable funds through deposits. During the period 2007 – 2015: Q2, the CR in Malaysia was observed to be declining so also were the FDRs decreasing correspondingly. The positive relationship between CR and FDR in Malaysia is in line with the a priori expectation. The practical implication of

this means that when the rate of growth of financing is faster than the rate of inflow of deposits the banks would be pressured to source funds from other sources such as inter-bank money market or overnight borrowing from the Central banks to cover the shortfall from the deposits. The effects of this are to use short-term funds to finance long-term customers' requests. This has the effects of putting pressure on the banks to channel the funds to high-risk financing which in effects leads to increasing credit risk.

Table 4.15
ARDL: Long-run relationship (Financing-Deposit gap / Credit Risk model)
Dependent variable: Credit risks (CR)

Variable	Estimated values		
	Malaysia	Indonesia	Bahrain
Constant	37.259697***	67.515413***	-110.656537
	(8.626423)	(15.522865)	(260.316118)
	[4.319252]	[4.349417]	[0.425085]
FDR	4.116528*	-0.061511**	117.289633***
	(1.953340)	(0.022813)	(50.387167)
	[2.107431]	[-2.696375]	[2.327768]
LGDP	-1.311400	-4.602295***	-25.023610***
	(1.078988)	(1.120398)	(9.265109)
	[-1.215398]	[-4.107734]	[-2.700843]
LRM	-2.448471***	-0.669778**	54.750275
	(0.610349)	(0.226491)	(47.643116)
	[-4.011595]	[-2.957200]	[1.149175]
EXC	-0.062305	0.000775***	0.538911***
	(0.347582)	(0.000092)	(0.0067203)
	[-0.179253]	[8.457677]	[8.0192131]

Note: SE is in parentheses ( ) and t-statistics are in brackets [ ]. Also ** and *** represent 5% and 1% significance levels respectively. Also, CR represents Credit Risk of IBs, FDR indicates Financing-Deposit Ratio. LRM and LGDP stand for the Logarithmic form of Real Money supply and Real income respectively. EXC represents exchange rate of domestic currency for US dollar.

On the other hand, if the deposit inflow is faster than the financing activities of the banks, it is expected that the banks would be liquid and would not be under pressure

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to take in high-cost funds. The bank would then be able to select low-risk investments even though, may yield moderate returns. This result supports the findings of Samad & Hassan (2000). Similarly, the coefficient of money supply shows a negative sign, meaning that it has an inverse relationship with the credit risk of Islamic banking in Malaysia. The implication of this is that a prolonged tight monetary policy has the potential of heightening credit risk of Islamic banking in Malaysia. CR and FDR of the Islamic banks in Bahrain also have a positive relationship. However, unlike in Malaysia where CR and FDR consistently show a decreasing trend over the period 2007 – 2015Q2, the CR and FDR of the Islamic banks in Bahrain show an increasing trend for the most part of the period. The implication of the result is that while credit risks of Islamic banks in Malaysia were on the downward trend those of the Islamic banks in Bahrain were increasing during the same period under review. The financing-deposit gap in Bahrain also has a positive and significant relationship with the credit risk of Islamic banking. Meaning that as the gap between financing and deposit widens the credit risk of the banks in Bahrain continues to increase. Similarly, real income is another important variable that explains the credit risk of Islamic banking in Bahrain. In line with the a priori expectation, the coefficient of the real income (Real GDP) is negative. The result, therefore, shows real income as negatively and significantly related to the credit risk of Islamic banking in Bahrain. The implication of the result suggests that the increase in the credit risk of the Islamic banking in Bahrain during the period was due to, among other factors, the decline in the economic growth rate.

The FDR of the Islamic banks in Indonesia during the period 2007 – 2015Q2 show an inverse relationship with the credit risks (CR) of the banks. This means that during the period while the FDR was increasing the CR was declining. The trend can be attributed to the type of sectors of the economy in which the Islamic banks in Indonesia concentrated their financing. For example, while Islamic banks in Malaysia concentrated their financing in the household sector and those in Bahrain concentrated their financing on consumer goods, Islamic banks in Indonesia on the other hand, had a fairly distributed financing portfolio and the financing concentration observed in Indonesia was in the productive sector. This inverse relationship between CR and FDR in Indonesia may have resulted from the policy of concentrating financing on productive activities through which businesses generate more income and are able to meet their repayments obligations to the banks as at when due. This result supports the findings of Tabak, Fazio and Cajueiro (2010) in their study of the effects of loan portfolio concentration on Brazilian banks' return and risk and Behr, et al. (2007) in their study of diversification and banks' risk-return characteristics of German banks.

LGDP representing real income is another important variable that is found to explain the credit risks of Islamic banks in Indonesia and Bahrain. The variable is significant at 1% levels in Indonesia and Bahrain and found to have an inverse relationship with the credit risk. In the case of Malaysia, even though, not significant, LGDP coefficient is also negative, meaning that it has an inverse relationship with the credit risks. The implication of the inverse relationship between the credit risk and economic growth means that when the economic growth is positive; investors were able to operate in a

good economic climate that encourages economic activities which made it possible for them to service their liabilities to the banks.

Under these economic conditions, non-performing financings were found to be going down. However, at the downturn of the economy, the non-performing financing would be on the increase. These results support the findings of some previous studies (Adebola, et.al. 2011; Al-Wesabi & Ahmad, 2013; Boduri, 2014; Louzis et. al., 2012; Saurina & Jimenez, 2006). Money supply (LRM) in both Malaysia and Indonesia is significant with an inverse relationship with the CR. This means that expansionary or contractionary monetary policies of these countries significantly impact on the financing activities of the Islamic banks. The contractionary monetary policy of the monetary authorities has the effect of reducing the volume of money in circulation. The effect of this on banks is to reduce the funding capacity they have. The contractionary monetary policy makes credit scarce and more expensive. The non-availability of credit to investors and the attendant high cost of fund where it is available to make the business environment hostile. This situation if prolonged leads to high credit risks for the banks. In this case, however, it does appear the authorities in Malaysia and Indonesia pursue expansionary monetary policies. The results indicate an inverse relationship between CR and LRM which means that as CRs were falling in the countries, money supply was increasing. Relaxed liquidity in the economies provided increased funding capacity for the banks and investors were able to meet their funding requirements and able to service their debts leading to declining credit risk.

Foreign currency exchange rate (EXC) is another important predictor of credit risks of Islamic banking in Indonesia and Bahrain. EXC is positively and significantly related to the CR in both Indonesia and Bahrain. To understand the actual effect of the exchange rate on the banks' borrowing, one needs to understand which end of the foreign exchange usage the borrowers are. For example, a fall in the nominal exchange rate (i.e. exchange rate appreciation) will benefit import-dependent raw material users and negatively affect the revenue of the export-oriented borrowers. This is because an exchange rate appreciation has the effect of making imports relatively becoming cheaper while products for exports becoming more expensive in the international market which can, therefore, affect the revenue of the borrowing customers and therefore, their ability to service their debts. A country that is import-dependent will loose from her currency depreciation. Depreciation in the currency of such a country will affect the cost of production, the decline in revenue and impaired ability of borrowers to make repayment of their loans. On the other hand, if a country is export-oriented, domestic currency depreciation has the potential of boosting the exports and thus increases the revenues of the exporting firms and improves their capacities to service their debts and thus reduce the credit risks of their banks. These findings also support the findings in (Demirguc-Kunt & Detragiache, 1998; Perry, 1992).

4.5.3.1 Diagnostic tests

The results of diagnostic tests for serial correlation and heteroscedasticity as given by chi-squares of the Lagrange Multipliers (LM) statistic presented in Table 4.16 show

that the model is free from serial correlation and the problem of heteroscedasticity. The models are also found to be fit and stable.

Table 4.16
Diagnostic tests

Country	Test statistic	LM test
Malaysia	Serial correlation	CHSQ(1) 0.2800 [0.7419]
	Heteroscedasticity	CHSQ(1) 0.9226 [0.9263]
Indonesia	Serial correlation	CHSQ(1) 0.2509 [0.5749]
	Heteroscedasticity	CHSQ(1) 0.3376 [0.3568]
Bahrain	Serial correlation	CHSQ(1) 0.9486 [0.9357]
	Heteroscedasticity	CHSQ(1) 0.1385 [0.1494]

The P-values are presented in parenthesis [ ]

4.6 The effects of financing concentration on the credit risk of Islamic banks.

In order to determine the effects of financing concentration on the credit risk of Islamic banks, there is the need to determine the pattern of allocation of financing to the various economic sectors of these countries by the Islamic banks operating in each of the countries. The relative share of each economic sector of the total financing is then subjected to concentration measurement index. In the case of this study, Hirschman-Herfindahl Index (HHI) has been employed. After obtaining HHI, a regression analysis using Dynamic OLS was conducted to estimate the relationship between credit risks of Islamic banking and financing concentration.

4.6.1 Result of the computation of HHI (Concentration index)

The result of the Hirschman-Herfindahl-Index (HHI) computed for Malaysia and Indonesia were presented in Table 4.17.

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Table 4.17

Hirschman-Herfindahl-Index (HHI) Malaysia and Indonesia

| | | | | Diversified | Moderately Concentrated | Concentrated |
| | | | | 0 – 0.1000 | 0.1000 – 0.1800 | Above 0.1800 |
Period		Malaysia	Indonesia			
2007	Q1	0.4766*	0.1878*			
	Q2	0.4604*	0.1875*			
	Q3	0.4437*	0.1975*			
	Q4	0.3967*	0.1881*			
2008	Q1	0.3768*	0.1917*			
	Q2	0.3650*	0.1894*			
	Q3	0.3550*	0.1921*			
	Q4	0.3663*	0.1926*			
2009	Q1	0.3775*	0.1915*			
	Q2	0.3666*	0.1919*			
	Q3	0.3860*	0.1954*			
	Q4	0.3728*	0.2026*			
2010	Q1	0.3873*	0.1996*			
	Q2	0.3767*	0.2026*			
	Q3	0.4028*	0.2167*			
	Q4	0.3987*	0.2245*			
2011	Q1	0.3998*	0.2291*			
	Q2	0.3994*	0.2370*			
	Q3	0.4058*	0.2566*			
	Q4	0.4004*	0.2573*			
2012	Q1	0.3931*	0.2576*			
	Q2	0.3904*	0.2659*			
	Q3	0.3951*	0.2607*			
	Q4	0.4036*	0.2751*			
2013	Q1	0.4148*	0.2813*			
	Q2	0.4174*	0.2780*			
	Q3	0.4116*	0.2732*			
	Q4	0.4054*	0.2700*			
2014	Q1	0.4048*	0.2616*			
	Q2	0.4040*	0.2360*			
	Q3	0.4032*	0.1909*			
	Q4	0.3882*	0.1933*			
2015	Q1	0.3970*	0.1892*			
	Q2	0.3922*	0.1876*			
AVRAG		0.3958*	0.2002*			

Note: "*" indicates portfolio concentration, "AVRAG" indicates average HHI for 2007Q1– 2015Q2

HHI for Bahrain was computed separately and presented in Table 4.18. This is because the distribution of financing of Islamic banks in Bahrain was always subsumed into the report of the entire banking system's lending to the various

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economic sectors of the Bahrain's economy until the first quarter of 2013 when it was first presented by the Central Bank of Bahrain.

The distribution of Islamic banks' financing to the various economic sectors was reported separately for the first time by the Central Bank of Bahrain in the first quarter of 2013. The HHI is computed to investigate the existence of financing portfolio concentration by Islamic banks in these countries. The result shows that Malaysia has very high HHI throughout the period 2007 – 2015: Q2. The average HHI for the financing portfolio of Islamic banks in Malaysia for the period is 0.3958. This is above the upper threshold of 0.1800 of moderate concentration. This means that the financing portfolio of Islamic banks in Malaysia is highly concentrated. The HHI for Indonesian Islamic banks, on the other hand, gives an average of 0.2002 for the same period.

The HHI for financing portfolio of Indonesian Islamic banks even though, above the upper threshold of 0.1800 for moderate concentration, it appears to be more diversified than the financing portfolio of Malaysian Islamic banks.The distribution of financing of Islamic banks in Bahrain presents a fairly diversified portfolio. The average HHI for the financing distribution of Islamic banks in Bahrain is 0.124763 which according to the rule, falls under the classification of "moderately concentrated" portfolio. The rule states that the closer HHI is to 1 the more concentrated the portfolio is. The HHI of Islamic banks in Indonesia and Bahrain for each of the quarters of the years 2007 – 2015: Q2 are farther away from 1 and closer to 0 than HHI of Islamic banks in Malaysia. This means that Islamic banks in

Indonesia and Bahrain have better-diversified financing portfolio than their counterparts in Malaysia. The concentration of financing portfolio in each of the countries is further illustrated by the pie charts presented in Figures 4.26 to 4.31.

Table 4.18
Hirschman-Herfindahl-Index (HHI) Bahrain

Period	Diversified 0 – 0.1000	Moderately Concentrated 0.1000 – 0.1800	Concentrated Above 0.1800
2013Q1	0.136483**		
2013Q3	0.130092**		
2014Q1	0.121157**		
2014Q3	0.122107**		
2015Q1	0.12235**		
2015Q2	0.12448**		
AVRAG	0.124763**		

Note: "**" indicates portfolio moderate concentration, "AVRAG" indicates average HHI for 2013 – 2015Q2

4.6.2 Results of the Dynamic OLS estimation of the financing concentration-credit risk model.

The HHI computed for the distribution of financing of Islamic banks to economic sectors in Malaysia, Indonesia indicates the concentration of financing portfolio. The HHI for Bahrain, on the other hand, indicates moderate concentration. The effects of the concentration of financing on the credit risk of the banks have not been determined. In the result of the regression analysis of the equation (15) and presented in Table 4.19 FC (financing concentration) has been used as a proxy for HHI and CR stands for credit risk. The result shows the relationship between credit risk and financing concentration of Islamic banks in Malaysia and Indonesia. Also, the correlation coefficient in Table 4.20 shows the relationship between credit risk and

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concentration of financing of Islamic banks in Bahrain. The results aim at analysing the relationship between credit risks and financing concentration.

The results of the estimation using Dynamic OLSare presented in Table 4.19. The results show FC (financing concentration) as an important variable having a significant long run relationship with the credit risk of Islamic banks in Malaysia.Its coefficient is positive and significant at 5 percent level. This means that credit risk is positively related to financing concentration. The implication of this is that credit risk of banks with concentrated financing portfolio would be higher than banks with a diversified portfolio. This also means that the credit risk of Islamic banks in Malaysia as represented by their non-performing financing can be explained to a great extent by their financing concentration particularly in the household sector of the economy. This in effect presents a moral hazard at work. The result, therefore, indicates that moral hazard may have been generated from the very nature of *mudarabah* (investment account) deposits. That under the profit and loss sharing (PLS) model, the return of the principal deposit is not guaranteed: incentives may have been created for the banks to undertake excessive risk-taking through financing concentration.

Another variable that has a significant long run relationship with the credit risks of Islamic banks in Malaysia is money supply. Money supply has a negative relationship with credit risks and significant at 5% level. This is in line with the theory of monetary policy which holds money supply as an instrument of monetary policy. Monetary authorities' policies of liquidity expansion or contraction can have significant impacts on banks' ability to meet their financing obligations to their

borrowing customers. The inability of banks to continue to meet the financing obligations to their customer can in turn negatively impact on the business activities of these customers and thereby constrain their ability to service their debts as at when due. The consequence of this is the increasing credit risks of the banks.

Table 4.19
Dynamic OLS: Financing Concentration / Credit Risk model.

Dependent variable: CR

Variable	Malaysia	Indonesia	Bahrain
FC	10.08855**	-48.43093***	
	(3.522291)	(10.89796)	-
	[2.864201]	[-4.444036]	
IR	0.682825**	0.331536*	-15.32258**
	(0.275554)	(0.162411)	(4.581053)
	[2.275554]	[2.041334]	[-3.344773]
LRM	-3.034876***	-320.6308***	-89.14322*
	(0.456992)	(79.98482)	(4.581053)
	[-6.640984]	[-4.008645]	[-2.538573]
LFIN	1.779068*	7.432718***	31.09764
	(0.858430)	(1.750334)	(15.78653)
	[2.072466]	[4.246458]	[1.969884]
INF	0.0064663	-0.219191**	-2.854928**
	(0.021098)	(0.066480)	(0.759593)
	[0.221012]	[-3.297102]	[-3.758499]

Note: Standard errors and t-statistic are reported in parentheses ( ) and bracket [ ] respectively. Also, ***, ** and * represent statistical significance at the 1, 5 and 10 percent levels respectively.

Also, CR represents Credit Risk of IBs, IR indicates Lending Rate of conventional banks. LRM and LFIN stand for the Logarithmic form of Real Money supply and Real Financing expansion respectively. INF represents Inflation rate in the economy.

The result also indicates a positive and significant relationship between the conventional banks' lending rates (IR) and the credit risk of Islamic banks. It shows that there exists a positive relationship between credit risk of the Islamic banks and

conventional average lending interest rates in Malaysia.Since financing rates of Islamic banks in the country are referenced to the conventional banks' lending rates, rising interest rates in the conventional credit markets would raise the financing rates in the Islamic banking credit markets as well. This supports the findings of a number of studies (Dash & Kabra, 2010; Fofack, 2005; Louzis, 2012). This means that when the average lending rate rises, implying that the financing rates of Islamic banks will also be rising; with the consequence of the possibility of an increase in default rates and the risk of non-performing financing. Also, credit expansion (LFIN)has a positive and significant relationship with the credit risks of Islamic banks in Malaysia. From the result of the estimation, the coefficient of the variable for credit expansion (LFIN) is positive and significant at 10% level. This is because, during favourable economic environments, competition is usually high among banks, income margin becomes thin, in order to sustain revenue base, banks often embark on credit expansion. In the process of credit expansion, credit rules are usually relaxed, and thus accommodate bad borrowers. This eventually leads to increase in default rates.However, the results indicate inflation though with a positive sign but not significant as a possible predictor of credit risk during the period covered by the study.

In the case of Indonesia and contrary to the situation in Malaysia, the result of the estimation presents a divergent effect of FC on credit risk of Islamic banks in the country. While FC has a significant and positive relationship with the credit risk in Malaysia, the result indicates the FC for the Islamic banks in Indonesia, though significant, but with a negative coefficient. This assumes a negative relationship between credit risk and financing concentration in Indonesia. This result is not

unexpected. It indeed supports the argument of the studies that affirm that concentration of financing can reduce monitoring cost and ensures efficiency which in turn leads to a reduction in risk. The studies that argue that specialisation (concentration of financing) reduces risk include (Acharya, et al., 2006; Tabak et al., 2010; Winton, 1999). However, beyond the theoretical arguments, this relationship can also be explained more importantly by the empirical reality of the financing concentration of Islamic banks in Indonesia which could be observed to be gradually decreasing over the period under review while the nonperforming financing was steadily increasing. To have this negative relationship is, therefore, not surprising. This means that nonperforming financing of Islamic banks in Indonesia during the period can be explained better by other variables. The credit risks of Islamic banks in Indonesia from the results of the estimation can, therefore, be explained by its long run relationship with such other factors as interest rates, money supply, and credit expansion. The result indicates a significant long run relationship between lending rates of the conventional banks and the credit risk of Islamic banks. The coefficient of IR in the model is positive and significant at 10% significance level implying an influence of the interest rates on the credit risks of Islamic banks. This means that credit risks of Islamic banks increase as a result of the increase in the conventional banks' lending rates. A fall in interest rates, on the other hand, reduces the repayment burden of the customers who source funds from Islamic banks. This is because of the correlation between the financing rates of the Islamic banks and lending rates of the conventional banks. Also, another predictor of the credit risk in Islamic banks in Indonesia is the credit expansion (LFIN) by the banks. The result indicates LFIN in

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Indonesia Islamic banks as positively related to the credit risk and significant at 1% level.

Money supply also plays a significant role in explaining the credit risk of the banks in Indonesia. From the result of the DOLS, the coefficient is negative and significant at 1% level. This means that expansion (or contraction) of money supply in the economy decrease (or increase) the possibility of default by the investors and thereby lower (or increase) the credit risk of the banks. Inflation with a negative sign is also, significantly related to the credit risk of the banks during this period.

As for Bahrain, the correlation coefficient ($r= 0.995522$) as presented in Table 4.20 shows a very strong relationship between credit risk and financing concentration by Islamic banks. These findings of the long run relationship between credit risks and financing concentration as observed with Islamic banks in Malaysia and Bahrain are in support of the findings of some previous studies (Behr et al., 2007; Diamond, 1984; Herring & Watcher, 1999; Hooks & Robinson, 2002; Markowitz, 1952).The studies argue that concentration can lead to increase in credit risk of banks.

Table4.20
Correlation analysis: Financing Concentration / Credit Risk (Bahrain).

Correlation	CR	FC
CR	0.635000	
	1.000000	
FC	0.004966	0.0000392
	0.995522	1.000000

The pertinent question that may arise is, why do we have a positive relationship between credit risk and financing concentration in Malaysia and Bahrain and an inverse relationship in Indonesia? The concentration index (HHI) in Table 4.17 shows that both Malaysia and Indonesia have financing concentration, Figures 26 and 27 on the other hand, show that financing portfolio of Islamic banks in Malaysia is very concentrated in the household sector. Figures 28 and 29 also, show the financing portfolio of Islamic banks in Indonesia is concentrated in productive sectors. For example, Islamic banks in Malaysia have between 61% and 68% of their financing concentrated in the household sector and also Islamic banks in Bahrain have the largest allocation of their financing (between 17% and 33%) to personal/consumer financing. In contrast to the two countries, financing distribution structure of the Islamic banks in Indonesia has the largest allocation (between 26% and 33%) of their financing to the "business services".

The significance of this difference is that while a large portion of the financing of the banks in Malaysia and Bahrain go for consumption that of the Islamic banks in Indonesia goes for productive activities. Business organisations know very well that availability of sustainable funds is very important to their business success and would always endeavour to maintain a good relationship with their banks. To achieve this, they must remain credit-worthy at all times. This may explain why the concentration of financing by the Islamic banks in Indonesia has no positive impact on the credit risk of the banks.

The DOLS result for Bahrain indicates conventional interest rate being significant at 5% level but negatively related to the credit risk of Islamic banks. This implies that when conventional interest rates increase the non-performing financing of Islamic banks decreases. Conversely, when the rate goes down, the non-performing financing (credit risk) of Islamic banks goes up. This suggests the existence of arbitrage in the Islamic banking and conventional banking credit markets in Bahrain. This implies that when interest rates in the conventional credit markets go down, customers of the Islamic banks appear to move to the conventional banks to take advantage of the low-interest-rate regime in that market. It thus, therefore, suggests that where Islamic banks cannot adjust their financing rates as quickly as the conventional banks can do; customers in Islamic banks tend to default. This is because it becomes cheaper for the customers to seek to refinance of their investments from the conventional banks which appear to be more competitive than Islamic banks anytime interest rates goes down. The converse is the case where there is an increase in interest rates.

The effects of money supply on the credit risk of Islamic banks in Bahrain are like the effects of money supply on the credit risk of the banks in Malaysia and Indonesia. Money supply is negatively and significantly related to the credit risk of the banks in all the three countries.

Credit expansion in Bahrain is positively related to the credit risk of Islamic banks but not significant for the period of the study. Inflation has negative coefficient and significant at 5%. Effect of inflation on the credit risk of banks could either be

positive or negative depending on whether the inflation had been anticipated or not anticipated.

4.6.3 Graphical representation of portfolio concentration

The results of the HHI computations only show the existence of a concentration of financing portfolios by the Islamic banks in these countries. The long-run relationship between credit risks and financing concentration together with the other control variables was obtained from the Dynamic OLS estimation. The index did not show the particular economic sectors in which such concentrations exist. To clearly show the direction of the portfolio concentration, we, therefore, present the relative share of the various economic sectors in the total of the financing of Islamic banks in these countries in pie-charts as presented in Figures 4.26 to 4.31.

Malaysia
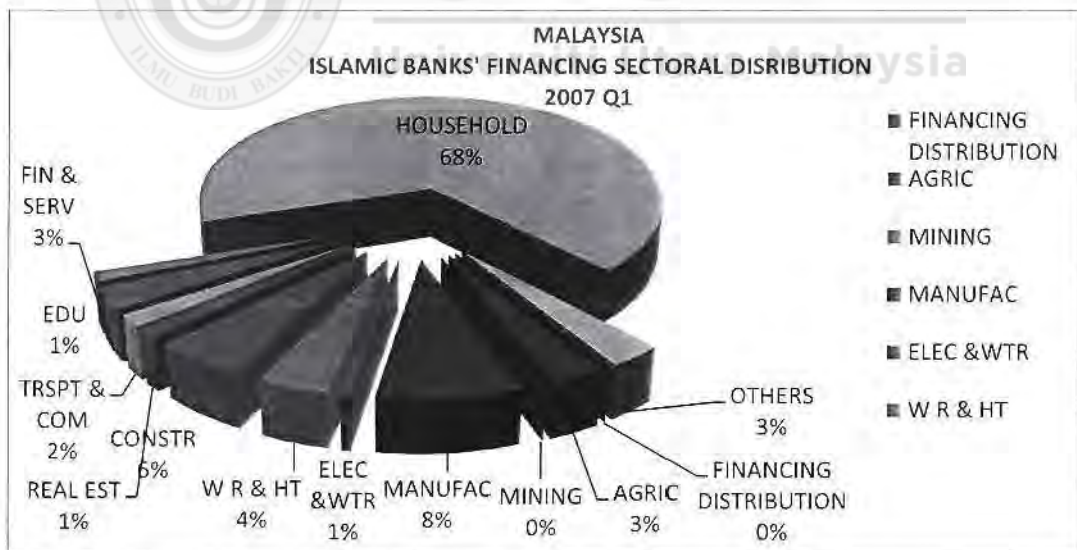
Figure 4.26
Sectoral distribution of financing of Islamic banks in Malaysia (2007Q1)
Source: Data from Bank Negara Malaysia's Monthly Statistical Bulletin, March 2007

Figure 4.26shows the relative share of the economic sectors as classified by the Bank Negara of Malaysia. The Figure shows the household sector alone being allocated as much as 68% of the total of the financing of Islamic banks in Malaysia in quarter one of 2007. The relative share of the household sector remains high throughout the study period. This is shown in Figure 4.27 presenting the household sector as having as high as 61% of the total financing in the last quarter of 2014.

MALAYSIA
ISLAMIC BANKS' FINANCING SECTORAL DISTRIBUTION
2014Q4
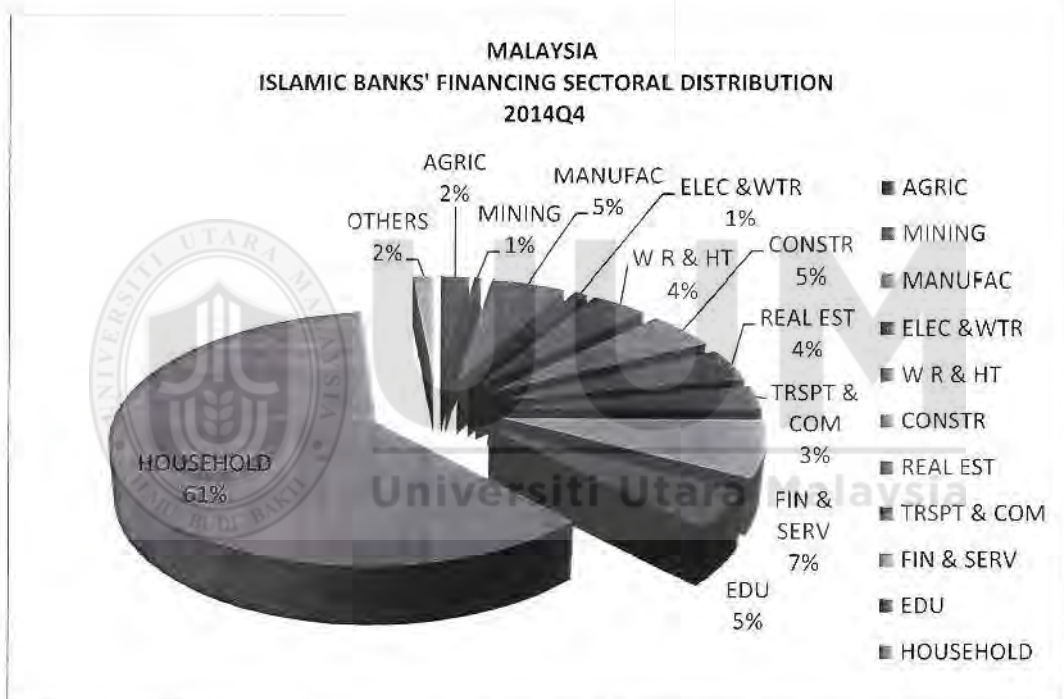
Figure 4.27:
Sectoral distribution of financing of Islamic banks in Malaysia (2014Q4).
Source: Data from Bank Negara Malaysia's Monthly Statistical Bulletin, March 2014

Indonesia

The review of the distribution of financing into various economic sectors by Islamic banks in Indonesia as presented in Figures 4.28 and 4.29 shows a much more diversified financing portfolio than the Malaysian Islamic banks. However, a critical

review of the financing distribution by the Islamic banks in Indonesia as presented in Figures 4.28 and 4.29 reveals that more than half of the total financing is into "business services" and "others". For example, in 2007 (Figure 4.28) business services and others' shares of the total financing are 26% and 26% respectively. These two categories alone take as much as 52% of the total financing. This is a concentrated financing.
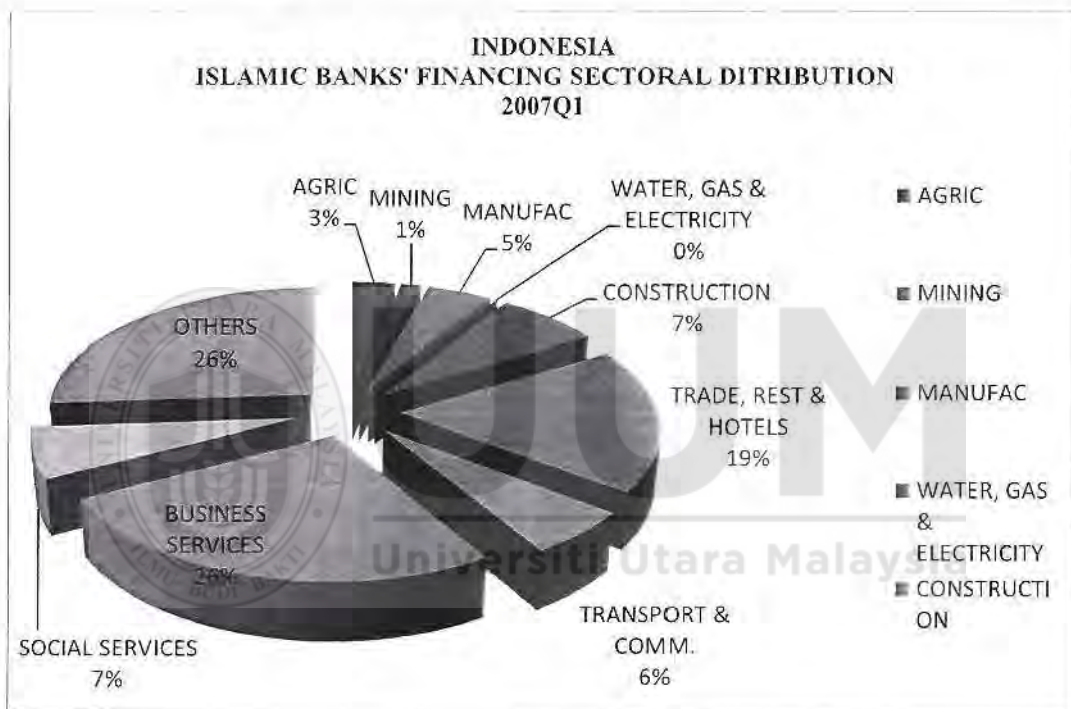
Figure 4.28
Sectoral distribution of financing of Islamic banks in Indonesia (2007Q1).
Source: Data from Bank Indonesia's Indonesian Banking Statistics March 2007

Also, the review of Figure 4.29 which presents the financing distribution as at the end of 2014 brings out the same pattern of concentration of financing distribution towards "business services" and "others". As the two sectors take as much as 55% of the total financing it, therefore, presents a concentrated financing portfolio.
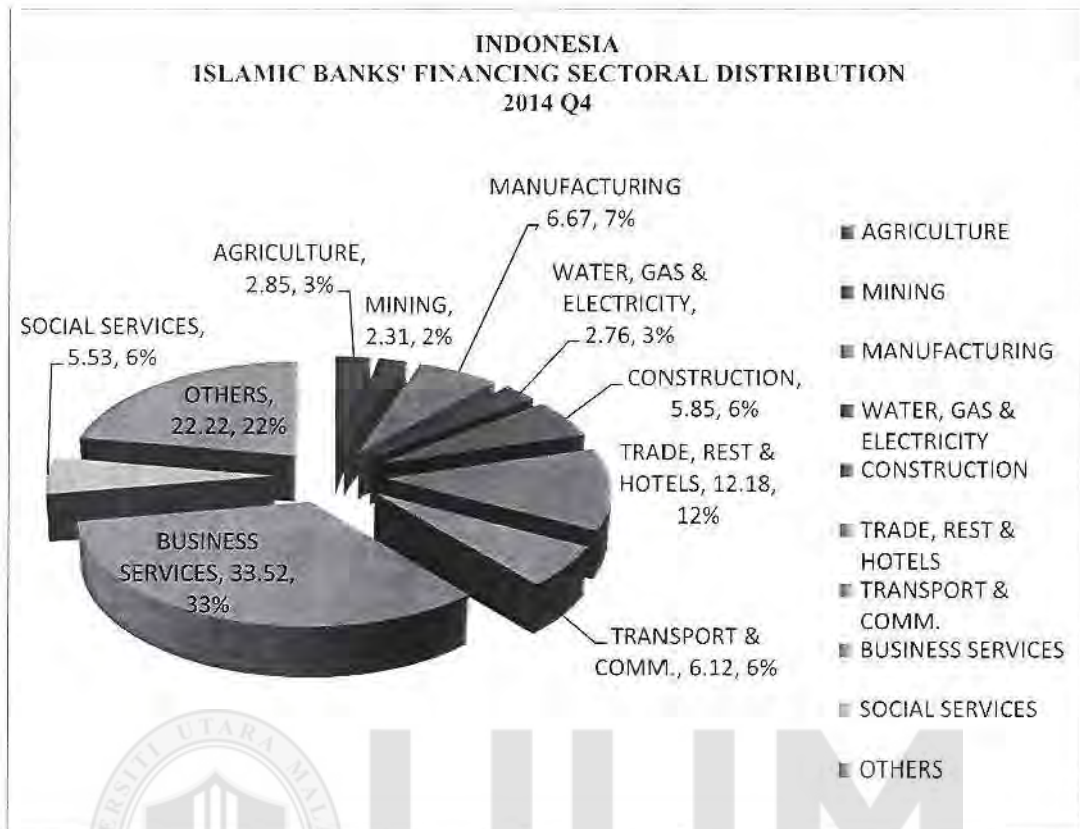
Figure 4.29
Sectoral distribution of financing of Islamic banks in Indonesia (2014Q4).
Source: Data from Bank Indonesia's Indonesian Banking Statistics, December 2014

Bahrain

The distribution pattern presented in Figures 4.30 and 4.31 supports the result of HHI presented in Table 4.18. The distribution of financing to the various economic sectors in Bahrain is much more evenly done than in Malaysia and Indonesia. Bahrain, unlike Malaysia and Indonesia, has an HHI falling within "moderately concentrated" financing classification. The review of Figures 4.30 and 4.31 reveals that personal consumer finance and real estate are the top-2 sectors sharing about 35% among themselves. For example, in 2013 personal consumer finance and commercial real estate share 21% and 14% respectively.

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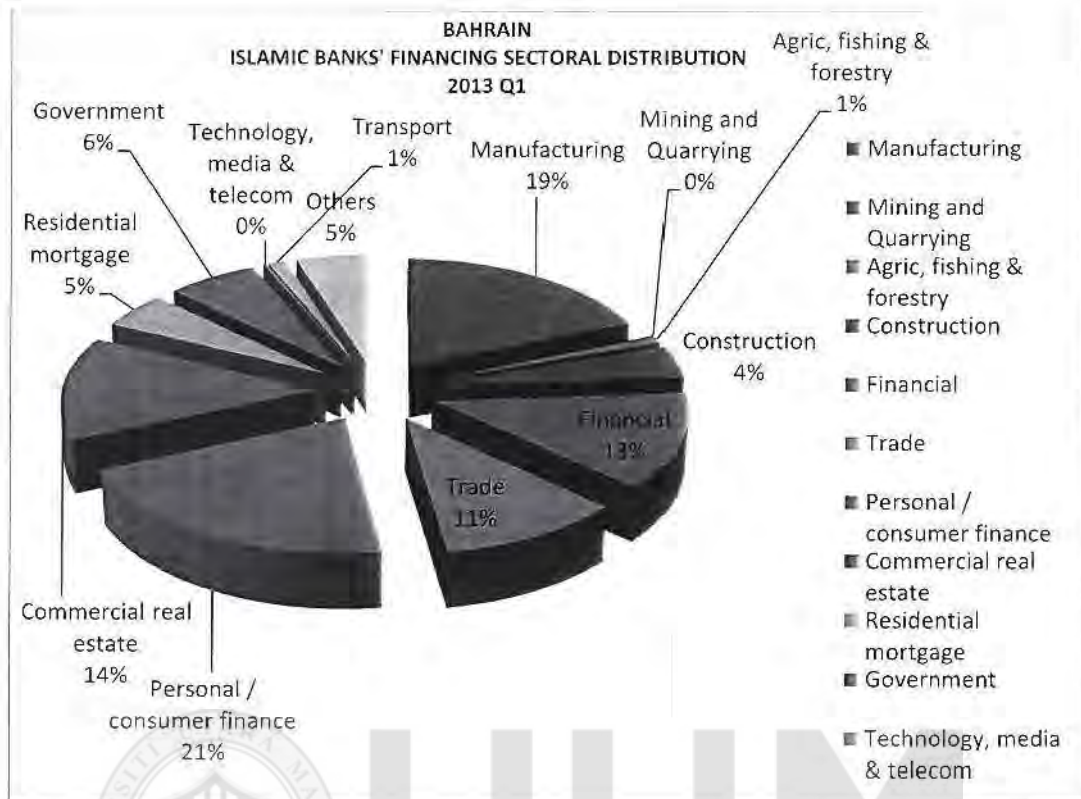
Figure 4.30
Sectoral distribution of financing of Islamic banks in Bahrain (2013Q1).

Source: Data from the Central Bank of Bahrain Statistical Bulletin Marc, 2013

Also, in 2014 the share of the total financing that went into personal consumer finance and commercial real estate were 17% each making a total of 34% for the two sectors. Even though financing of Islamic banks in Bahrain are considered to be more diversified than in Malaysia and Indonesia, the Central Bank of Bahrain always considers the concentration of financing by Islamic banks a critical issue of concern. The concern is always reflected in its Financial Stability Reports.

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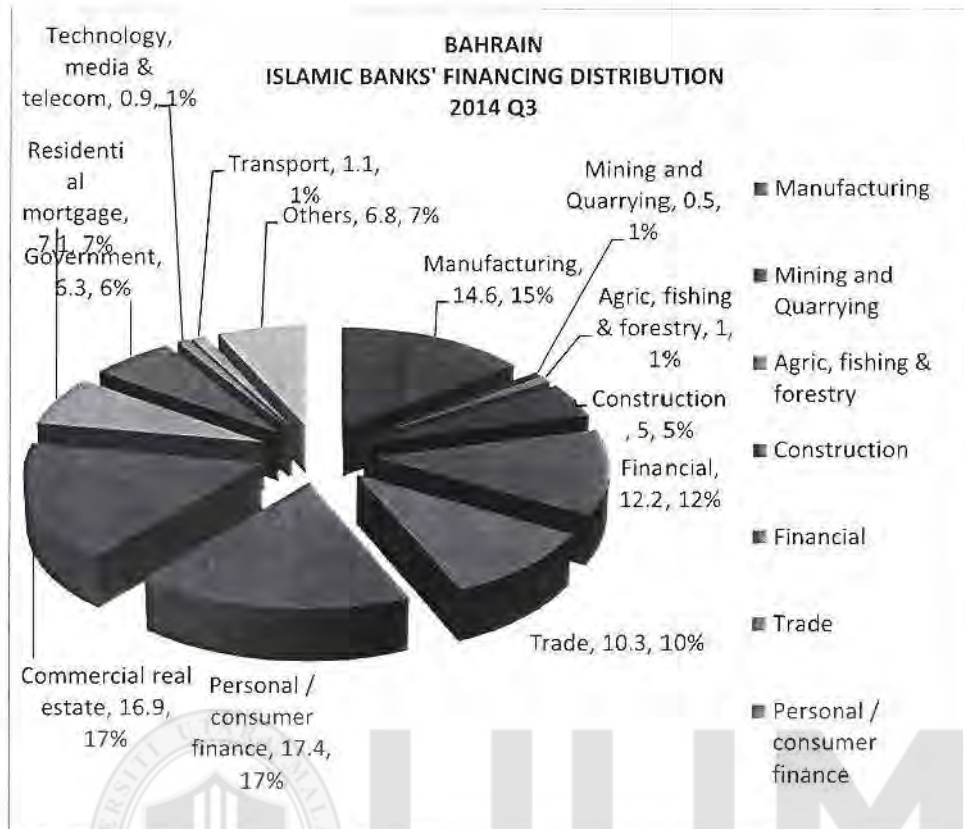
Figure 4.31
Sectoral distribution of financing of Islamic banks in Bahrain (2014Q3).
Source: Data from the Central Bank of Bahrain Statistical Bulletin Sept 2014

4.6.4 Moral hazard in financing concentration of Islamic banks

Islamic banking has created enormous goodwill because of its potential to provide an alternative to conventional banking. The goodwill arises from the ability of Islamic banking to provide ethical-based and *Sharia*-compliant banking services, particularly to most Muslims. This goodwill enables Islamic banks to generate most of their deposit funds from *Mudharabah* (particularly unrestricted *mudharabah)* investments. Muslims consider Islamic banking as capable of meeting their investment and financing needs within the context of *Sharia*. The Muslim depositors in Islamic

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banks,therefore believe that their banks being ethically-based institutions, would not undertake any investment activities that can jeopardise the safety and *halal* feature of their investments. Violation of this trust is a breach of trust and therefore, creates moral hazard problems.

The results of the HHI computation have shown the existence of concentration in the financing portfolio of the Islamic banks in Malaysia, Indonesia, and Bahrain. Also, the results from the Dynamic OLS estimations and correlation analysis have also confirmed the strong relationship between credit risk and financing concentration of the banks' financing structure. The incidence of financing concentration with a positive relationship with credit risk presents a moral hazard at work. This indicates a violation of the fundamental principles of ethic in business. According to Bozovic (2007), one of the principles of ethics in business is avoiding the conflict between one's interest and that of its business partner. In ensuring the principle enunciated above, Bozovic (2007, p 177) states that "the bank must avoid a high concentration of loans in one industrial branch, sector or field, with the exception of specialised institutions that have this as their core activity". That financing concentration is a moral hazard at work is also supported by Dow (2000). Dow considers a bank's strong focus on profitability to take excessive risk to enhance short-term profitability as a moral hazard problem. The breach of the trust by undertaking investment structure akin to their conventional counterparts which are capable of jeopardising the interest of their depositors, no doubt, raises the issue of moral hazard in the financing activities of Islamic banks.

In summary, the HHI reveals the concentration of financing portfolio by the Islamic banks in the three countries, viz, Malaysia, Indonesia, and Bahrain. The results of the Dynamic OLS estimation show that financing concentration has a direct relationship with the credit risk of Islamic banks in Malaysia. Other variables that are found to have an influence on the credit risks of Islamic banks in Malaysia are interest rates, money supply and credit expansion. In the case of Indonesia, the credit risks of the Islamic banks are found be explained better by other variables such as interest rates, money supply, and credit expansion.

Also, in Bahrain, financing concentration is found to be highly correlated to the credit risks of the Islamic banks and presents an incentive to moral hazard. This result supports the findings of Hellmann, et al. (2000), Hooks and Robinson (2002) and Rosly and Zaini (2008). This is further supported by the moral hazard hypothesis by Berger and De Young (1997) who argues that moral hazard occurs when excessive risk-taking takes place when the party that bears the risk or loss from the risk cannot monitor or prevent that risk-taking by the other party. According to Berger and De Young (1997) under moral hazard hypothesis, banks with relatively low capital have higher incentive to increase the riskiness of their loan portfolio which usually results in nonperforming loans than the banks with a higher level of capital. Applying this hypothesis to the very nature of Islamic finance based on PLS under which; investment account (*mudarabah*) deposits are not principal-guaranteed, incentives for moral hazard can, therefore, be observed. Rosly and Zaini (2008) observe that Islamic banks leverage on *mudarabah* deposits up to 80% of their capital. If any Islamic bank, therefore, suffers financial crisis arising from large scale repayment defaults,

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theoretically, the depositors would bear the loss. This, therefore, provides an incentive for moral hazard. This becomes more obvious because, under Sharia, according to Ariff and Rosly (2011), an Islamic bank as a *mudarib* is not required to hold capital.

4.7 Summary of the chapter

The chapter provides the empirical results of the determinants of the credit risks of Islamic banks in Malaysia, Indonesia, and Bahrain. Estimation of the ARDL models was conducted; analysis and interpretation of the results are provided. The comparative analysis of the effects of the individual explanatory variables on the credit risks of the banks in each of the countries is provided. The effects of conventional interest rates on the rates of return on and the size of deposits of Islamic banks were empirically analysed and found to be significant in the three countries. In addition to finding conventional interest rates having effects on the rates of return on deposits of Islamic banks and the deposit size of the banks, the study also establishes the existence of causality between the conventional interest rates and rates of return on Islamic deposits as well as the deposit size.

The existence of moral hazards denoting issues bordering on ethical questions was also established by the presence of financing concentration in household and consumers' sectors of two of the three countries viz, Malaysia and Bahrain. Financing concentration was found to be positively and significantly related to the credit risks of the Islamic banks in Malaysia and Bahrain. The result of financing concentration in Indonesia was found to be different. Meaning that credit risks of Islamic banks in Indonesia might have been explained more by such variables like liquidity, real

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income, money supply and exchange rate rather than financing concentration during the period of the study.

Financing-deposit ratio (FDR) reflects the way the banks structure their financings with their deposit profile. Financing-deposit gap has been found to be an important determinant of credit risks of Islamic banks in the three countries. Other determinants of credit risks of the Islamic banks in these countries are real income and the level of economic activities (GDP), money supply in the economy (LRM), conventional interest rates (IR), and exchange rate movements (EXC).

The implications of these findings are that Islamic banks must always monitor and manage those factors that specific to the banks and therefore, within their control. These factors are optimal diversification of their financing and appropriate financing-deposit ratio. As for the macroeconomic variables, the banks must at all times analyse their impacts on their risk assets both in the short-run and in the long-run and align their financing in such a way to recognise the potential risks associated with the prevailing macroeconomic environment. This will avail the banks the opportunity to take proactive measures that can help them hedge potential negative effects on their risk assets.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the study findings

The objectives of the study are designed to investigate the factors that explain the credit risks of Islamic banks in the course of the performance of their financial intermediation functions. The study was conducted within the dual banking environments in Malaysia, Indonesia, and Bahrain. The study period is from the first quarter of 2007 to the second quarter of 2015.

In order to achieve the broad objectives, the study attempts to analyse some specific objectives. In particular, it examines the relationship between the interest rates on the deposits of the conventional banks and rate of return on the deposits of Islamic banks in Malaysia, Indonesia, and Bahrain. This is to enable us to know the influence which conventional interest rate on deposits has on the formation of the rates of return or rates of profit paid by Islamic banks on the deposits accounts with them. The objective is further to investigate the impact of interest rate and rate of return on the size of deposits of Islamic banking in Malaysia, Indonesia and Bahrain. Since Islamic banks engage in the business of financial intermediation, they can only perform this role by taking deposits from the surplus units to finance the deficit units of the economy. The conventional interest rate, given its influence on the rates of return on the deposits of Islamic banks, could have explanatory power on the size of deposits of Islamic banks. Similarly, whatever happens to the deposit portfolio of a bank has great consequence for the credit risk of the bank. Deposit inflow to the banks and the

cost of the fund on these deposits determine the capacity of the banks to meet the financing requests of their customers. The cost of funds to the banks also determines the cost of financing to their customers. Therefore, investigation of the cost of deposits and the size of deposits of Islamic banks is an objective of the study towards the understanding of the determinants of the credit risks. The next specific objective is to investigate the relationship between interest rate, real income, money supply exchange rate and the credit risk of Islamic banking in Malaysia, Indonesia, and Bahrain and their effects on the credit risk.

The Third objective is to examine the long-run relationship between the financing-deposit gap and the credit risks of Islamic banks. The availability of fund through regular deposits is essential to the quality of risk assets of banks. It is, therefore,important to investigate the extent to which Islamic banks are able to carry out their financing activities from their customers' deposits. The final objective of the study is to determine the effects of factors such as financing concentration, conventional lending rates, real GDP, money supply and exchange rates on the credit risks of Islamic banks within the context of a dual banking system.

In order to attain the stated objectives, the study employs ARDL Bound Testing Approach to cointegration to investigate the relationship between the interest rates on conventional banks' deposits and the rates of return of Islamic banks over the period 2007 to 2015. As a follow up to the tests of cointegration, the study went further to determine the effects of each of the dependent variables, viz, conventional interest rates, real income, and money supply on the rates of return of Islamic banks. This is

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achieved by estimating the ARDL long-run coefficients. The essence of the investigation is to determine the existence and the direction of the influence of conventional interest rates and other independent variables on the determination of rates of return on the deposits of Islamic banks. To further understand the impacts of the independent variables on the rates of return on deposits of Islamic banks, the study employs Toda-Yamamoto Granger Causality tests to determine the direction of causality running among the variables.

Findings indicate the existence of the long-run relationship between the interest rates on the deposits of the conventional banks and rates of return on the deposits of Islamic banks in Malaysia, Indonesia, and Bahrain. In addition to the existence of the long-run relationship, the findings also, reveal the influence of the interest rates on the rates of return on the deposits of Islamic banks across the countries. Also, the findings establish the existence of causality running between the two variables. The findings support the findings of several earlier studies (Cevik & Charap, 2011; Erge & Kaytanci, 2014; Obiyathulla, 2004; Obiyathulla, 2008; Zainol & Kassim, 2012).

For the Islamic banks in Malaysia, the finding shows bidirectional causality running between the interest rates on deposits of conventional banks and the rates of return on the deposits of Islamic banks. This implies that movements of the rates of return on the deposit of Islamic banks are caused by the trend in the movements of the interest rates on the deposits of conventional banks in Malaysia. Similarly, the direction of the movements of the conventional deposits interest rates is also found to be caused by the direction of the rates of return on deposits of Islamic banks. This means that

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deposit holders and banks in Islamic banking sector and their counterparts in the conventional banking sector of the Malaysian banking sector do react to and are influenced by the rate movements in the two segments of the banking sector.

In the case of Indonesia, the findings also reveal the existence of the long-run relationship between the rates of return on deposits of Islamic banks and the interest rates on deposits of conventional banks similar to the findings in Malaysia. However, unlike the finding in Malaysia, the causality between the rates of return on deposits of Islamic banks and the conventional deposit interest rates is unidirectional in Indonesia. This implies that it is the interest rates that seem to have greater causality impact on the rates of return on deposits of Islamic banks.

Similarly, for Bahrain, the findings reveal the existence of the long-run relationship between the interest rates and the rates of return on the deposits of Islamic banks. The results also indicate a bidirectional causality running between the two variables. This implies that both the rates of return on deposits of Islamic banks and interest rates on deposits of conventional banks have a causal effect on each other in Bahrain's deposit market. The results, therefore suggest a very strong relationship between the rates of return of Islamic banks and deposit interest rates of conventional banks in Malaysia, Indonesia, and Bahrain.

The results of the Bound Tests indicate the existence of the long-run relationship between the size of the deposits of Islamic banking and rate of return on the deposits, conventional interest rates, and real income in Malaysia, Indonesia, and Bahrain. For the effects of the individual variables on the deposit size, evidence from ARDL long-

run coefficients reveals that for Malaysia, the conventional interest rate is inversely related to the size of the deposits of Islamic banking and significant at 1% level. This finding suggests that inflow of deposits to Islamic banks reacts negatively to the changes in the rates of interest on the deposits of conventional banks. This implies that a fall in the rates of interest on deposits of the conventional banks led to an increase in the size of the deposits of Islamic banks. On the other hand, an increase in the rates of interest of the deposits on the conventional banks tends to lead to the decline in the size of the deposits of Islamic banks.

A similar pattern to the trend in the Malaysian deposit market was also found in Indonesia. The result indicates the existence of the long run relationship between the size of the deposits of Islamic banking and interest rates on conventional banks' deposits in Indonesia. The interest rate on the deposits of the conventional has a negative and significant relationship with the size of the deposits of Islamic banking at 1% level. This suggests that increase (decrease) in the size of the deposits in Islamic banks were explained in part, by the fall (rise) in the conventional banks' deposit rates. Similarly, the findings also indicate the existence of the long-run relationship between the size of deposits of Islamic banks and the interest rates in Bahrain. As it has been found in Malaysia and Indonesia, the interest rate on deposits of conventional banking in Bahrain is also negatively related to the size of the deposits of Islamic banking and similarly significant at 1% level. The results also reveal the causality power of conventional interest rates on the size of the deposits of Islamic banks in these countries. The results support the findings of (Haron & Ahmad, 2000; Kasri & Kassim, 2008).

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To determine the effects of the financing-deposit gap represented by the financing/deposit ratio on the credit risks of the Islamic banking in each of the countries the study also employs ARDL Bound Testing approach to cointegration. The findings show that financing-deposit gap is an important predictor of the credit risks in Malaysia and Bahrain. The results indicate that financing-deposits gap in Islamic banking in Malaysia is positively related to the credit risks (CR) of the banks and significant at 10% level. For Bahrain financing-deposit gap is positively related to the credit risks of Islamic banking at 1% significance level. It, therefore, follows that a high proportion of financing portfolios of the banks relative to the deposits inflows led to an increase of the credit risks of the banks. The practical implication of this is that the banks engaged in credit expansion faster than the inflow of loanable funds from deposits. In addition to the financing-deposits gaps, the findings also indicate that real income, interest rates, and exchange rates are important determinants of credit risk in Malaysia and Bahrain.

For the Islamic banks in Indonesia, financing-deposit gap shows a significant but negatively related to the credit risks of Islamic banks. The result in Indonesia is against the apriori expectation of a positive relationship between credit risk and financing-deposit ratio. The result in Indonesia suggests that the focus of financing concentration in business sector by Islamic banks rather than household and consumer sectors might have caused opposite impacts as compared with Malaysia and Indonesia.The findings thus indicate that credit risks in Islamic banks in the country were caused by factors other than the financing-deposit gap. However, real income

and exchange rates are found to be significant and negatively related to the credit risk in Indonesia. The findings, therefore, conclude that financing-deposit gap, real income, money supply, interest rates and exchange rates, all have a long-run relationship with, and are major determinants of the credit risks of Islamic banking in these countries.

Evidence from the result of the Dynamic OLS tests indicates the existence of the long-run relationship between the credit risks and financing concentration in Malaysia and Bahrain. In addition to the long-run relationship among the variables, the findings reveal the explanatory power of the individual variables in explaining the credit risks of Islamic banks in each of the countries. The study finds financing concentration as an important determinant of the credit risks in Malaysia and Bahrain. In Malaysia, financing concentration is positively related to the credit risks of Islamic banks and significant at 5% level. For Bahrain, the correlation coefficient between financing concentration and the credit risk of Islamic banks is very high (0.99). Whereas financing concentration appears to have less effect on the credit risks of Islamic banks in Indonesia. The other factors that evidence from the results suggests to be determinants of the credit risks of Islamic banks are conventional interest rates, money supply, real income, and credit expansion.

The study concludes that finding of financing concentration as an important determinant of credit risk presents the existence of moral hazard in the prevailing practices of Islamic banking in these countries within the study period. This is because the fundamental principles of ethics in business have been violated.

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According to Bozovic (2007), one of the principles of ethics in business is avoiding the conflict between one's interest and that of its business partner.

Bozovic (2007, p 177) states that in ensuring the principle ethics in business, "the bank must avoid a high concentration of loans in one industrial branch, sector or field, with the exception of specialised institutions that have this as their core activity". That financing concentration is a moral hazard at work is also supported by Dow (2000). Dow considers a bank's strong focus on profitability to take the excessive risk as a moral hazard problem. This is further supported by the moral hazard hypothesis by Berger and De Young (1997) who argues that moral hazard occurs when excessive risk-taking takes place when the party that bears the risk or loss from the risk cannot monitor or prevent that risk-taking by the other party. According to Berger and De Young (1997) under moral hazard hypothesis, banks with relatively low capital have higher incentive to increase the riskiness of their loan portfolio which usually results in nonperforming loans than the banks with a higher level of capital. Therefore, undertaking financing with a skewed structure which is capable of jeopardising the interest and trust of their depositors, no doubt, raises the issue of moral hazard in the financing activities of Islamic banks.

5.2 Contributions of the study

Credit risk has remained one of the most important risks banks and other financial institutions face in the course of their financial intermediations. The recognition of this importance has generated a lot concerns to financial institutions and regulatory authorities. This concern has also raised interests among researchers to investigate the determinants of the credit risks in financial institutions. Many research efforts have

also been carried out in the area of the credit risk of Islamic banking. The research effort to investigate the determinants of the credit risks of Islamic banking on a cross-country basis is still in infancy. The contributions of the present study in investigating the factors that determine the credit risks of Islamic banking are as follows:

First, studies on the investigation of the determinants of the credit risks in the conventional banking are diverse in the literature. However, in the Islamic banking system, studies on the determinants of credit risk have largely been concentrated on individual countries. The present study has, therefore, extended the argument by investigating the determinants of the credit risks of Islamic banking on a cross-country basis. The essence is to identify the response of the credit risk in Islamic banks to the same set of variables in different countries. The choice of the countries (Malaysia, Indonesia, and Bahrain) for the study is very significant in term of the strategic positions they occupy in the growth and development of the contemporary Islamic financial system. Also, more importantly, the success or failure of Islamic banking and finance globally will largely depend on what happens in these countries. The new finding is premised on the fact that the countries are subjected to the same parameters within the same study period. Conventional deposit interest rates are found to dictate the rates of return on the deposits of Islamic banks across the three countries. Changes in the size of deposits of Islamic banks in all the three countries are also found to be explained by conventional deposit interest rates. Similarly, conventional bank lending rates are also found to be important determinants of the credit risks in all the three countries. Financing concentration, for the first time, is

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empirically found to be an important determinant of the credit risks of Islamic banks in Malaysia and Bahrain.

Financing concentration, real income, conventional interest rates, money supply, credit expansion, financing-deposit gap and exchange rates are found to be important determinants of the credit risks of Islamic banking in Malaysia, Indonesia, and Bahrain. However, there are appear to be some factors specific to each country as not so important as determinants of the credit risk of Islamic banks in that country. For example, exchange rate appears not to play a significant role in the determination of the credit risk of Islamic banks in Malaysia, during the study period. In the case of Indonesia, the credit risks of Islamic banks could not be explained by financing concentration while the money supply could not explain the credit risk of Islamic banks in Bahrain.

Second, in terms of methodological approach, earlier studies in this area have employed such methods such as VAR and VECM to examine the long-run relationship between the credit risks of Islamic banks and a set of selected variables. However, these methods are only applicable if all the variables are integrated of order one I(1). Therefore, ARDL Bound Testing Approach to cointegration has been employed in this study because of its superiority over the other methods of analysing integration. ARDL is also considered more appropriate for this study because of the different orders of integration of the time series data employed.

In addition, the study employs Dynamic OLS approach to cointegration. Dynamic OLS is also employed DOLS, according to Masih and Masih (1996) is a robust

procedure to model long-run relationships. Among the advantages of DOLS is that it is a single equation method of estimation with the ability to allow for variables integrated of alternative orders. It has the capacity to eliminates the problems of simultaneity amongst regressors. DOLS is considered to be very efficient in solving the problems associated with endogeneity and biases often experienced in small samples estimations (Jackman & Lorde, 2010; Masih & Masih, 1996; Stock& Watson, 1993).

Third, the few studies that have investigated credit risks of Islamic banking had neither considered financing concentration as an important predictor of the credit risk nor considered it as presenting evidence of moral hazard. The findings of the present study have been able to identify financing concentration, for the first time, as an issue of moral hazard. The moral hazard or ethical question aspect of the findings emanates from two perspectives.

First, the belief and trust, Muslim depositors have in Islamic banks that they (Islamic banks) would not only be *Sharia* complaints in their operations but would also avoid any financing or investment activities that would expose them to financial crises. Even, banks, under the common laws, owe a fiduciary duty to their customers not only by protecting their assets but also to advise them on how to manage these assets where necessary. To this end, therefore, Islamic banks owe more to their customers by allowing *maslahah* as the guiding principle of their investments. After all, the prohibition of usury (*riba*), excessive ambiguity or uncertainty (*gharar*) and gambling (*maysir*) is to ensure and protect the interests and benefits of the society (*maslahah*).

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Therefore, the concentration of financing to the household sector and on consumer goods by the Islamic banks in Malaysia and Bahrain respectively raises the issues of moral hazard as it (financing concentration) has been found to be positively and significantly related to the credit risk of the banks during the study period. Private actions of the banks, therefore, generate information asymmetry and thus raising the issue of moral hazard and ethical questions in financing concentration by Islamic banks. Islamic banking as a brand of ethical banking should, at all times, be devoid of excessive ambiguity that is capable of leading to credit risks of the banks and instability of the whole financial system. The evidence that existence of financing concentration is established in Malaysia, Indonesia and Bahrain and that financing concentration is also found to have a positive relationship with the credit risk of the banks in Malaysia and Bahrain provide the evidence of the presence of moral hazard in Islamic banking.

Secondly, incentives for moral hazard can be generated from the very nature of Islamic finance based on PLS. under the rules; investment account (*mudarabah*) deposits are not principal-guaranteed. Rosly and Zaini (2008) observe that Islamic banks leverage on *mudarabah* deposits up to 80% of their capital. If any Islamic bank, therefore, suffers financial crisis arising from large scale repayment defaults, the first casualty would be the depositors. However, a well-diversified financing portfolio would not suffer defaults at the same rates a concentrated portfolio would, in event of a negative macroeconomic shock. This finding is supported by Hooks and Robinson (2002) also argues that evidence of the existence of loan concentration by banks is consistent with the presence of moral hazard incentive.

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Table 5.1:

Summary of findings, conclusions and contributions

Summary of findings, conclusions and contributions

Objective	Finding	Conclusion	Contribution
Objective 1 To examine the relationship between interest rate and the rate of return on the deposits of Islamic banking and their effects on the size of deposit of Islamic banks in Malaysia, Indonesia, and Bahrain	Findings indicate the existence of the long-run relationship between the interest rates on the deposits of the conventional banks and rates of return on the deposits of Islamic banks and that both ROR and IRD have positive and significant with the the size of the deposits of Islamic banking in Malaysia, Indonesia, and Bahrain	The study concludes that there is evidence of the influence of the interest rates on the rates of return on the deposits of Islamic banks across the countries. Similarly, the study concludes that interest rate affects the size of the deposit of Islamic banks in Malaysia, Indonesia, and Bahrain. These findings support findings in some previous studies (Cevik & Charap, 2011; Erge & Kaytanci, 2014; Obiyathulla, 2004; Haron& Ahmad, 2000; Kasri& Kassim, 2008). Zainol & Kassim, 2012).	The present study's contribution to the literature further strengthens the findings of some previous studies that interest rate has influence over the rate of return (rate of profit) paid on the deposits of Islamic banks. The study furthermore establishes the role of interest rate in influencing the dynamics in the size of the deposits of Islamic banking.

Objective	Findings	conclusion	contribution
Objective 2			
To investigate the long-run relationship between financing-deposit gap, real income, money supply exchange rate and the credit risk of Islamic banking in Malaysia, Indonesia, and Bahrain and their effects on the credit risk.	The results indicate financing-deposits gap in Islamic banking in Malaysia to be positively related to the credit risks (CR) of the banks and significant at 10% level. For Bahrain,the financing-deposit gap is also positively related to the credit risks of Islamic banking at 1% significance level. Similarly, money supply is found to have negative but significant relationship with the credit risk of Islamic banking in Malaysia and Indonesia. Real income and exchange rate are found to be important determinants of the credit risk of Islamic	The study concludes that financing-deposit gap is an important predictor of the credit risks in Malaysia and Bahrain. The results indicate that financing-deposits gap in Islamic banking is positively and significantly related to the credit risks (CR) of the banking in Malaysia and Bahrain. However, the study could not find evidence of a relationship between the thefinancing-deposit gap and the credit risk of the Islamic banking in Indonesia. This finding, the study suggests may have resulted from the type of the sector	The present study has further expanded the literature on the credit risk of Islamic banking by empirically establishing the important link between deposit and credit risk of Islamic banking.

	banking in Indonesia and Bahrain; However, not significantly related to the credit risk of Islamic banking in Malaysia. For the Islamic banking in Indonesia, financing-deposit gap shows a different sign. It is significant but negatively related to the credit risks of Islamic banks.	(business sector) in which the banks concentrated their financing in Indonesia during the period under review.	
Objective 3 To determine the long-run relationship between financing concentration, interest rate, money supply, credit expansion and inflation on the credit risks of Islamic banking	Evidence from the result of the Dynamic OLS tests indicates the existence of the long-run relationship between the credit risks and financing concentration in Malaysia and Bahrain. However, in the case of Indonesia, financing	The study concludes that financing concentration is one of the factors that determine the credit risk of Islamic banking in Malaysia and Bahrain during the period under review. This supports the findings in many previous studies	The contribution of the present study to the literature on the credit risk of Islamic banking clearly shows that effect of financing contribution on the credit risk of Islamic banking is largely

in Malaysia, Indonesia, and Bahrain	concentration has a negative relationship with the credit risk of Islamic banks. Furthermore, interest rate and credit expansion are also found to be positively and significantly related to the credit risk of Islamic banking in these countries. Inflation, on the other hand, is found to have a negative and significant relationship with the credit risk of Islamic banks in Indonesia and Bahrain during the period under review.	albeit, on conventional banking that conclude that diversification lower cost, reduce credit risk and improve profit efficiency (Hooks & Robinson, 2002; Rossi, Schwaiger & Winkler, 2009).	determined by the sector of the economy where concentration takes place.
Objective 4 To determine the presence of moral hazard arising from the financing concentration	The finding of the study that financing concentration is an important determinant of credit risk presents the existence of moral hazard in the	The study concludes that financing concentration having a positive relationship with the credit risk of the banks in Malaysia	The study has further enriched the literature on the credit risk of Islamic banking by showing that moral hazard in

in Islamic banking in Malaysia, Indonesia and Bahrain.	prevailing practices of Islamic banking in these countries within the study period.	and Bahrain provides the evidence of the presence of moral hazard in Islamic banking. This supports the finding in (Berger & De Young, 1997; Dow, 2000; Hellmann, Murdock, & Stiglitz, 2000)	Islamic banking derives from two sources: 1, The implicit trust, Muslim depositors have in the management of Islamic banks that they will always safeguard their investments according to the *Sharia* principles. 2, The nature of Islamic financing based on PLS which presumes that Islamic bank as a *mudarib* is not required to hold capital (Ariff & Rosly, 2011).

5.3 Conclusions and Practical Implications

The practical implications of the findings are numerous for the various stakeholders such as investment account holders, bank managements and regulatory authorities. The finding of the study that the rates of return on deposit of Islamic banks and the size of deposits are significantly linked with interest rates of the conventional banks supports the findings of many earlier studies (Anuar, et. al, 2014; Ergec & Kaytanci,

2014; Haron & Ahmad, 2000; Haron & Azmi, 2008; Kasri & Kassim, 2009; Obiyathulla, 2004; Obiyathulla, 2008; Takayasu, 2013; Zainol & Kassim, 2012;).

The findings further indicate that gap continues to exist between the Sharia principles and the actual practices of Islamic Financial Institutions. This contradicts the theoretical expectation of Islamic banking and finance based on Sharia's prohibition of payment and receipt of interest rate anchored on the warning from Allah (Qur'an 2: 278 – 279). This is further reinforced by the saying of the Prophet (may peace be upon him) as reported by Abu Sa'id al-Khudri who reported Allah's Messenger (PBUH) as saying: "You would tread the same path as was trodden by those before you inch by inch and step by step so much so that if they had entered into the hole of the lizard, you would follow them in this also…"(The *Hadith*, n.d).

The benchmarking of many Islamic banking products by conventional interest rates has become an issue of great concern among Muslim banking public, Islamic researchers and many non-Muslim researchers in the field of Islamic banking and finance. This is more so as most Muslim deposit customers of Islamic banks keep their monies with the banks in order to screen their wealth from the effects of interest rate. Islamic banks, therefore, owe these customers fiduciary duty to protect them from receiving incomes that can be the subject of controversy.

In the same manner, benchmarking of financing products of Islamic banks by conventional lending rates, in real terms, denies the banks from earning an optimum return through profit sharing. The yield from fixed charged financing rates in most

cases could be much lower than the yield from shares of profit. This supports the finding of Rosly and Zaini (2008). This may, in fact, explain the reluctance of profitable business organisation to fund their businesses through profit and loss arrangements. Rather they prefer to source their financing funds from fixed rate charges funds. This is because the fixed rate charges can be treated in their income statements as operating expenses and thus tax deductible. Whereas, the share of profit is an appropriation which does not enjoy the tax advantage the fixed charge rates enjoy.

The study, therefore, concludes that interest rates on the deposits of conventional banks in Malaysia, Indonesia and Bahrain have a long-run relationship with the rates of return on the deposits of Islamic banks. Interest rates, indeed, exhibited causality power over the rates of return of Islamic banks in these countries. These empirical findings confirm the prevailing practices of the Islamic banks benchmarking their services with the conventional interest rates.

A pertinent point to note here is the fact that the yield on the deposit of Islamic banks (investment accounts) does not reflect the risk it carries. Rosly and Zaini (2008) in their study of risk-return analysis of Islamic banks' deposits conclude that "the large discrepancy between ROMD and ROE in Islamic banking seems to imply that *mudarabah* deposits have been treated in a similar fashion to fixed deposits, where banking risks are entirely borne by the bank's capital" (p. 706). These findings further reveal the existence of the contradictions in the contemporary practices of Islamic

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banking with the theoretical expectation under the *Sharia* principle of transactions anchored on profit and loss sharing arrangements.

It is, therefore, recommended that in order to comply with the injunctions of Allah and observe the warning of the Prophet (saw), Islamic banks have to keep away from benchmarking rates of return on deposits of Islamic banks with the conventional interest rates. Observance of interest rates prohibition, by Islamic banks, has to be both in form and in substance. Islamic banks should give returns on Islamic deposits (investment accounts) that reflect the risks the accounts carry.

Therefore, efforts have to be intensified towards finding solutions towards making profit and loss sharing mode of financing come with an acceptable level of risk to the banks and attractive to investors as a profitable source of fund. Whereby returns obtained through profit-loss sharing principle or any other Sharia compliant investments would largely depend on the performance of such investments. Returns on deposits of Islamic banks, therefore, could be more volatile than the conventional interest rates that are fixed ex-ante but in most cases would yield higher returns as it would be based on the profit made ex-post.

The findings also indicate a positive and significant relationship between the conventional banks' lending rates and the quality of risk assets of Islamic banks. Since financing rates of Islamic banks are referenced to the conventional banks' lending rates, an increase in the interest rates in the conventional credit markets would raise the financing rates in the Islamic banking credit markets as well. Rising cost of

funds to investors can impair their ability to meet their financial obligations to their creditors as at when due. The consequence of this is the possibility of an increase in default rates and the risk of non-performing financing. Therefore, Islamic banks should engage in a collaborative effort among themselves to undertake research into finding solutions to the problems that make profit and loss financing risky to the banks and unattractive to high-net-worth investors.

Similarly, the study concludes that financing-deposit gap is a strong predictor of the credit risk in Islamic banking. Deposits are the major sources of funds for the banks' intermediation functions. Formation of banks' credit risks can, therefore, be influenced by the way banks carry out their financing activities relative to the size, the mix and the tenure of their deposit portfolio. Anytime financing runs faster than deposit inflow, it creates liquidity gap within the system. More so, banks' deposits are usually short term while banks' financing is usually long term. Furthermore, heavy reliance of Islamic banks on deposit as an important source of financing is considered as not healthy (Sukmana & Kassim, 2010). If the financing-deposit gap is not properly managed it creates a mismatch between the assets and liabilities of the bank. The financing-deposit gap often puts banks under pressure to source deposits at high costs. High-cost funds can only be extended to low-quality investors who are desperate to source funds at any cost. This type of financing often leads to non-performing financing thereby creating a credit risk for the banks.

Therefore, in order to avoid the negative impact of a financing-deposit gap on the credit risk; Islamic banks should design appropriate incentive package that will attract

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deposits into investment accounts on the basis of *mudharabah* of tenure longer than the usual one month, three, six and twelve-month tenures. Over-reliance on short-term funds to finance long-term investments will always create mismatch which can crystallise into credit risk and eventual financial crisis. Islamic banks should operate rather more as investment banks than retail banks.

Furthermore, evidence from the findings of the study; also indicates that financing concentration is a predictor of the credit risk in Islamic banking. Financing concentration, therefore, could be worrisome particularly, if it occurs in sectors that can be impacted by shocks from macroeconomic factors. The findings that financing concentration is observed largely in the household sector in Malaysia and consumer sector in Bahrain could, therefore, be of great concern. The evidence that existence of financing concentration is established in Malaysia, Indonesia and Bahrain and that financing concentration is also found to have a positive relationship with the credit risk of the banks in Malaysia and Bahrain provide the evidence of the presence of moral hazard in Islamic banking. Incentives for moral hazard can be generated from the very nature of Islamic finance based on PLS. under the rules; investment account (*mudarabah*) deposits are not principal-guaranteed. Rosly and Zaini (2008) observe that Islamic banks leverage on *mudarabah* deposits up to 80% of their capital. If any Islamic bank, therefore, suffers financial crisis arising from large scale repayment defaults, the first casualty would be the depositors. The very nature of *mudarabah* deposits, theoretically under Sharia, that it is non-principal-guaranteed and that in the case of loss; the depositors bear the entire loss may, in fact, provide an incentive for moral hazard. This becomes more obvious because, under Sharia, according to Ariff

and Rosly (2011), an Islamic bank as a *mudarib* is not required to hold capital. This is further supported by the moral hazard hypothesis by Berger and De Young (1997).

However, a well-diversified financing portfolio would not suffer defaults at the same rates a concentrated portfolio would, in event of a negative macroeconomic shock. This finding is supported by Hooks and Robinson (2002) also argues that evidence of the existence of loan concentration by banks is consistent with the presence of moral hazard incentive. It has been established that during the boom, the economic environment is favourable and households' incomes are stable. Investors generate good profits and meet their financial obligations to their banks. Therefore, during the economic boom, the credit risks are low. However, when the downturn sets in, business activities become dampened. Businesses close shops, unemployment goes up and household's incomes are negatively impacted and default rates heighten. This is because an economic downturn would have a negative impact on the household's incomes which could lead to credit defaults in a large scale and therefore, trigger financial crises in the economy.

Therefore, Islamic banks should always balance their focus on profitability with the security of their risk assets by ensuring an optimum diversification. Islamic banking system shall continue to retain the goodwill it currently enjoys in the financial market, if only, it's long-run stability is perceived to be beyond doubt. This will further strengthen the confidence and trust, the banking public has in the Islamic banking system and thereby minimises the incidence of moral hazard. The argument in Rosly and Zaini (2008) can be pertinent here, saying "taking risks can lead to profits, as

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well, as losses. On the other hand, since only God knows what lies ahead of the man, risk and uncertainties should be faced with adequate planning, such that all efforts to confront it are pursued without inflicting harm and injury to the society" p. 696. In order to reduce the incentive for moral hazard in banking, Hellmann, Murdock and Stiglitz (2000) make a number of recommendations, among which are, interest rate control as a prudential regulation and asset-class exposure restriction. To this end, AAOIFI (Accounting and Auditing Organization for Islamic Financial Institutions) can set asset-class exposure limits for Islamic banks.

Another finding of the study also reveals that the credit risk grew with the credit expansion policy of the banks, particularly to non-productive sectors. What this implies is that the credit expansion occurred in low-quality investments. It has been established that during the economic boom, competition among banks increases. In order to be competitive, many banks relax their credit rules and adopt expansionary credit policy. The relaxed credit rules allow low-quality investors to be booked. Any change in the economic conditions immediately exposes these customers to the business downturn and consequently, trigger repayment defaults and heightened credit risk. Therefore, Islamic banks should always adopt a conservative approach to credit analysis and credit approval. Post credit disbursement administration is an important part of a good and effective credit administration. Credit should be granted only to the high-credit-worthy investors and properly monitored until it is fully repaid.

In addition to the above bank-specific factors that have been found to explain the credit risks of Islamic banks, the following macroeconomic variables are also found to be important determinants of the credit risks of Islamic banks in the three countries. The study concludes that economic expansion and contraction have a significant relationship with the credit risks of banks. During the economic boom, economic activities are high, credit expansion takes place. In many instances, credit rules are relaxed because of the competitions in the credit market. Usually, it is during the boom period that bad credits are booked. With the downturn of the economy, which is the normal characteristics of the business cycle, the bad credits contracted during the boom period quickly become sticky and credit defaults become heightened.

Banks' managements should, therefore, ensure absolute compliance with their banks' credit policies at every stage of each credit's life. Boards of each bank should always carry out their oversight functions on the administration of their banks' risk assets particularly, during the economic upturn. The banks' regulatory authorities such as central banks and national deposits insurance corporations should step up their oversight supervisory functions over the banks in order to ensure full compliance with the rules, regulations, and standards on banks' credits.

Further evidence from the findings of the study also suggests that liquidity-induced credit risk could result from a monetary policy of the monetary authorities. Monetary authorities control the money supply in the economy by means of expansion or contraction of money supply to the economy. Expansionary policy of the monetary authorities expands the pool of loanable funds for the banks and provides them with

the opportunities to meet the financing requests of their customers. This, *cetereparibus*, would enable the investors to continue their business activities with ease and enable them to pay back to the banks as at when their liabilities become due. On the other hand, a tight monetary policy of the monetary authorities, usually through open market operations, has the effect of withdrawing money from circulation. The effects of this are to reduce banks' deposits and liquidity in the system and thereby impairing the financing capacity of the banks. This leads to a shortage of funds to investors. When this happens, business activities contract and the ability of investors to meet their obligations to their banks also, become impaired. If this becomes prolonged, the effects would, therefore, be default in repayments of credits and hence credit risks in the credit market. This supports Sukmana and Kassim (2010).

Therefore, it is imperative for Islamic banks to establish a very strong and effective assets and liability committee (ALCO) that would manage the banks' assets and liabilities profile with a view to maximising their return on the assets while at the same time minimising their exposure to the various markets risks. Islamic banks should always monitor the macroeconomic policies of the government, most particularly the monetary policy of the monetary authorities and take proactive measures to balance the structure of their assets and liabilities with a view to safeguarding the quality of their risk assets.

The study also concludes that foreign currency exchange rate fluctuation is another important predictor of credit risks of Islamic banks. To understand the actual effect of

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the fall or rise of the exchange rate on the banks' borrowing customers, one need to understand which end of foreign exchange usage, the customers are. For example, an appreciation of the exchange rate of the local currency will benefit import-dependent raw material users and negatively affect the revenue of the export-oriented borrowers. This is because appreciation of the exchange rate of the local currency would have the effect of making local products becoming more expensive in the international market which can, therefore, affect their sales. Equally, a country that is import-dependent will loose from her currency depreciation. Depreciation in the currency of such a country will affect the cost of domestic production, the decline in revenue and impaired ability of investors to make repayment of their credits. On the other hand, if a country is export-oriented, domestic currency depreciation has the potential of boosting their exports and thus increases their revenues and improves the capacities of investors to service their liabilities and thus reduce the credit risks of their banks.

To mitigate the adverse effects of foreign exchange rate fluctuation on the credit risks, the banks should understand the business of their clients. Banks must understand the financial and operational requirements of the business vis-à-vis the macroeconomic environment before the granting of credit facilities. This will enable them to be proactive in putting in place such measures that can hedge the credit risk exposure from exchange rate fluctuations.

Table 5.2:

Discussions and Conclusion

Discussions and Conclusion		
Objective	**Conclusion**	**Implications**
1	The study concludes that there is evidence of the influence of the conventional interest rates on the rates of return on the deposits of Islamic banking across the countries. Similarly, the study concludes that conventional interest rate affects the size of the deposit of Islamic banking in Malaysia, Indonesia and Bahrain. These findings support the findings in some previous studies (Cevik & Charap, 2011; Erge & Kaytanci, 2014; Obiyathulla, 2004; Obiyathulla, 2008; Haron& Ahmad, 2000; Kasri & Kassim, 2008). Zainol & Kassim, 2012).	1, Since the rate of return on the deposit of Islamic banks (investment accounts) co-move with the interest rate, the yield on the investment accounts in Islamic banking does not reflect the risk it carries. This is because, even though, Islamic banking deposit is non-principal guaranteed, it nevertheless shares the same attribute of the conventional interest on deposits that are guaranteed. 2, The influence of the conventional interest rate on the size of the deposit of Islamic banking shows that motivation of most of the deposit account holders in Islamic banks is more of return maximisation than religious motive satisfaction.
2	The study concludes that financing-deposit gap is an important predictor of the credit risks of Islamic banking in Malaysia and Bahrain. The results indicate that financing-deposits gap	A situation where the growth rate of the financing portfolio of a bank is higher than the rate of growth of deposit could curtail the capacity of the bank to meet its customers'

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Objective	Contribution	Implications
2Ctd	in Islamic banking is positively and significantly related to the credit risks (CR) of the banking in Malaysia and Bahrain. The study further concludes that financing-deposit gap did not relate to the credit risk of the Islamic banking in Indonesia. This finding, the study suggests may have resulted from the type of the sector in which the banks concentrated their financing in Indonesia during the period under review	Funding demands. In order to fill the gap banks most often result to short term and usually more expensive sources of fund. Where the cost of fund is high and is passed on to the borrowers, or the tenor of deposits does not match the tenor of the credit granted borrowers, the ground for credit risk is thereby laid.
3	The study concludes that financing concentration is one of the factors that determine the credit risk of Islamic banking in Malaysia and Bahrain during the period under review. This supports the findings in many previous studies albeit, on conventional banking that conclude that diversification lower cost, reduce credit risk and improve profit efficiency (Hooks & Robinson, 2002; Rossi, Schwaiger & Winkler (2009).	Financing concentration could sometimes lead to higher return because of the possibility of better monitoring. However, the risk volatility is high in case of any macroeconomic shock. Following from the findings of the study, concentration of financing increases the chances of the incidence of credit risk in Islamic banking

Objective	Conclusions	Implications
4	The study concludes that financing concentration having a positive relationship with the credit risk of the banks in Malaysia and Bahrain provides the evidence of the presence of moral hazard in Islamic banking. This supports the finding in (Berger & De Young, 1997; Dow, 2000; Hellmann, Murdock, & Stiglitz, 2000)	The findings of the present study have been able to identify financing concentration, for the first time, as an issue of moral hazard.

Moral hazard leads the banks to undertake such financing as financing concentration that potentially creates credit risk with the belief that it is other people that will bear the loss when losses occur. |

5.4 Limitations of the study

The study could not include many bank-specific variables because many of them had been invested in previous studies. This, therefore, could constitute a limitation to the study. The non-availability of the time series data for the countries over a reasonably long period may also constitute a limitation to the study.

5.5 Suggestions for Future Research

In view of the fact that the present study is situated in the countries with the dual banking system, the similar study can, therefore, be replicated in the countries with overwhelming Islamic banking system, such as Iran, Pakistan, and Sudan. Similar studies on cross-country basis can be conducted with the inclusion of many bank-specific variables.

Another area of concern, future research efforts can focus on is the extent of information asymmetry in profit and loss financing in dual banking environments compared with countries with full Islamic legal and financial systems.

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Appendix A: Results of Unit Root Tests

RESULTS OF UNIT ROOT TESTS (MALAYSIA)

CR

Null Hypothesis: CR has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.398412	0.5702
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(CR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.630914	0.0001
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

ROR

Null Hypothesis: ROR has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.439952	0.1394
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Unit root test (MALAYSIA ctd)

Null Hypothesis: D(ROR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.747277	0.0079
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

IRD

Null Hypothesis: IRD has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.354896	0.1625
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(IRD) has a unit root
Exogenous: Constant
Lag Length: 8 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.354275	0.0002
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

Unit root test (MALAYSIActd)

LRM

Null Hypothesis: LRM has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.753961	0.8188
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LRM) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.022815	0.0003
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

LGDP

Null Hypothesis: LGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.006528	0.7394
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Unit root test (MALAYSIA ctd)

Null Hypothesis: D(LGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.308613	0.0001
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

FDR
Null Hypothesis: FDR has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.374735	0.9020
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(FDR) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.765573	0.0006
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Unit root test (MALAYSIA ctd)

EXC
Null Hypothesis: EXC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.688202	0.8361
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(EXC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.379733	0.0016
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

RESULTS OF UNIT ROOT TESTS (INDONESIA)

ROR
Null Hypothesis: ROR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.059354	0.2615
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

RESULTS OF UNIT ROOT TESTS (INDONESIA) ctd

Null Hypothesis: D(ROR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.077066	0.0002
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

IRD

Null Hypothesis: IRD has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.587217	0.0118
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

LRM

Null Hypothesis: LRM has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.507054	0.1236
Test critical values:	1% level	-3.661661	
	5% level	-2.960411	
	10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LRM) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.766713	0.0007
Test critical values:	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

LGDP

Null Hypothesis: LGDP has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.120166	0.9620
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LGDP) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.938290	0.0000
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

RESULTS OF UNIT ROOT TESTS (BAHRAIN)

CR
Null Hypothesis: CR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.227240	0.6507
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(CR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.664815	0.0007
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

ROR
Null Hypothesis: ROR has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.500738	0.1253
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

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RESULTS OF UNIT ROOT TESTS (BAHRAIN) ctd

Null Hypothesis: D(ROR) has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.328042	0.0000
Test critical values:	1% level	-3.670170	
	5% level	-2.963972	
	10% level	-2.621007	

*MacKinnon (1996) one-sided p-values.

IRD

Null Hypothesis: IRD has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.688939	0.0006
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

LRM

Null Hypothesis: LRM has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.099516	0.0040
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

RESULTS OF UNIT ROOT TESTS (BAHRAIN) ctd

LGDP
Null Hypothesis: LGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.568965	0.8643
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LGDP) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.864698	0.0000
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

FDR

Null Hypothesis: FDR has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.047633	0.2662
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

RESULTS OF UNIT ROOT TESTS (BAHRAIN) ctd

Null Hypothesis: D(FDR) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.730437	0.0006
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

EXC

Null Hypothesis: EXC has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.214574	0.9695
Test critical values:	1% level	-3.646342	
	5% level	-2.954021	
	10% level	-2.615817	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(EXC) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=8)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.784511	0.0072
Test critical values:	1% level	-3.653730	
	5% level	-2.957110	
	10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Appendix B: ARDLCointegration Results

ARDLCointegration result (MALAYSIA)

Results of Bound tests

ROR model

ARDL Bounds Test
Date: 08/19/16   Time: 19:29
Sample: 2007Q4 2015Q2
Included observations: 31
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	**5.130393**	**3**

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

ARDL Cointegration and long-run coefficients

ARDL Cointegrating And Long Run Form
Dependent Variable: ROR
Selected Model: ARDL(2, 0, 3, 3)
Date: 08/19/16   Time: 19:29
Sample: 2007Q1 2015Q2
Included observations: 31

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROR(-1))	-0.411910	0.200920	-2.050121	0.0544
D(IRD)	0.111362	0.075137	1.482125	0.1547
D(LRM)	-0.945042	0.531838	-1.776937	0.0916
D(LRM(-1))	-0.294493	0.705093	-0.417666	0.6809
D(LRM(-2))	1.204032	0.498204	2.416745	0.0259
D(LGDP)	1.850061	0.389110	4.754590	0.0001
D(LGDP(-1))	0.465839	0.422378	1.102896	0.2838
D(LGDP(-2))	0.670340	0.367747	1.822828	0.0841
CointEq(-1)	-0.223679	0.117268	-1.907417	0.0717

Cointeq = ROR - (0.4979*IRD -5.0095*LRM + 7.3633*LGDP -42.6224
)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
IRD	0.497867	0.177059	2.811867	0.0111
LRM	-5.009532	3.035214	-1.650471	0.1153
LGDP	7.363298	4.263410	1.727091	0.1004
C	-42.622435	24.337884	-1.751279	0.0960

Diagnostic test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.860910	Prob. F(1,16)	0.3673
Obs*R-squared	1.531786	Prob. Chi-Square(1)	0.2158

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.595604	Prob. F(11,19)	0.8097
Obs*R-squared	7.948642	Prob. Chi-Square(11)	0.7179
Scaled explained SS	1.512303	Prob. Chi-Square(11)	0.9996

MODEL STABILITY TEST (CUSUM TEST)

CUSUM of SQUARES

240
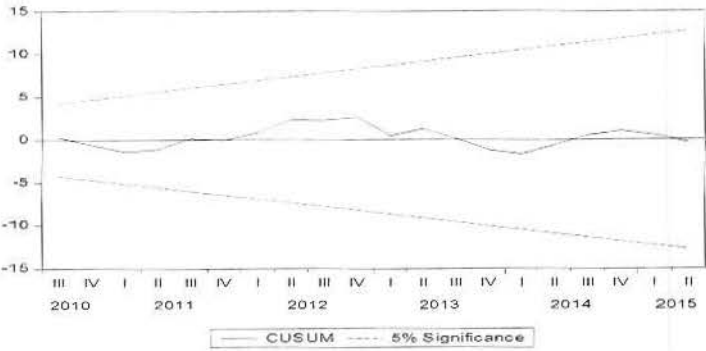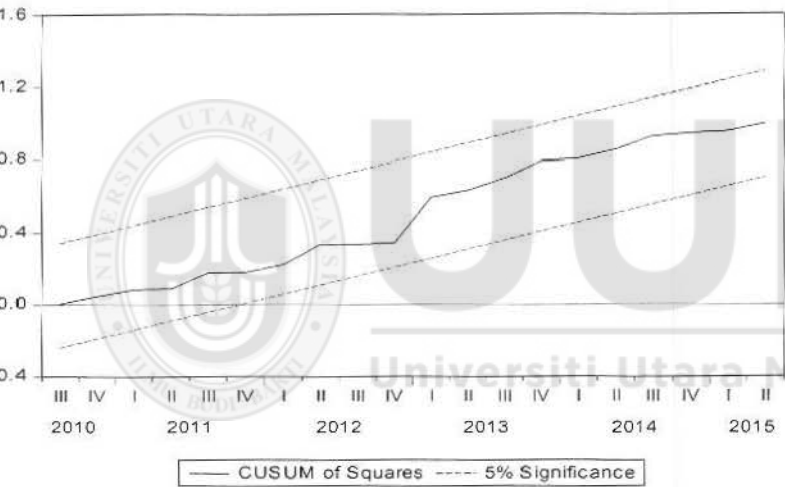
Toda-Yamamoto Causality test

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 08/26/16   Time: 09:22
Sample: 2007Q1 2015Q2
Included observations: 30

Dependent variable: ROR

Excluded	Chi-sq	df	Prob.
IRD	11.27605	3	0.0103
LRM	4.186870	3	0.2420
LGDP	3.711876	3	0.2943
All	14.73879	9	0.0984

Dependent variable: IRD

Excluded	Chi-sq	df	Prob.
ROR	8.534421	3	0.0362
LRM	1.404239	3	0.7045
LGDP	2.286498	3	0.5151
All	9.670414	9	0.3778

Dependent variable: LRM

Excluded	Chi-sq	df	Prob.
ROR	22.69680	3	0.0000
IRD	7.627230	3	0.0544
LGDP	14.64174	3	0.0021
All	32.51963	9	0.0002

Dependent variable: LGDP

Excluded	Chi-sq	df	Prob.
ROR	7.194750	3	0.0659
IRD	2.652796	3	0.4483
LRM	1.276121	3	0.7348
All	18.39660	9	0.0308

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ARDL Cointegration and long-run coefficients (INDONESIA)

ARDL Cointegrating And Long Run Form
Dependent Variable: ROR
Selected Model: ARDL(1, 1, 3, 1)
Date: 08/20/16   Time: 16:29
Sample: 2007Q1 2015Q2
Included observations: 31

	Cointegrating Form			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IRD)	-0.315376	0.242280	-1.301704	0.2078
D(LRM)	0.234504	0.595317	0.393914	0.6978
D(LRM(-1))	0.381560	0.685036	0.556993	0.5837
D(LRM(-2))	0.993528	0.675304	1.471231	0.1568
D(LGDP)	0.580216	6.404663	0.090593	0.9287
D(@TREND())	-0.197346	0.131172	-1.504486	0.1481
CointEq(-1)	-0.568956	0.164796	-3.452481	0.0025

Cointeq = ROR - (0.2957*IRD -2.3662*LRM + 31.4707*LGDP -393.9571
-0.3469*@TREND)

	Long Run Coefficients			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
IRD	0.295723	0.155092	1.906750	0.0710
LRM	-2.366222	0.902368	-2.622235	0.0163
LGDP	31.470709	17.562239	1.791953	0.0883
C	-393.957143	229.170178	-1.719059	0.1010
@TREND	-0.346857	0.238728	-1.452935	0.1618

Results of Bound tests (ROR model)

ARDL Bounds Test
Date: 08/20/16   Time: 16:30
Sample: 2007Q4 2015Q2
Included observations: 31
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.858307	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	3.47	4.45
5%	4.01	5.07
2.5%	4.52	5.62
1%	5.17	6.36

Diagnostic tests

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.809674	Prob. F(1,19)	0.3795
Obs*R-squared	1.267052	Prob. Chi-Square(1)	0.2603

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.376134	Prob. F(10,20)	0.2600
Obs*R-squared	12.63580	Prob. Chi-Square(10)	0.2448
Scaled explained SS	4.234830	Prob. Chi-Square(10)	0.9361

MODEL STABILITY TEST (CUSUM TEST)
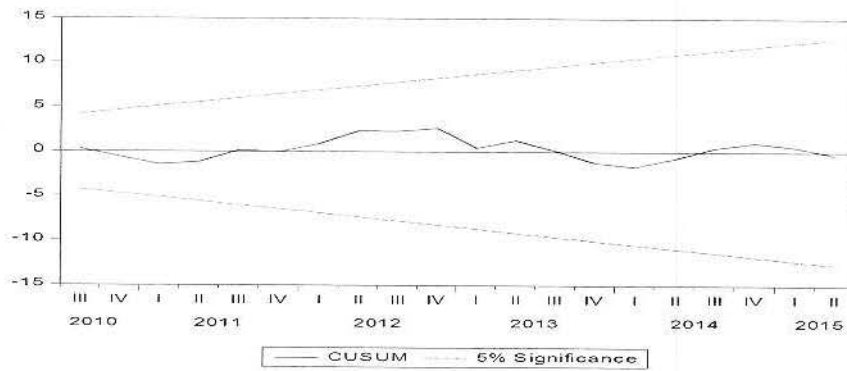
CUSUM of SQUARES

244
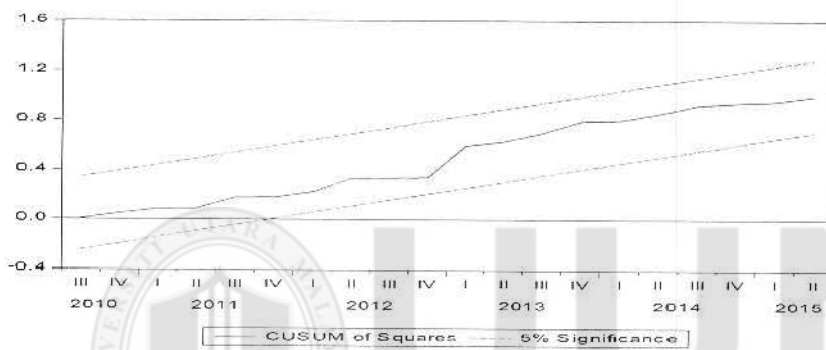
CAUSALITY TEST

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 08/26/16   Time: 10:31
Sample: 2007Q1 2015Q2
Included observations: 28

Dependent variable: ROR

Excluded	Chi-sq	df	Prob.
IRD	9.371558	5	0.0951
LRM	9.117829	5	0.1045
LGDP	6.006167	5	0.3056
All	20.21616	15	0.1638

Dependent variable: IRD

Excluded	Chi-sq	df	Prob.
ROR	6.173707	5	0.2897
LRM	4.019136	5	0.5467
LGDP	11.44609	5	0.0432
All	62.02268	15	0.0000

Dependent variable: LRM

Excluded	Chi-sq	df	Prob.
ROR	16.59064	5	0.0053
IRD	21.60996	5	0.0006
LGDP	16.85656	5	0.0048
All	37.64258	15	0.0010

Dependent variable: LGDP

Excluded	Chi-sq	df	Prob.
ROR	4.400459	5	0.4933
IRD	3.554299	5	0.6152
LRM	3.801864	5	0.5783
All	8.933043	15	0.8810

BAHRAIN

ARDL Cointegrating And Long Run Form
Dependent Variable: ROR
Selected Model: ARDL(4, 0, 0, 3)
Date: 09/30/16   Time: 10:00
Sample: 2007Q1 2015Q2
Included observations: 30

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROR(-1))	-0.023773	0.178961	-0.132837	0.8957
D(ROR(-2))	-0.292361	0.149986	-1.949250	0.0662
D(ROR(-3))	-0.439945	0.141392	-3.111535	0.0057
D(IR)	0.484839	0.206898	2.343372	0.0301
D(LGDP)	0.965478	0.468894	2.059055	0.0535
D(LRM)	2.172395	4.533050	0.479235	0.6372
D(LRM(-1))	-0.733235	4.917865	-0.149096	0.8830
D(LRM(-2))	9.127176	3.398889	2.685341	0.0146
CointEq(-1)	-0.892721	0.219784	-4.061811	0.0007

Cointeq = ROR - (0.5431*IR + 1.0815*LGDP -1.9099*LRM -0.8668)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
IR	0.543103	0.240808	2.255332	0.0361
LGDP	1.081500	0.545334	1.983187	0.0620
LRM	-1.909923	2.705260	-0.706004	0.4888
C	-0.866764	12.048945	-0.071937	0.9434

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.210265	Prob. F(1,18)	0.6520
Obs*R-squared	0.346394	Prob. Chi-Square(1)	0.5562

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.450280	Prob. F(10,19)	0.2328
Obs*R-squared	12.98650	Prob. Chi-Square(10)	0.2244
Scaled explained SS	8.740116	Prob. Chi-Square(10)	0.5569

MODEL STABILITY TEST (CUSUM TEST)
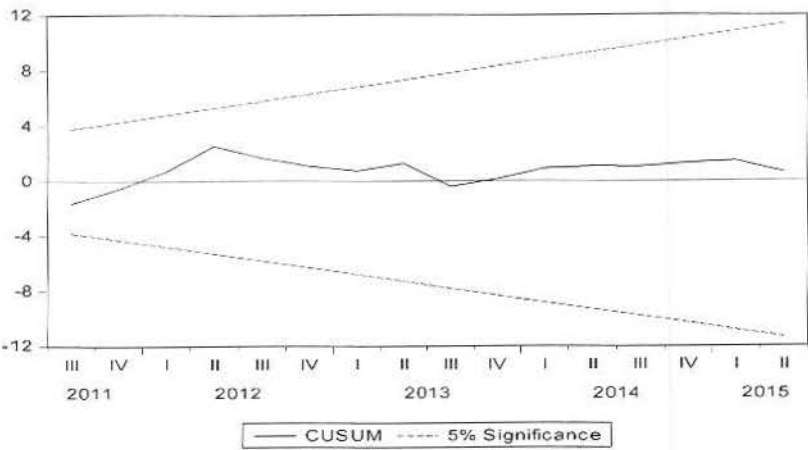
CUSUM of SQUARES
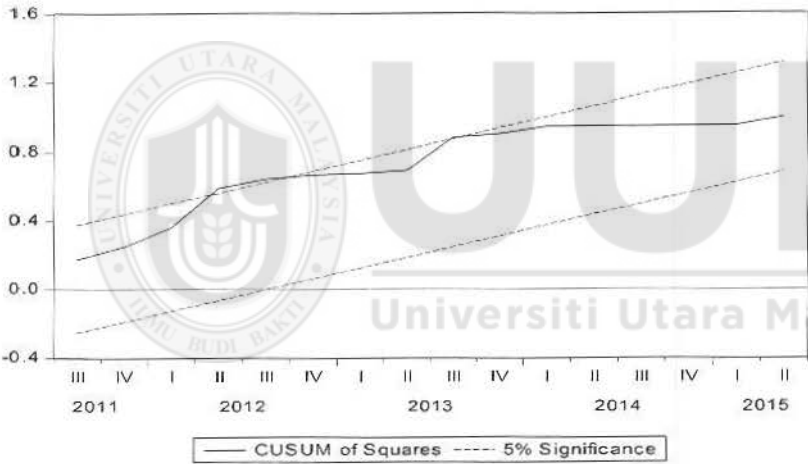
Appendix C: Islamic banks' Deposit-Interest Rate Model

Islamic banks' deposit-Interest rate model

ARDL Cointegration tests results (MALAYSIA)

Bound Test

ARDL Bounds Test
Date: 08/29/16   Time: 22:59
Sample: 2008Q1 2015Q2
Included observations: 30
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	11.94867	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	3.47	4.45
5%	4.01	5.07
2.5%	4.52	5.62
1%	5.17	6.36

ARDL Cointegrating And Long Run Form
Dependent Variable: LDP
Selected Model: ARDL(3, 4, 4, 2)
Date: 08/29/16   Time: 22:59
Sample: 2007Q1 2015Q2
Included observations: 30

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDP(-1))	-0.028003	0.147473	-0.189885	0.8526
D(LDP(-2))	0.176660	0.126904	1.392073	0.1892
D(ROR)	0.089024	0.049484	1.799050	0.0972
D(ROR(-1))	-0.224322	0.061456	-3.650155	0.0033
D(ROR(-2))	0.154248	0.047529	3.245372	0.0070
D(ROR(-3))	-0.127072	0.040937	-3.104067	0.0091
D(IRD)	0.000740	0.028415	0.026039	0.9797
D(IRD(-1))	-0.094791	0.027971	-3.388905	0.0054
D(IRD(-2))	0.067499	0.024345	2.772595	0.0169
D(IRD(-3))	0.038952	0.042222	0.922531	0.3744
D(LGDP)	-0.275462	0.221707	-1.242457	0.2378
D(LGDP(-1))	0.567521	0.151112	3.755629	0.0027
D(@TREND())	0.039212	0.008457	4.636516	0.0006
CointEq(-1)	-0.877880	0.184154	-4.767110	0.0005

Cointeq = LDP - (0.2559*ROR -0.1907*IRD -0.2706*LGDP + 14.7034 +
    0.0447*@TREND)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROR	0.255896	0.079872	3.203826	0.0076
IRD	-0.190725	0.051100	-3.732367	0.0029
LGDP	-0.270619	0.337520	-0.801787	0.4383
C	14.703367	3.938456	3.733282	0.0029
@TREND	0.044666	0.005708	7.825683	0.0000

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.307158	Prob. F(1,11)	0.5905
Obs*R-squared	0.814948	Prob. Chi-Square(1)	0.3667

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.493471	Prob. F(17,12)	0.9108
Obs*R-squared	12.34342	Prob. Chi-Square(17)	0.7789
Scaled explained SS	1.781829	Prob. Chi-Square(17)	1.0000

MODEL STABILITY TEST (CUSUM TEST)

CUSUM —— 5% Significance

CUSUM of SQUARES
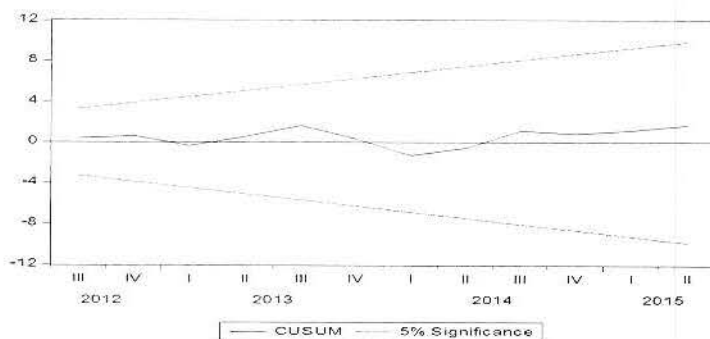
CUSUM of Squares —— 5% Significance
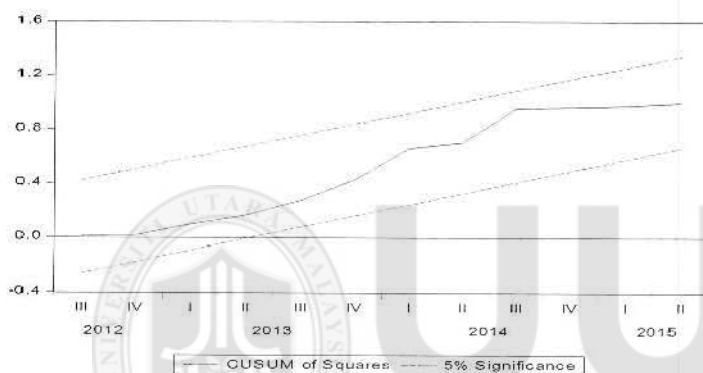
INDONESIA

ARDL Bounds Test
Date: 08/30/16   Time: 11:11
Sample: 2007Q4 2015Q2
Included observations: 31
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	8.668462	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

ARDL Cointegrating And Long Run Form
Dependent Variable: LDP
Selected Model: ARDL(2, 2, 0, 3, 3)
Date: 08/30/16   Time: 11:13
Sample: 2007Q1 2015Q2
Included observations: 31

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDP(-1))	0.612552	0.198676	3.083173	0.0071
D(ROR)	-0.023426	0.010003	-2.341873	0.0325
D(ROR(-1))	0.058891	0.011467	5.135720	0.0001
D(IRD)	-0.029526	0.007390	-3.995142	0.0010
D(LGDP)	0.200987	0.364738	0.551044	0.5892
D(LGDP(-1))	0.049707	0.512733	0.096944	0.9240
D(LGDP(-2))	-1.677468	0.424447	-3.952129	0.0011
D(INF)	0.006033	0.004189	1.440085	0.1691
D(INF)	-0.002140	0.006696	-0.319607	0.7534
D(INF)	-0.012704	0.005700	-2.228960	0.0405
CointEq(-1)	-0.908129	0.212583	-4.271877	0.0006

Cointeq = LDP - (-0.0742*ROR -0.0325*IRD + 5.1315*LGDP -0.0119*INF -56.0836)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROR	-0.074187	0.008464	-8.765447	0.0000
IRD	-0.032512	0.004771	-6.814624	0.0000
LGDP	5.131452	0.081799	62.732544	0.0000
INF	-0.011886	0.004276	-2.779709	0.0134
C	-56.083591	1.155080	-48.553878	0.0000

DIAGNOSTIC TESTS

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.048786	Prob. F(1,15)	0.8282
Obs*R-squared	0.100497	Prob. Chi-Square(1)	0.7512

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.352869	Prob. F(14,16)	0.9717
Obs*R-squared	7.313458	Prob. Chi-Square(14)	0.9220
Scaled explained SS	1.496227	Prob. Chi-Square(14)	1.0000

MODEL STABILITY TEST (CUSUM TEST)
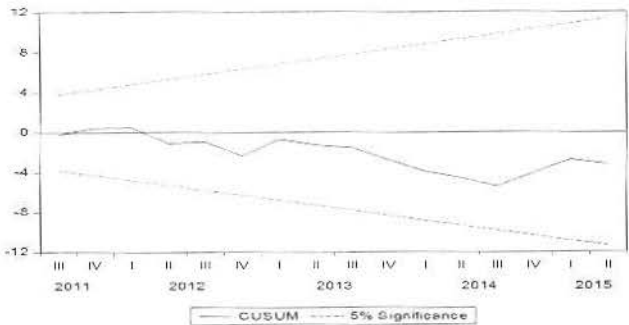
CUSUM of SQUARES
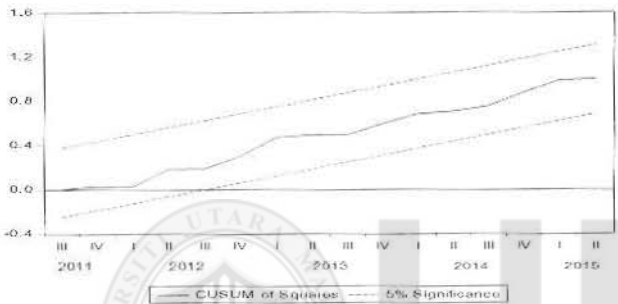
BAHRAIN

ARDL Bounds Test
Date: 08/31/16   Time: 08:18
Sample: 2007Q4 2015Q2
Included observations: 31
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	6.121260	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	3.47	4.45
5%	4.01	5.07
2.5%	4.52	5.62
1%	5.17	6.36

ARDL Cointegrating And Long Run Form
Dependent Variable: LDP
Selected Model: ARDL(3, 0, 1, 0)
Date: 08/31/16   Time: 08:22
Sample: 2007Q1 2015Q2
Included observations: 31

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LDP(-1))	0.126158	0.157127	0.802903	0.4306
D(LDP(-2))	0.256926	0.155867	1.648361	0.1135
D(ROR)	0.026014	0.012472	2.085824	0.0488
D(IRD)	-0.068635	0.037530	-1.828792	0.0810
D(LGDP)	0.124647	0.050385	2.473895	0.0216
D(@TREND())	-0.006883	0.002667	-2.580454	0.0171
CointEq(-1)	-0.595391	0.124046	-4.799761	0.0001

Cointeq = LDP - (0.0437*ROR -0.2558*IRD + 0.2094*LGDP + 8.4699
      -0.0116*@TREND)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROR	0.043692	0.024165	1.808080	0.0843
IRD	-0.255818	0.054695	-4.677191	0.0001
LGDP	0.209353	0.086685	2.415090	0.0245
C	8.469893	0.565599	14.975095	0.0000
@TREND	-0.011560	0.004597	-2.514753	0.0197

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.085729	Prob. F(1,21)	0.7726
Obs*R-squared	0.126038	Prob. Chi-Square(1)	0.7226

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.489166	Prob. F(8,22)	0.8508
Obs*R-squared	4.681495	Prob. Chi-Square(8)	0.7910
Scaled explained SS	7.264243	Prob. Chi-Square(8)	0.5084

MODEL STABILITY TEST (CUSUM TEST)
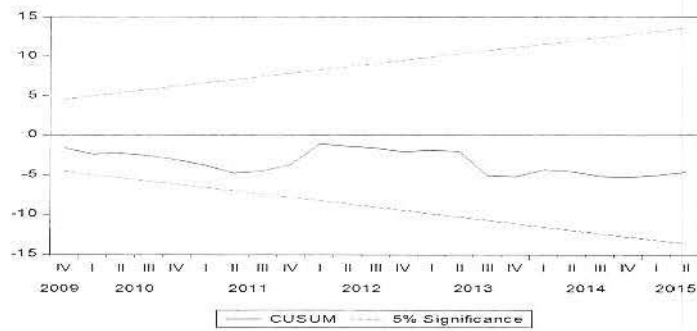
CUSUM of SQUARES
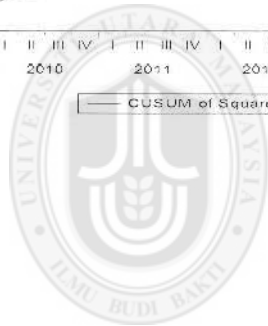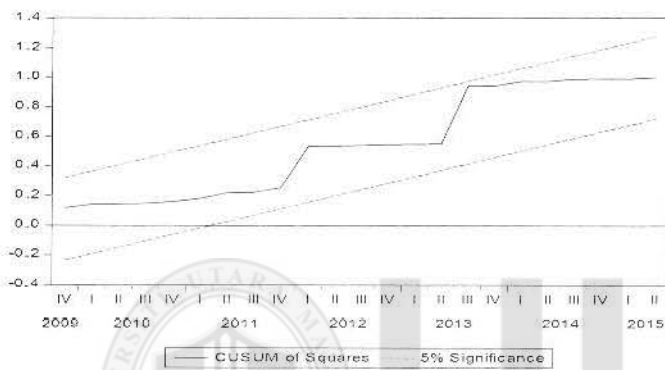
Appendix D: Financing-Deposit Gap and Credit Risks

Financing-Deposit gap and credit risks (Malaysia)

ARDL Cointegrating And Long Run Form
Dependent Variable: CR
Selected Model: ARDL(2, 4, 4, 4, 3)
Date: 09/20/16   Time: 10:06
Sample: 2007Q1 2015Q2
Included observations: 30

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CR(-1))	0.493080	0.365233	1.350043	0.2140
D(FDR)	0.616600	0.927656	0.664685	0.5249
D(FDR(-1))	-2.400582	1.175292	-2.042540	0.0754
D(FDR(-2))	0.854986	0.697589	1.225631	0.2552
D(FDR(-3))	-2.683320	1.750578	-1.532819	0.1639
D(LGDP)	0.555874	0.465823	1.193316	0.2669
D(LGDP(-1))	-0.010954	0.843107	-0.012992	0.9900
D(LGDP(-2))	-0.344424	0.847297	-0.406497	0.6950
D(LGDP(-3))	1.828885	0.725076	2.522337	0.0357
D(LRM)	3.180287	1.087761	2.923699	0.0192
D(LRM(-1))	-1.934554	1.182013	-1.636660	0.1403
D(LRM(-2))	2.593345	1.080295	2.400590	0.0431
D(LRM(-3))	1.511924	1.048720	1.441686	0.1874
D(EXC)	-0.234481	0.264344	-0.887029	0.4009
D(EXC(-1))	-0.890713	0.404874	-2.199978	0.0590
D(EXC(-2))	0.660990	0.285329	2.316592	0.0492
CointEq(-1)	-0.987910	0.322272	-3.065456	0.0155

Cointeq = CR - (4.1165*FDR -1.3114*LGDP -2.4485*LRM -0.0623*EXC + 37.2597)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDR	4.116528	1.953340	2.107431	0.0681
LGDP	-1.311400	1.078988	-1.215398	0.2589
LRM	-2.448471	0.610349	-4.011595	0.0039
EXC	-0.062305	0.347582	-0.179253	0.8622
C	37.259697	8.626423	4.319252	0.0025

ARDL Bounds Test
Date: 09/20/16   Time: 10:07
Sample: 2008Q1 2015Q2
Included observations: 30
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	5.079450	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.220258	Prob. F(1,7)	0.6531
Obs*R-squared	0.915166	Prob. Chi-Square(1)	0.3387

Heteroskedasticity Test: ARCH

F-statistic	0.246570	Prob. F(1,27)	0.6235
Obs*R-squared	0.262437	Prob. Chi-Square(1)	0.6085
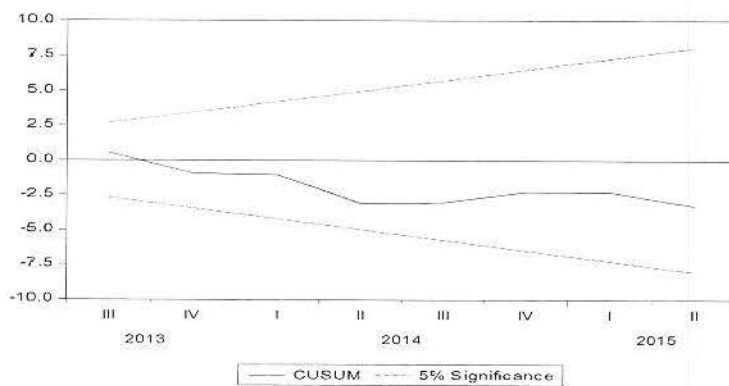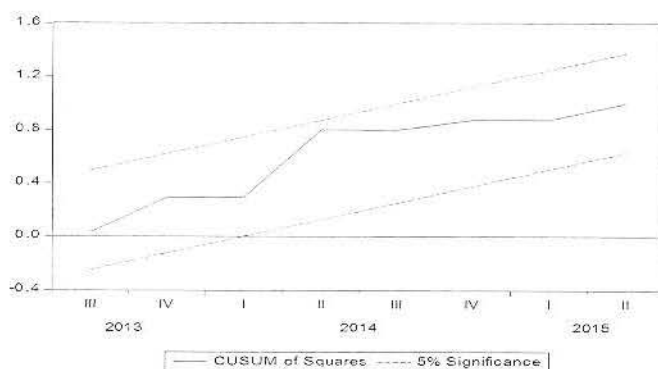
CUSUM ---- 5% Significance

256

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CUSUM of Squares ----- 5% Significance
```

VAR Lag Order Selection Criteria
Endogenous variables: CR FDR LGDP LRM EXC
Exogenous variables: C
Date: 09/18/16   Time: 11:15
Sample: 2007Q1 2015Q2
Included observations: 30

Lag	LogL	LR	FPE	AIC	SC	HQ
0	145.6310	NA	5.83e-11	-9.375401	-9.141868	-9.300692
1	265.1462	191.2244	1.10e-13	-15.67642	-14.27522*	-15.22816
2	278.8407	17.34629	2.72e-13	-14.92271	-12.35385	-14.10091
3	318.3089	36.83705	1.60e-13	-15.88726	-12.15074	-14.69192
4	385.2644	40.17328*	2.82e-14*	-18.68429*	-13.78010	-17.11540*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 09/18/16   Time: 11:27
Sample: 2007Q1 2015Q2
Included observations: 32

Dependent variable: CR

Excluded	Chi-sq	df	Prob.
FDR	7.230968	2	0.0269
LGDP	11.10543	2	0.0039
LRM	9.144015	2	0.0103
EXC	15.11464	2	0.0005
All	33.88394	8	0.0000

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Dependent variable: FDR

Excluded	Chi-sq	df	Prob.
CR	3.373555	2	0.1851
LGDP	0.106572	2	0.9481
LRM	1.168290	2	0.5576
EXC	1.226481	2	0.5416
All	12.99324	8	0.1121

Dependent variable: LGDP

Excluded	Chi-sq	df	Prob.
CR	4.744821	2	0.0933
FDR	5.145170	2	0.0763
LRM	2.674911	2	0.2625
EXC	2.631341	2	0.2683
All	11.40516	8	0.1798

Dependent variable: LRM

Excluded	Chi-sq	df	Prob.
CR	0.768197	2	0.6811
FDR	1.014463	2	0.6022
LGDP	6.191379	2	0.0452
EXC	0.732862	2	0.6932
All	11.98719	8	0.1518

Dependent variable: EXC

Excluded	Chi-sq	df	Prob.
CR	0.264067	2	0.8763
FDR	0.032484	2	0.9839
LGDP	0.059221	2	0.9708
LRM	0.004473	2	0.9978
All	2.795468	8	0.9465

INDONESIA

ARDL Bounds Test
Date: 09/18/16   Time: 17:20
Sample: 2008Q1 2015Q2
Included observations: 30
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	7.782504	4

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Heteroskedasticity Test: ARCH

F-statistic	1.883192	Prob. F(1,27)	0.1813
Obs*R-squared	1.890808	Prob. Chi-Square(1)	0.1691

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.394320	Prob. F(1,5)	0.5576
Obs*R-squared	2.192965	Prob. Chi-Square(1)	0.1386
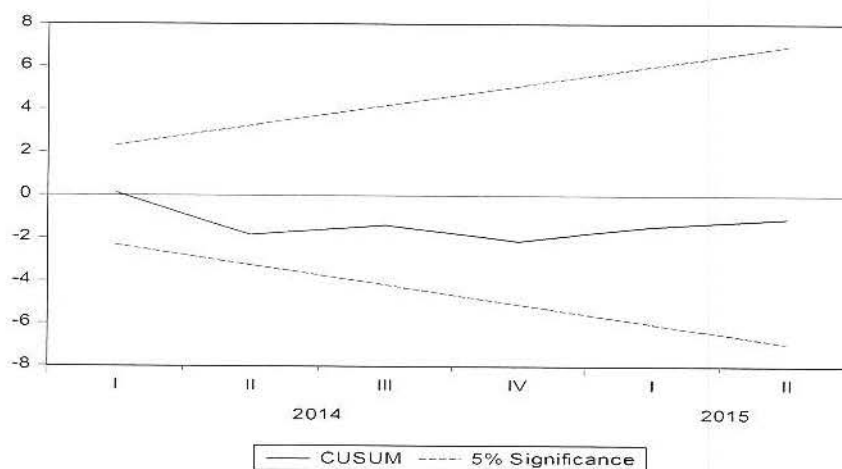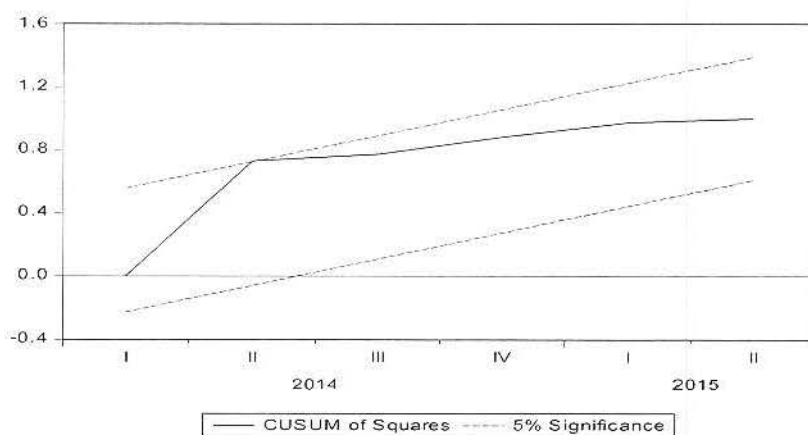
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CUSUM of Squares ----- 5% Significance

VAR Lag Order Selection Criteria
Endogenous variables: CR FDR LGDP LRM EXC
Exogenous variables: C
Date: 09/18/16   Time: 17:26
Sample: 2007Q1 2015Q2
Included observations: 30

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-359.2694	NA	24230.45	24.28463	24.51816	24.35934
1	-243.1313	185.8210	57.20782	18.20875	19.60995	18.65701
2	-213.1456	37.98185	47.75031	17.87637	20.44523	18.69817
3	-173.1854	37.29617	27.22752	16.87903	20.61555	18.07437
4	-97.46243	45.43378*	2.667429*	13.49750*	18.40169*	15.06639*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

VAR Granger Causality/Block Exogeneity Wald Tests
Date: 09/18/16   Time: 17:28
Sample: 2007Q1 2015Q2
Included observations: 30

Dependent variable: CR

Excluded	Chi-sq	df	Prob.
FDR	9.684528	3	0.0214
LGDP	5.192048	3	0.1583
LRM	8.203674	3	0.0420
EXC	7.501600	3	0.0575
All	32.50813	12	0.0012

Dependent variable: FDR

Excluded	Chi-sq	df	Prob.
CR	5.641441	3	0.1304
LGDP	5.432781	3	0.1427
LRM	3.898878	3	0.2726
EXC	7.169164	3	0.0667
All	45.68687	12	0.0000

Dependent variable: LGDP

Excluded	Chi-sq	df	Prob.
CR	0.533156	3	0.9115
FDR	4.943908	3	0.1760
LRM	1.200600	3	0.7529
EXC	4.952386	3	0.1753
All	9.162420	12	0.6890

Dependent variable: LRM

Excluded	Chi-sq	df	Prob.
CR	19.69124	3	0.0002
FDR	5.029100	3	0.1697
LGDP	4.557985	3	0.2072
EXC	1.217402	3	0.7488
All	42.61796	12	0.0000

Dependent variable: EXC

Excluded	Chi-sq	df	Prob.
CR	5.618501	3	0.1317
FDR	2.525887	3	0.4706
LGDP	4.215528	3	0.2391
LRM	10.97944	3	0.0118
All	22.46011	12	0.0327

BAHRAIN

ARDL Cointegrating And Long Run Form
Dependent Variable: CR
Selected Model: ARDL(4, 1, 0, 3, 3, 3, 1)
Date: 09/20/16   Time: 11:56
Sample: 2007Q1 2015Q2
Included observations: 30

Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CR(-1))	0.891893	0.216232	4.124702	0.0033
D(CR(-2))	0.298038	0.163365	1.824369	0.1055
D(CR(-3))	0.803232	0.158970	5.052740	0.0010
D(FDR)	24.778457	6.613734	3.746515	0.0057
D(LGDP)	-2.525890	1.595881	-1.582756	0.1521
D(LRM)	23.814653	15.630082	1.523642	0.1661
D(LRM(-1))	49.083770	3.825006	12.832337	0.0000
D(LRM(-2))	-38.762679	4.396026	-8.817663	0.0000
D(EXC)	-11433.209	4164.942	-2.745106	0.0252
D(EXC(-1))	-29845.347	4010.451	-7.441892	0.0001
D(EXC(-2))	33015.452	6036.566	5.469244	0.0006
D(IR)	0.366084	0.297133	1.232052	0.2529
D(IR(-1))	0.251480	0.397830	0.632130	0.5449
D(IR(-2))	2.273505	0.618852	3.673744	0.0063
D(INF)	2.181661	1.208817	1.804790	0.1088
CointEq(-1)	-0.558263	0.125722	-4.440442	0.0022

Cointeq = CR - (35.8551*FDR -4.5246*LGDP - 54.3697*LRM +
34744.0787*EXC -5.8899*IR + 0.4731*INF -302.9162)

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDR	35.855127	7.899713	4.538789	0.0019
LGDP	-4.524552	2.533998	-1.785539	0.1120
LRM	54.369728	21.256162	2.557834	0.0338
EXC	34744.078	10968.732	3.167556	0.0132
IR	-5.889915	1.706713	-3.451029	0.0087
INF	0.473127	0.499521	0.947162	0.3713
C	-302.916152	134.041379	-2.259870	0.0537

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ARDL Bounds Test
Date: 09/19/16   Time: 18:44
Sample: 2008Q1 2015Q2
Included observations: 30
Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	4.719188	6

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.293861	Prob. F(1,7)	0.6046
Obs*R-squared	1.248953	Prob. Chi-Square(1)	0.2638

Heteroskedasticity Test: ARCH

F-statistic	2.079554	Prob. F(1,27)	0.1608
Obs*R-squared	2.073865	Prob. Chi-Square(1)	0.1498

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CUSUM of Squares ----- 5% Significance
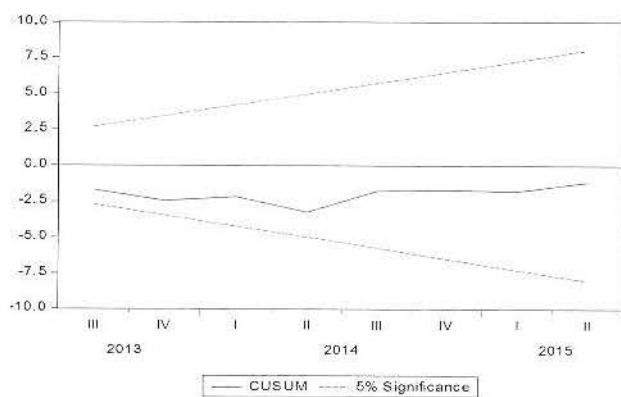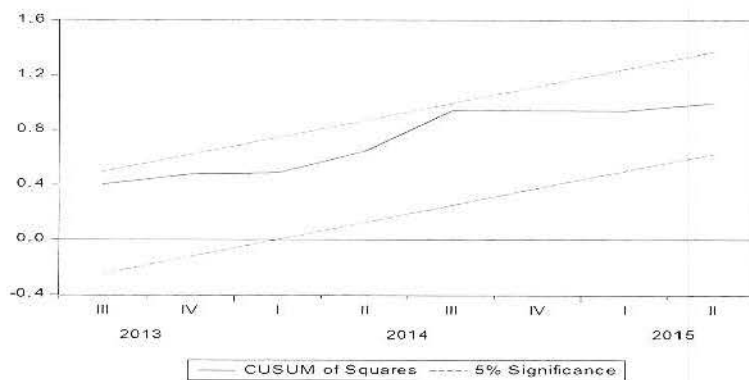
Optimum lag selection

VAR Lag Order Selection Criteria
Endogenous variables: CR FDR LGDP LRM EXC
Exogenous variables: C
Date: 09/20/16   Time: 12:07
Sample: 2007Q1 2015Q2
Included observations: 30

Lag	LogL	LR	FPE	AIC	SC	HQ
0	282.7635	NA	6.25e-15	-18.51757	-18.28403	-18.44286
1	398.8437	185.7284	1.48e-17	-24.58958	-23.18839	-24.14133
2	417.9298	24.17568	2.56e-17	-24.19532	-21.62646	-23.37352
3	450.7326	30.61594	2.35e-17	-24.71551	-20.97898	-23.52016
4	542.9341	55.32091*	7.67e-19*	-29.19561*	-24.29142*	-27.62671*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Granger Causality/Block Exogeneity Wald Tests
Date: 09/20/16   Time: 12:23
Sample: 2007Q1 2015Q2
Included observations: 31

Dependent variable: CR

Excluded	Chi-sq	df	Prob.
FDR	0.465947	2	0.7922
LGDP	2.037833	2	0.3610
LRM	8.370288	2	0.0152
EXC	8.703403	2	0.0129
All	12.82268	8	0.1181

Dependent variable: FDR

Excluded	Chi-sq	df	Prob.
CR	5.712500	2	0.0575
LGDP	0.157465	2	0.9243
LRM	2.089941	2	0.3517
EXC	5.094579	2	0.0783
All	15.33169	8	0.0530

Dependent variable: LGDP

Excluded	Chi-sq	df	Prob.
CR	8.661538	2	0.0132
FDR	0.660720	2	0.7187
LRM	6.609648	2	0.0367
EXC	2.451181	2	0.2936
All	16.02966	8	0.0420

Dependent variable: LRM

Excluded	Chi-sq	df	Prob.
CR	3.424161	2	0.1805
FDR	5.245945	2	0.0726
LGDP	0.014156	2	0.9929
EXC	1.732386	2	0.4205
All	14.41136	8	0.0717

Dependent variable: EXC

Excluded	Chi-sq	df	Prob.
CR	0.916652	2	0.6323
FDR	1.588761	2	0.4519
LGDP	0.303516	2	0.8592
LRM	0.415999	2	0.8122
All	3.129415	8	0.9260

Appendix E:Financing Concentration and Credit Risks of Islamic Banks

Malaysia

Dependent Variable: CR
Method: Dynamic Least Squares (DOLS)
Date: 09/16/16   Time: 23:07
Sample (adjusted): 2007Q3 2015Q1
Included observations: 31 after adjustments
Cointegrating equation deterministics: C @TREND
Fixed leads and lags specification (lead=1, lag=1)
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth =
    4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FC	10.08855	3.522291	2.864201	0.0187
IR	0.682825	0.275554	2.478013	0.0351
LRM	-3.034876	0.456992	-6.640984	0.0001
LFIN	1.779068	0.858430	2.072466	0.0681
INF	0.004663	0.021098	0.221012	0.8300
C	2.660634	9.980004	0.266597	0.7958
@TREND	-0.085100	0.031055	-2.740346	0.0228

R-squared	0.996778	Mean dependent var		1.893548
Adjusted R-squared	0.989259	S.D. dependent var		0.762861
S.E. of regression	0.079064	Sum squared resid		0.056260
Long-run variance	0.003697			

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.474740	Prob. F(1,26)	0.2355
Obs*R-squared	1.824991	Prob. Chi-Square(1)	0.1767

Heteroskedasticity Test: ARCH

F-statistic	0.469212	Prob. F(1,31)	0.4984
Obs*R-squared	0.492036	Prob. Chi-Square(1)	0.4830

INDONESIA

Dependent Variable: CR
Method: Dynamic Least Squares (DOLS)
Date: 09/16/16   Time: 23:19
Sample (adjusted): 2007Q3 2015Q1
Included observations: 31 after adjustments
Cointegrating equation deterministics: C @TREND
Fixed leads and lags specification (lead=1, lag=1)
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth =
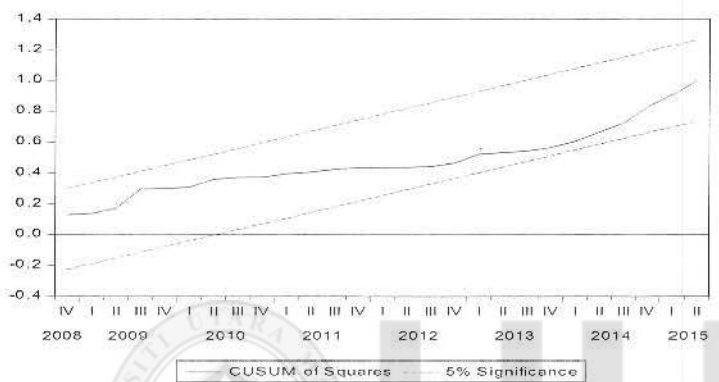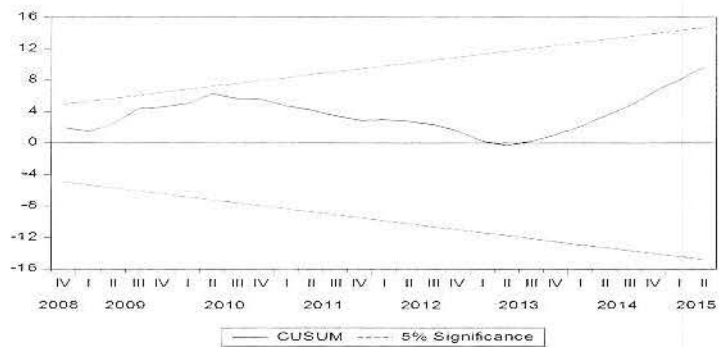   4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FC	-25.05358	12.80725	-1.956203	0.0821
LRM	8.923444	11.00237	0.811048	0.4383
LFIN	4.818872	4.642913	1.037898	0.3264
IR	1.083804	0.232202	4.667499	0.0012
INF	-0.044797	0.082372	-0.543840	0.5998
C	-118.8497	61.60277	-1.929292	0.0858
@TREND	-0.554149	0.257090	-2.155466	0.0595
R-squared	0.948728	Mean dependent var		3.810323
Adjusted R-squared	0.829094	S.D. dependent var		0.950924
S.E. of regression	0.393120	Sum squared resid		1.390888
Long-run variance	0.035276			

Dependent Variable: CR

Method: Dynamic Least Squares (DOLS)
Date: 11/03/16   Time: 11:27
Sample (adjusted): 2007Q3 2014Q3
Included observations: 29 after adjustments
Cointegrating equation deterministics: C
Fixed leads and lags specification (lead=1, lag=1)
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth =
    4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FC	-48.43093	10.89796	-4.444036	0.0022
LRM	-320.6308	79.98482	-4.008645	0.0039
IR	0.331536	0.162411	2.041334	0.0755
INF	-0.219191	0.066480	-3.297102	0.0109
LFIN	7.432718	1.750334	4.246458	0.0028
C	-84.15039	19.25322	-4.370718	0.0024
R-squared	0.957778	Mean dependent var		3.757931
Adjusted R-squared	0.852223	S.D. dependent var		0.959514
S.E. of regression	0.368854	Sum squared resid		1.088427
Long-run variance	0.028305			

Breusch-Godfrey Serial Correlation LM Test:

|			
F-statistic	0.195457	Prob. F(2,24)	0.8238
Obs*R-squared	0.512866	Prob. Chi-Square(2)	0.7738

Date: 11/03/16   Time: 11:34
Sample: 2007Q1 2014Q4
Included observations: 29

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
. |*. |	. |*. |	1	0.174	0.174	0.9676	0.325
.**| . |	.**| . |	2	-0.240	-0.279	2.8889	0.236
.**| . |	. *| . |	3	-0.239	-0.154	4.8697	0.182
. *| . |	. *| . |	4	-0.156	-0.166	5.7445	0.219
. | . |	. | . |	5	0.065	0.023	5.9011	0.316
. |*. |	. |*. |	6	0.203	0.090	7.5138	0.276
. |*. |	. |*. |	7	0.212	0.158	9.3458	0.229
. *| . |	. *| . |	8	-0.097	-0.105	9.7451	0.283
.**| . |	. *| . |	9	-0.260	-0.110	12.782	0.173
. *| . |	. *| . |	10	-0.178	-0.106	14.283	0.160
. *| . |	. *| . |	11	-0.104	-0.177	14.827	0.191
. |**. |	. |*. |	12	0.238	0.145	17.811	0.122

*Probabilities may not be valid for this equation specification.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.658816	Prob. F(5,26)	0.6577
Obs*R-squared	3.598358	Prob. Chi-Square(5)	0.6086
Scaled explained SS	2.344561	Prob. Chi-Square(5)	0.7997
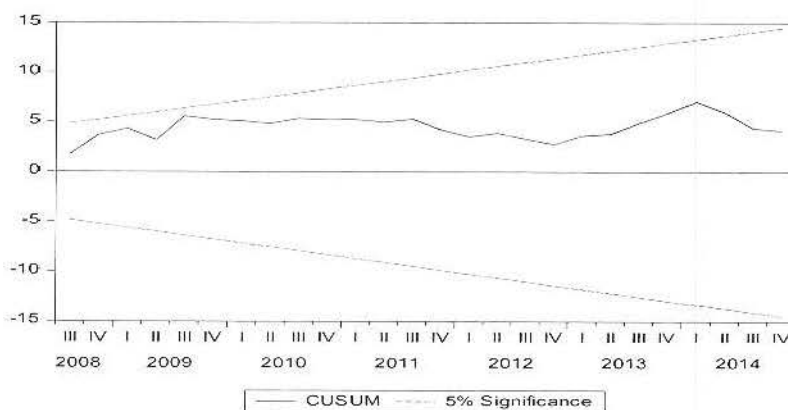
Dynamic OLS

Dependent Variable: CR
Method: Least Squares
Date: 09/16/16   Time: 23:57
Sample: 2007Q1 2015Q2
Included observations: 34

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FC	-19.76850	5.282094	-3.742550	0.0008
IR	0.336505	0.176211	1.909666	0.0661
LRM	0.689419	0.532410	1.294904	0.2056
INF	-0.032424	0.048183	-0.672943	0.5063
C	-1.145302	6.361547	-0.180035	0.8584

R-squared	0.699653	Mean dependent var		3.964118
Adjusted R-squared	0.658226	S.D. dependent var		1.052631
S.E. of regression	0.615383	Akaike info criterion		2.001908
Sum squared resid	10.98218	Schwarz criterion		2.226373
Log likelihood	-29.03244	Hannan-Quinn criteria.		2.078457
F-statistic	16.88878	Durbin-Watson stat		1.708438
Prob(F-statistic)	0.000000			

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.562238	Prob. F(1,28)	0.4596
Obs*R-squared	0.669279	Prob. Chi-Square(1)	0.4133

Heteroskedasticity Test: ARCH

F-statistic	1.531621	Prob. F(1,31)	0.2252
Obs*R-squared	1.553673	Prob. Chi-Square(1)	0.2126

CUSUM of Squares — 5% Significance

272
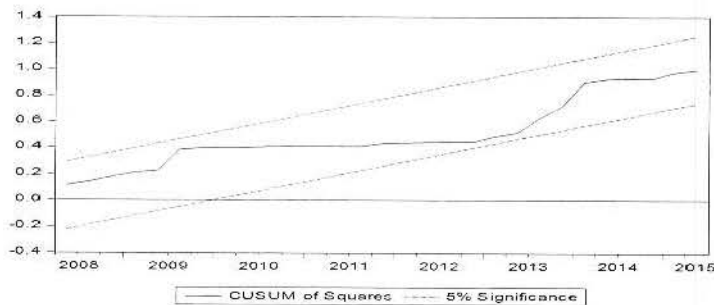
BAHRAIN

CORRELATION BETWEEN CR AND FC

Covariance Analysis: Ordinary
Date: 05/21/16   Time: 11:54
Sample: 2013S1 2014S2
Included observations: 4

Covariance Correlation	CR	FC
CR	0.635000	
	1.000000	
FC	0.004966	3.92E-05
	0.995522	1.000000

BAHRAIN

(Dynamic OLS Result)

Dependent Variable: CR
Method: Dynamic Least Squares (DOLS)
Date: 11/13/16   Time: 15:34
Sample (adjusted): 2008Q1 2015Q1
Included observations: 29 after adjustments
Cointegrating equation deterministics: C
Fixed leads and lags specification (lead=1, lag=3)
Long-run variance estimate (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LFIN	31.09764	15.78653	1.969884	0.1202
INF	-2.854928	0.759593	-3.758499	0.0198
IR	-15.32258	4.581053	-3.344773	0.0287
LRM	-89.14322	35.11548	-2.538573	0.0641
C	188.0885	94.82544	1.983523	0.1183

|			
R-squared	0.995911	Mean dependent var	10.47931
Adjusted R-squared	0.971380	S.D. dependent var	4.204112
S.E. of regression	0.711233	Sum squared resid	2.023408
Long-run variance	0.295908		

DIAGNOSTIC TEST

Serial correlation test

Date: 11/13/16   Time: 15:11
Sample: 2007Q1 2015Q2
Included observations: 29

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
.**| . |	.**| . |	1	-0.251	-0.251	2.0300	0.154
. |* . |	. |* . |	2	0.200	0.146	3.3565	0.187
. | . |	. | . |	3	-0.028	0.056	3.3832	0.336
. | . |	. | . |	4	-0.002	-0.028	3.3834	0.496
. *| . |	. *| . |	5	-0.074	-0.095	3.5893	0.610
. |* . |	. | . |	6	0.088	0.065	3.8904	0.692
. *| . |	. | . |	7	-0.110	-0.052	4.3846	0.735
. | . |	. | . |	8	0.039	-0.024	4.4487	0.815
. | . |	. |* . |	9	0.047	0.080	4.5488	0.872
. *| . |	. *| . |	10	-0.122	-0.105	5.2529	0.874
. |**. |	. |* . |	11	0.236	0.191	8.0358	0.710

*Probabilities may not be valid for this equation specification.

CUSUM ----- 5% Significance

CUSUM of Squares ----- 5% Significance
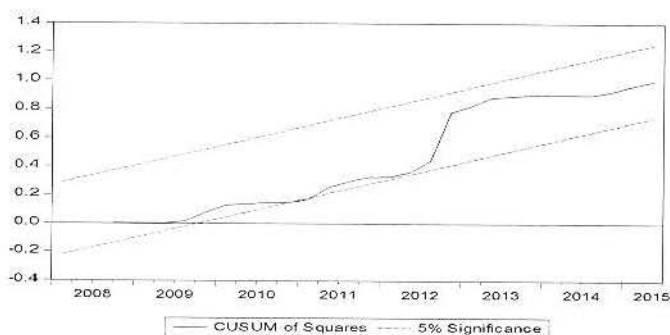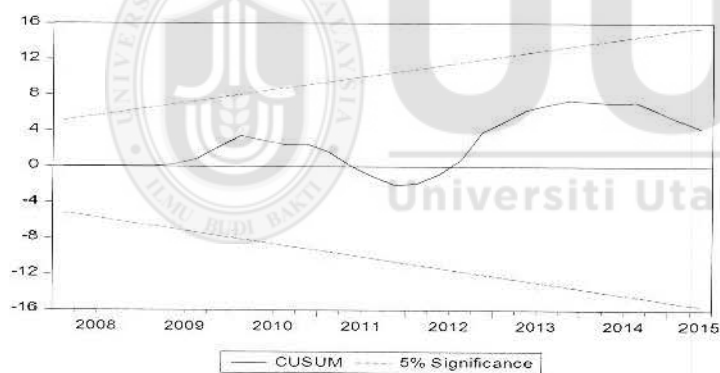
APPENDIX F: Lists of Islamic Banks

Malaysia:

1. Affin Islamic Bank Berhad

2. Al Rajhi Banking & Investment Corporation (Malaysia) Berhad

3. Alliance Islamic Bank Berhad

4. AmIslamic Bank Berhad

5. Asian Finance Bank Berhad

6. Bank Islam Malaysia Berhad

7. Bank Muamalat Malaysia Berhad

8. CIMB Islamic Bank Berhad

9. Hong Leong Islamic Bank Berhad

10. HSBC Amanah Malaysia Berhad

11. Kuwait Finance House (Malaysia) Berhad

12. Maybank Islamic Berhad

13. OCBC Al-Amin Bank Berhad

14. Public Islamic Bank Berhad

15. RHB Islamic Bank Berhad

16. Standard Chartered Saadiq Berhad

Source: Bank Negara Malaysia's Monthly Statistical Bulletin

Appendix F ctd

Indonesia:

1. PT. Bank Muamalat Indonesia

2. PT. Bank Victoria Syariah

3. Bank BRI Syariah

4. B.P.D. Jawa Barat Banten Syariah

5. Bank BNI Syariah

6. Bank Syariah Mandiri

7. Bank Syariah Mega Indonesia

8. Bank Panin Syariah

9. PT. Bank Syariah Bukopin

10. PT. BCA Syariah

11. PT. Maybank Syariah Indonesia

12. PT. Bank Tabungan Pensiuanan National Syariah

Source: Bank Indonesia's Statistical Bulletin

Appendix F Ctd: Bahrain
1. Al Barak Islamic Bank B.S.C. (c)
2. Al Salam Bank Bahrain B.S.C.
3. Bahrain Islamic Bank B.S.C.
4. Ithmaar Bank B.S.C.
5. Khaleej Commercial Bank B.S.C.
6. Kuwait Finance House (Bahrain) B.S.C.
7. ABC Islamic Bank (E.C.)
8. Al Baraka Banking Group B.S.C.
9. Arab Islamic Bank (E.C.)
10. Bank Al-Khair B.S.C.
11. Citi Islamic Investment Bank (E.C.)
12. First Energy Bank B.S.C.
13. Global Banking Corporation B.S.C
14. Gulf Finance House B.S.C.
15. Ibdaar Bank B.S.C.
16. International Investment Bank B.S.C.
17. Investment Dar Bank B.S.C.
18. Investors Bank B.S.C.
19. Kuwait Turkish Participation Bank Inc.
20. Liquidity Management Centre B.S.C. (c)
21. R A Bahrain B.S.C. (c)
22. Seera Investment Bank B.S.C. (c)
23. Turkiye Finans Katilim Banakasi A.S.
24. Venture Capital Bank B.S.C. (c)

Source: Central Bank Of Bahrain Statistical Bulletin.