

EMPIRICAL ANALYSIS ON THE NEXUS BETWEEN ISLAMIC BANKING DEVELOPMENT IN TERMS OF SIZE AND ACTIVITY, ECONOMIC GROWTH AND FINANCIAL CRISIS IN ISLAMIC REPUBLIC OF IRAN

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Abstract

Purpose - This paper use empirical analysis to examine Iran's Islamic banking development in terms of size and activity -growth-crisis nexus and identify the Granger causality relationship among them over the period of 1990Q1 to 2010Q4.

Design/methodology/approach - This study utilizes the Auto Regressive Distributed Lag ARDL models to identify the short and long run estimations.

Findings - The results generally signify that, in the long run there is a bidirectional hypothesis exists between Islamic banking development in terms of activity and size, growth, while in the short run both of Islamic banking activity and size development don't Granger cause growth and financial crisis. Furthermore, the finding show that generally Islamic banking activity based system is more appropriate compared to Islamic banking size based system to achieve a growth without crises in Islamic republic of Iran. In the end, despite the selected Islamic country suffer since more than 30 years from strong international economic and political siege, the results show that Islamic banking system played significant role in promoting growth and absorbing the negative effects of the internal and international financial and economic crises.

Research limitations/implications - Data were not available after 2010 in Islamic republic of Iran.

Practical implications - This study is helpful for the investors, bankers and policy makers for formulating the future policy

Originality/value - This paper is a first attempt to study the relationship between Islamic banking development in terms of Activity and size and economic growth without ignoring the potential causal link between Islamic financial development and financial crisis.

Keywords: Islamic Banking, Growth, Crisis, Size, Activity, Development, Causality, Nexus, ARDL.

Introduction

Economic thinkers have been concerned with growth and development from the beginning of times although mainstream economists' opinions and feedbacks have often preceded those of development theorists'. In this regard, Kindleberger and Herrick (1988) stated that a theory of economic development is distinct from that of economic growth because in the latter, the theory can be explained in a simple, easy and elegant manner. Contrastingly, theories dedicated to the former are more general, ambiguous and in effect, confusing – akin to the mass poverty which it tries to clarify. Nevertheless, economic growth is crucial aspect of economic development and is referred to as the increase in the market value of the goods and services generated by the economy over the years. In related studies, Meier and Baldwin (1957) and Deane (1961) argued that economic growth and economic development are synonymous as they should both indicate long-term and maintainable increases in per capita income as well as output. On the other hand, Maddison (2006) and Hirschman (1988) went against their argument and stated that economic growth only takes place in a rich country while economic development takes place in a poor country. Added to the above, Hamid (1999) and Flammang (1979) believed that the two terms complement each other – where economic growth refers to a simple increase of the same thing, while economic development is a change in the structure indicating something different or something more.

The heightened concerns regarding the environment, societal culture and religions and institutions along with their connections with economic activities have offered a new dimension to the actual development economics concept (Biswas, 2009). In addition, it is evident that modern development economics should exert higher efforts to understand the various growth objectives and directions. It has to make sure that its paradigms and objectives match the state of the world that is attempting to reconcile globalization with regionalism, and uniformity with national identity. Moreover, development economics is on the edge of being acknowledged as a valid social science, wherein the analysis of traditional institutions, societal life, religious and ethnic aspects is significant as well as decisive in the development of novel social and economic growth objectives, and in turn, economic theories and models (Piascecki & Wolnicki, 2004).

In the country's economy, the financial sector forms a part that provides financial services to the rest of the economic sectors and is described as the interconnection between the supply of and the demand for the capital provision and the provision of financial services. Added to this, some economists viewed financial development as a growth driver, while others described it as an outcome and a symptom of actual economic development (i.e. Schmidt & Tyrell, 2003). There is however no doubt that the financial markets and institutions development remains a part of the growth process where financial systems have key roles in the countries' economies. Such roles entail providing loans and credit facilities to bring about the production process (Levine, 1997).

To this end, because the financial system is a crucial economic aspect, it comes to reason that a weak financial system threatens the long-term economic sustainability and ultimately leads to a financial crisis (Vaithilingam, Nair & Samudram, 2006). This is why it is no longer a novelty for a country to suffer from one crisis to another and as such, there have been 100 crisis in the past three and half decades (Alam, 2010; Stiglitz, 2003). Consequently, every area and country in the world has been affected at one time or another by a crisis. This includes countries that are generally protected by fiscal and monetary policies.

In this context the illiquidity of banks as well as their susceptibility to exogenous shocks and shifts have been made worse by the domestic financial liberalization and capital flows from abroad (particularly in short-term) (Chang & Velasco, 1998). Moreover, the more recent international financial crisis which began in the summer of 2007 has a more significant impact than any other crises that occurred in the past and its affects are still felt all over the world although certain countries (the U.S., the U.K., Europe and other countries) have made a

coordinated bail of three to four trillion dollars. The crisis has managed to control money-markets and this has led to the decrease in the values of properties and stocks, failures of banks and anxiety concerning the state of the global economy and the international financial system (Chapra, 2008). In sum, the financial crisis has impacted the whole world and the effects are increasingly permeating into the real sector bringing about economic recession (Khan, 2009). While an economic crisis is attributed to numerous causes, the commonly acknowledged cause is excessive and irresponsible bank lending which leads to temporary boom in asset prices, after which the consumption and speculative investment shows an artificial increase, where the greater the leverage, the more challenging it is to recover from the downturn. Unwinding only extends the selling cycle that consumes itself and eventually results in the decline of asset prices and financial crisis.

In relation to the above the effectiveness of monetary policy and fiscal policy that is largely dependent on the rate of interest and inflation in boosting the economy, are currently debatable among researchers as majority of them attempt to determine solutions and financial instruments that can outperform interest rate, inflation and unemployment rate in effectiveness (Grier & Tullock, 1989; Barth & Bradley, 1988; Chong & Li, 2009; Subbarao, 2009; Kia, 2002).

What seems evident is the fact that the international financial system has failed big time in stabilizing the international financial flow, even adding to the financial crisis owing to its effectiveness. This highlights the error in the system which begs the question of what the new financial system architecture should be. Such architecture would call for innovation that could steer clear of an outbreak and the future proliferation of future crisis or to lessen it in terms of frequency and severity (Alam, 2010).

To this end, the Islamic finance presents a good theoretical argument towards its suitability to become an alternative to the current international financial system, particularly in the context of Islamic countries. Majority of economists are of the consensus that that the Islamic financial system directly contributes to the economic recovery and that modern generation of financial system results in financial development and growth and is superior to the conventional system in that it does not bring about financial crisis and is not impacted by it (e.g. Abduh & Chowdhury, 2012; Alam, 2010; Grais & Pellegrini, 2006; Khan, 2009; Khan & Bhatti, 2008; Warde, 2010; Ahmed, 2010).

Unfortunately, the above proposition only comes in theory as empirical analysis does not provide sufficient evidence to prove that the Islamic banking development and growth can be an alternative to the current system and on top of this, empirical studies in this field are still lacking (Furqani & Mulyany, 2009; Farahani & Dastan, 2013). What little studies were done in the field provided mixed findings and largely ignored the potential causal link between Islamic financial development and financial crisis, and the probable link between Islamic financial development and financial crisis. This could be considered as a large oversight in the analysis of the Islamic finance-growth causality and in policy planning, particularly in emerging economies (like the study sample) that are characterized by financial liberalization.

Therefore, the present paper attempts to minimize the gap found in literature as it investigates the short and long-run relationships between Islamic banking development, economic growth and financial crisis. It also examines the short and long-run Granger causality hypotheses existing between Islamic banking developments (size and activity development) and economic growth, and the probable causal linkage between Islamic financial development and financial crisis in the context of an emerging economy.

The main research questions in the present study include - What is the relationship between Islamic banking development in light of size and activity, and economic growth in both short and long-term in Iran? Does Islamic banking development (size and activity) significantly impact Iran's economic growth in both short and long run? Does Islamic banking development in light of size and activity lead to financial crisis in Iran? Is Islamic banking development in light of size and activity affected by international financial crisis in Iran?

What is the Granger causality hypothesis that exists between Islamic banking development (size and activity) and financial crisis in both short and long run in Iran?

The present paper selected Iran as the Islamic country under focus to obtain the data from based on availability and compatibility and to test the theoretical findings on. According to Hassan (2003b), when Islamic banks operate in Iran and Sudan, the whole banking system is operated under Islamic Shariah, and as a consequence, the banks become effective in their allocative aspects, with an average scale efficiency of around 89.1%, and average technical efficiency of around 95%. Added to this the sample period is considered from 1990:1 to 2010:4.

LITERATURE REVIEW

The relationship between finance and growth has been focused on by cross-country empirical studies because of the lack of time series data in the context of developing nations (Ang & McKibbin, 2007; McCaig & Stengos, 2005). Majority of studies have reported that financial development anteceded economic growth (McCaig & Stengos, 2005; Rioja & Valev, 2004a).

Owing to the possibility of finance's effect on growth, and the influence of both as endogenous variables, the use of a framework becomes appropriate. However, in this respect, evidence concerning financial development-economic growth causal relationship reported by time series studies adopting a framework is inconclusive (e.g. Bell & Rousseau, 2001; Rousseau, 2002; Thangevelu & Jiunn, 2004).

Specifically, empirical studies dedicated to examining the effect of Conventional Financial Development (CFD) on economic growth revealed mixed results – while some authors revealed a significant and positive effect of CFD on economic growth (e.g. King & Levine, 1993; Kunt & Maksimovi, 1998; Rioja & Valev, 2003b; Dimitris & Efthymios, 2004; Eita & Jordaan, 2007), others revealed a significant and negative impact (e.g. de Gregorio & Guidotti, 1995; Hermes & Lensink, 2005; Al-Malkawi, Arashdeh & Abdullah, 2012; Samargandi, Fidrmuc & Ghosh, 2013).

Although there is a considerable number of studies that examined the nexus between financial development and economic growth, to date, there is still lack of consensus as to the nature and direction of the relationship. In relation to this, Patrick and Reimer (1966) highlighted three different hypotheses concerning the relationship and they are; supply-leading, demand-following and a bi-directional causality relationship. Other studies (Graff, 1999; Lucas Jr., 1988) proposed another hypothesis that posits the absence of the causality between the two variables.

By and large, four types of causality relationships have been stressed by different research works between financial development and economic growth. Such hypotheses go against the general notion that only financial development causes economic growth (short and long-run) and they are;

1. Supply-leading relationship, where financial development leads to economic growth (Gregorio & Guidotti, 1995; Calderon & Liu, 2003).
2. Demand-following relationship, where economic growth leads to financial development (Robinson, 1952; Odhiambo, 2009; Ang & Kibbin, 2007).
3. Bi-directional causal relationship, where financial development leads to economic growth and latter leads to the former (Demetriades & Hussein, 1995; Abu-Bader & Abu Qarn, 2008).

4. No causality between the two variables (Deidda & Fattouh, 2002; Rioja & Valev, 2004; Graff, 1999; Lucas, 1988; Stern, 1989).

Other studies that advocated and supported the supply-leading view with their study findings are King and Levine (1993) who considered 80 countries and employed a simple cross-country OLS regression. They found that financial development anteceded economic growths. Their findings were supported by Chistopoulos and Tsionas (2004) who examined the long-run relationship between banking development and economic growth among 10 developing nations with the help of panel co-integration method. They revealed a uni-directional relationship that originated from the financial development to the growth of the economy.

On the other hand, Robinson (1952) revealed that economic growth leads to financial development indicating that with the heightening of the demand for financial services, more financial institutions, and financial instruments/services are introduced in the market. On this basis, financial development depends on the level of economic development and not the other way around.

In the context of South Africa, Odhiambo (2009) focused on the dynamic and causal relationship between financial development, investment and economic growth through the developed ARDL Bounds testing technique and found economic growth to influence the financial sector development. Meanwhile, in Demetriades and Hussein's (1996) study, they covered 16 countries and their results showed that majority of the countries they selected supported a bi-directional linkage between the two variables.

Such a bi-directional relationship was also supported by Calderon and Liu (2003) who divided their sample into two namely developing and industrial nations. They found a bi-directional causality between the two variables, which indicated that financial depth boosts growth while growth promoted financial development. It was clear that the financial sector development was significantly affected by the expansion in the real sector despite the fact that the study only included developed nations.

In the case of Saudi Arabia, Turkey and the UAE, Darrat (1999) concentrated on examining the causal relationship between the financial depth level and the economic growth through multivariate Granger causality test's error correction framework. They revealed that the Saudi case displayed bi-directional causality relationship in the long run. Also, in Egypt Abu-Bader and Abu-Qarn (2008) examined the causal relationship between financial development and economic growth in the span of years from 1960 to 2001 with the help of VAR model. Their findings showed that the two variables are mutually causal in a bi-directional relationship.

With regards to the negative relationship between finance and growth, other empirical studies who examined the impact of the financial development on economic growth brought this finding to the surface. Among them, DeGregorio and Guidotti (1995) evidenced that in some Latin American nations, financial development negatively affects growth. In a more current study conducted by Al-Malkawi et al. (2012), the short as well as the long-term relationship between financial development and growth in the context of the UAE showed a negative relationship between the two variables. However, in a related study by Loayza and Ranciere (2006), they showed that financial intermediation and output growth coexist with a notable negative direction in the short-run.

Also, in Al-Malkawi, Arashdeh and Abdullah's (2012) study, they empirically examined the relationship between financial development and economic growth in the context of the UAE through a time series data for the years 1974-2008. They also employed the ARDL method for co-integration. Their findings revealed a statistically significant relationship between the two with a negative direction as measured by M2/GDP and growth in the economy.

A negative but insignificant relationship was found in the context of Saudi Arabia by Samargandi, Fidrmuc and Ghosh (2013). They studied the effect of financial development on economic growth through the autoregressive distributed lag (ARDL) and evidenced a negative but significant effect on total growth of GDP.

In contrast to the above, Goaid and Sassi (2010) found no significant association between banking and growth in their empirical assessment of the two variables in the context of MENA countries. They also revealed that some banks indicators negatively and significantly related with growth.

The above mixed findings are mimicked in studies dedicated to the effect of Islamic financial development and economic growth. For instance, some studies (Furqani & Mulyany, 2009; Majid & Kassim, 2010; Abduh & Omar, 2012; and Yusof & Bahlous, 2013) revealed a significant positive effect of Islamic banking on economic growth while others (Goaid & Sassi, 2010) reported unfavorable effects of financial development on the growth in the MENA countries. As Islamic banks were revealed to be weakly related to growth hence, financial markets were concluded to have a weak relationship with growth also.

However, studies dedicated to determining the causal relationship between the development of Islamic finance and economic growth are few and far between (e.g. Abduh & Chowdhury, 2012; Abduh & Omar, 2012; Farahani & Dastan, 2013; Furqani & Mulyany, 2009; Goaid & Sassi, 2010; Majid & Kassim, 2010; Rajaei-Baghsiyaei, 2011; Yusof & Bahlous, 2013).

The above few studies were mentioned by Farahani and Dastan (2013) and owing to such lack of studies; no consensus has been achieved as to the relationship nature and direction. More importantly, different hypotheses have been proposed namely the supply-leading, demand-following, bi-directional causality and no causal relationship between Islamic financial development and economic growth.

The above proposed hypotheses are specifically explained in this section; to begin with, Majid and Kassim (2010) advocated a supply-leading hypothesis in that Islamic financial development boosts economic growth by playing a crucial role as a generative input. In contrast to this view is the demand-following hypothesis where a causal relationship originates from economic growth to Islamic financial development. In relation to this, Calderon and Liu (2003) explained that the heightening demand for Islamic financial services may urge the expansion of the financial sector with the increased real economy. Stated clearly, Islamic financial development responds to the economic growth in a passive manner as empirically evidenced by Furqani and Mulyany (2009).

Specifically, the dynamic interaction between Islamic banking and economic growth was studied by Furqani and Mulyany (2009) in Malaysia with the help of vector ECM and co-integration test. Their results showed that fixed investments were the only granger cause of Islamic banking in the short run in the time span (1997:1 to 2005:4). Added to this, they also showed a bi-directional relationship between Islamic banking and fixed investment in the long-run and a demand following trend between Islamic banking and GDP, where the GDP causes the development of Islamic banking.

Generally, the variable of Islamic bank total financing (IBfinancing) is used as a proxy for the financial sector and three variables are employed to proxy real economic sector and they are, GDP, real gross fixed capital formation (GFCF), and trade activities that entail export-plus-import.

Added to the above evidenced hypotheses, a third one was obtained from the two's combination – when both views are considered valid both the Islamic financial deepening and real economic growth causality are considered as interdependent (Darrat, 1999). This view is also supported by Abduh and Omar (2012), Abduh and Chowdhury (2012), Yusof and Bahlous (2013), and Farahani and Dastan (2013).

More specifically, Abduh and Omar's (2012) study examined the short-run and long-run correlations between Islamic banking development and economic growth in Indonesia where they employed the bound testing method of co-integration and Error Correction Model (ECMs) on the basis of Autoregressive Distributed Lag (ARDL) framework. Their results showed a significant relationship in short and long-run between Islamic financial development and economic growth. The relationship was found to be a bi-directional one as opposed to being a Schumpeter's supply-leading or Robinson's demand-following relationship. In their study, the quarterly time series data gathered for the period (2003:1-2010:2) represented the total financing of Islamic banks [ln(fin)] variable whereas the two variables (gross fixed capital formation [gfcf] and GDP [ln(gdp)]) represented the Islamic financial sector.

In the fourth causal hypothesis, no causal relationship was proposed between the two variables. In this regard, Goaid and Sassi (2010) stated that Islamic financial development negatively affects economic growth as economists generally stress the financial role in the growth of the economy. Based on this hypothesis, no relationship was found between Islamic finance and economic growth. In other words, Islamic financial development does not result in growth or the other way around. On the basis of the GMM estimation system of a dynamic panel model and with the help of an unbalanced panel data, Goaid and Sassi (2010) carried out an empirical assessment of the conventional and Islamic financial development-economic growth relationship in the case of MENA countries in the period (1993-2006). They reported that conventional banking indicators significantly and negatively related with growth at the significance level of 5%, whereas Islamic banking negatively related with it at the significance level of 10%.

In related empirical studies, the impact of financial crisis on Islamic financial development was focused on by Hasan and Dridi (2010), and Kassim and Abd Majid (2010) and they revealed that Islamic and conventional banking systems are susceptible to financial shocks, which contradicts the well-known belief that the Islamic financial system is invulnerable to the same owing to the fact that its interest-free.

DATA & METHODOLOGY

Considering the lack of research on Islamic banking development system, the Republic of Iran is chosen in this study as the Islamic country as only Iran and Sudan have available data on Islamic banking development in light of size and activity for the period (1990-2010). Accordingly, the Islamic banking development (size and activity) model was developed to empirically examine the nature and direction of causality between the variables in the sample country. This necessitated the acquiring of data from the World Development Indicators (WDI) of the World Bank and Data Market database.

More specifically, the Autoregressive Distributive Lag (ARDL) model was employed on the basis of the co-integration and Granger-causality tests to identify the nature and direction of causality between IBD, EG and FC in the selected countries. Owing to the short sample data size, the data is disaggregated into quarterly data through the Gandolfo (1981) method. To this end, the econometric models specification is hereby given as follows:

- i*1.1
- i*1.2
- i*1.3
- i*1.4

Here: Domestic Credit to Private Sector by Banks to GDP (%) (DCPB) as proxy of Islamic Banking Activity Development (IBAD) (Beck and Levine, 2004; Zervos, 1998), Deposit Money Bank Assets to GDP (%) (DMBA) as proxy of Islamic Banking Size Development (IBSD) (Abduh and Chowdhury, 2012; Goaid and Sassi, 2010), GDP per capita growth (%) as the proxy of economic growth (EG) (King and Levine (1993); Yusof and Bahlous (2013); Goaid and Sassi (2010)), Money and quasi money (M2) to total reserves ratio Volatility (M2RV) as proxy of Financial Crisis (FC) (Fukuda & Dahalan, 2012). The u represents the error 43. In view of the above equation, our long-run corruption-aid model is hereby specified as follows:

$$i \dots\dots\dots 3.4$$

$$i \dots\dots\dots 3.5$$

$$i \dots\dots\dots 3.6$$

$$i \dots\dots\dots 3.7$$

It is crucial to note that the entire variables, except economic growth (EG) measurements are in the form of natural logarithm procedure terms, where the long-run relationship's presence is identified via the variables with the help of bounds testing procedure brought forward by Pesaran and Pesaran (1997). Such a procedure forms the initial stage of the ARDL co-integration method and is according to the F-test or Wald-statistics. Therefore, a join-significance test, indicating no co-integration ($H_0: \beta_0^i = \beta_1^i = 0$) was carried out.

Added to the above, the f-test was used in the bound test had a non-standard distribution, and for a distinct significance level, two critical values bands are computed as recommended by Pesaran and Pesaran (1997). The lower band views the entire variables to be I(0) whereas the upper band views them to be I(1). Co-integration is deemed to be present when the calculated f-statistic is higher than the upper critical value. However, if the f-statistic lies between the two critical bands of values, then the test is deemed to be inconclusive and if it is lower than the lower critical value, there is absence of co-integration. In other to achieve this, we hereby specified the following generic form equation in which each variable comes in turn as dependent variable.

$$i \dots\dots\dots 3.8$$

In this context, the Granger-causality test, which is also the main test to determine the short and long-run relationship among variables, is conducted by specifying the equation below for estimation and is considered as a composite of short-run and error correction estimates (ECT-error correction term);

$$t - 1 \dots\dots\dots 3.9$$

$$t - 1 \dots\dots\dots 3.10$$

$$t - 1 \dots\dots\dots 3.11$$

$$t - 1 \dots\dots\dots 3.12$$

In the equation 3.12, θ represents the speed of adjustment, and ECT represents the residuals obtained from the estimated co-integration model of Eq. (16). Added to this, the researcher also made use of the obtained Granger causality test results to determine the variables' causality relationship in both short and long-term. Such a test checks the dynamic relationship between time series variables and is widely utilized in the literature of economics to determine the direction and magnitude of the relationship between two variables. Granger (1988) was the pioneering researcher to include the concept of co-integration into causality, where both co-integrated variables and causal relationships of variables are tested within the framework of ECM.

In this study's ARDL analysis, a three-phase method was employed as recommended by Kouakou (2011). In the first phase, the integration order of the entire variables was obtained through the unit root test (stationarity) after which, in the second phase, the co-integration relationship among the variables was tested through bounds test. On the final phase, the Granger causality test was employed to test the causal relationships among the variables.

Results and Empirical Findings

The table (Table 4.1) presents that some of the variables integrated in the zero order (1(0)) whereas others, integrated in the one order (1(1)) or at first difference with different levels of significance (1, or 5 or 10%). The fundamental criterion is that ARDL method is deemed valid if the variables integration stays within the first difference level as evidenced in Table 4.1. Added to this, the results of the diagnostic tests reveal that in the fourth model, no serial correlation exists among the entire variables, a correct functional form is present and heteroscedasticity is non-existent.

Table 4.1 Unit Root Tests

Variables	Levels			First differences		
	ADF	PP	DF-GLS	ADF	PP	DF-GLS
GDPPCGR	-3.19**	-2.59*	-1.28	-3.52***	-4.86***	-2.11**
LM2RV	-6.63***	-6.66***	-5.92***	-14.33***	-40.10***	-13.75***
LDCPB	-0.83	-1.05	-0.85	-1.17	-3.97***	-1.36
LDMBA	-2.75*	-1.45	-1.97**	1.4	0.84	0.18

Notes: The null hypothesis is generally no stationarity. The significance levels of * and ** imply stationarity at 1% and 5 % respectively**

The next step involves the examination of the bound test (See Table 4.2), where the table shows that EG, IBAD, and IBSD bound tests revealed F-statistic that is greater than the upper bound of 1%, FC bound tests revealed F-statistic that is greater than the upper bound of 5%. It can therefore be concluded that the result at 1 and 5% showed a significant cointegration relationship among the respective variables.

Table 4.2 Bound Test Result

Dependent Variable	F-statistics	10%		5%		1%	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
IBAD	6.98***	2.37	3.2	2.79	3.67	3.65	4.66
IBSD	7.56***	2.37	3.2	2.79	3.67	3.65	4.66
EG	6.29***	2.37	3.2	2.79	3.67	3.65	4.66
FC	4.05**	2.37	3.2	2.79	3.67	3.65	4.66

***, **, *** Imply 10%, 5%, and 1% level of significance respectively. The null hypothesis is no cointegration. Critical values are from Pesaran and Pesaran (2001)**

The result shows the existence of long-run equilibrium relationship between the development of Islamic banking (activity and size) and economic development (economic growth and financial crisis). Based on this result of the presence of a long-run equilibrium between the two, the study can be modeled by the following equation;

$$IBAD = -0.54*** - 0.004FC - 0.09EG*** + 1.39IBSD*** \dots\dots\dots 3.13$$

Table 4.3 Diagnostic test of IBAD long-run equilibrium model

Test Statistic	LM Version	F Version
A : Serial Correlation	CHSQ (4) 5.990[0.200]	F(4.60) 1.247[0.301]
B: Faction Form	CHSQ (1) 0.102[0.749]	F(1.63) 0.082[0.775]
C: Heteroscedasticity	CHSQ (1) 0.3E-5[0.999]	F(1.76) 0.3E-5[0.301]

The Lagrange multiplier tests are distributed as Chi-squared variates with degrees of freedom in parentheses. The first figures in the parenthesis for the F-test are the degrees freedom. The null hypothesis of the two tests is no serial correlation, correct functional form and homoscedasticity respectively.

According to the above long-run equilibrium equation (3.13), it can be concluded that FC negatively effects IBAD in an insignificant manner, where EG enters the regression with a negative sign goes against the theory, at the level of significance of 1%. It is noted that for every 1% increase in EG, IBAD falls by 0.09%. In addition, IBSD was found too positively and significantly impact IBAD at the significance level of 1%. The diagnostics tests presented in Table 4.3 indicates that the estimates are free from heteroscedasticity or serial correlation and no functional form issue is present. The study increases the maximum lag to 6, according to

the comments of Dr. Bahram Pesaran (the co-author of Microfit 4.0) on the need to increase the optimal lag length of the variables to solve the diagnostic tests. The study actually selected the lag order as follows (6, 3, 5, 5) based on Akaike Information Criterion.

Therefore, the long-run equilibrium model of the relationship between Islamic banking development, economic growth and financial crisis can be presented as follows;

$$IBSD = +0.086 + 0.887IBAD^{***} - 0.016FC^{***} - 0.019EG \dots \dots \dots 3.14$$

Table 4.4 Diagnostic test of IBSD long-run equilibrium model

Test Statistic		LM Version	F Version	
A : Serial Correlation	CHSQ			
	(4)	6.404[0.171]	F(4.60)	1.431[0.234]
B: Faction Form	CHSQ			
	(1)	0.982[0.321]	F(1.67)	0.855[0.358]
C: Heteroscedasticity	CHSQ			
	(1)	0.498[0.480]	F(1.76)	0.488[0.487]

The Lagrange multiplier tests are distributed as Chi-squared variates with degrees of freedom in parentheses. The first figures in the parenthesis for the F-test are the degrees freedom. The null hypothesis of the two tests is no serial correlation, correct functional form and homoscedasticity respectively.

The above equation (Equation 3.14) is representative of the long-run equilibrium model between IBSD, IBAD, EG and FC. It indicates that FC significantly and negatively impacts IBSD and that for every 1% increase in FC, IBSD falls by 0.016% at the significance level of 1%. It also represents that EG negatively but insignificantly impacts IBSD in Iran and IBAD enters the regression equation with a positive sign at the level of significance of 1%. The diagnostic test results presented in Table 4.4 indicates no serial correlation among the variables, a correct functional form is present and heteroscedasticity is non-existent. The study increases the maximum lag to 6, according to the comments of Dr. Bahram Pesaran (the co-author of Microfit 4.0) on the need to increase the optimal lag length of the variables to solve the diagnostic tests. The study actually selected the lag order as follows (6, 0, 0, 0) based on Schwarz Bayesian Criterion.

The following equation (Equation 3.15) presents the long-run equilibrium model between the variables (EG, FC IBSD and IBAD);

$$EG = - 0.930 - 0.041FC + 2.62IBAD^{**} - 1.835IBSD \dots \dots \dots 3.15$$

Table 4.5 Diagnostic test of EG long-run equilibrium model

Test Statistic	LM Version		F Version	
A : Serial Correlation	CHSQ			
	(4)	5.990[0.200]	F(4.60)	1.247[0.301]
B: Fuction Form	CHSQ			
	(1)	0.102[0.749]	F(1.63)	0.082[0.775]
C: Heteroscedasticity	CHSQ			
	(1)	0.308[0.999]	F(1.76)	0.3E-5[0.99]

The Lagrange multiplier tests are distributed as Chi-squared variates with degrees of freedom in parentheses. The first figures in the parenthesis for the F-test are the degrees freedom. The null hypothesis of the two tests is no serial correlation, correct functional form and homoscedasticity respectively.

It is evident from equation 3.15 that IBAD is the only variable that has a positive effect on EG at the level of significance of 5% in that for every 1% increase in IBAD, EG increases by 2.62%. Both FC and IBSD have insignificant and negative effect on EG. The results of the diagnostic tests presented in Table 4.5 shows that the estimates are free from heteroscedasticity or serial correlation and no functional form issue exists. The study increases the maximum lag to 6, according to the comments of Dr. Bahram Pesaran (the co-author of Microfit 4.0) on the need to increase the optimal lag length of the variables to solve the diagnostic tests. The study actually selected the lag order as follows (6, 3, 0, 1) based on Akaike Information Criterion.

After conducting the long-run equilibrium test between FC, EG, IBAD and IBSD, the study can be modeled by the following equation.

$$FC = +1.357 - 0.0430EG + 1.373IBAD - 4.448IBSD \dots \dots \dots 3.16$$

Table 4.6 Diagnostic test of EG long run equilibrium model

Test Statistic	LM Version		F Version	
A : Serial Correlation	CHSQ			
	(4)	1.568[0.814]	F(4.66)	0.334[0.854]
B: Faction Form	CHSQ			
	(1)	0.1E-4[0.99]	F(1.69)	0.1E-4[0.99]
C: Heteroscedasticity	CHSQ			
	(1)	0.312[0.860]	F(1.77)	0.034[0.862]

The Lagrange multiplier tests are distributed as Chi-squared variates with degrees of freedom in parentheses. The first figures in the parenthesis for the F-test are the degrees freedom. The null hypothesis of the two tests is no serial correlation, correct functional form and homoscedasticity respectively.

According to equation 3.16, Islamic banking development (size and activity) do not result in financial crisis in the context of Iran and the results presented in Table 4.6 indicated no serial correlation among the variables, there is correct functional form and heteroscedasticity is non-existent. The study select the lag order as follows (1, 2, 0, 2) based on Akaike Information Criterion.

One of the major tests in the ARDL analysis is the Granger-causality test and the results are presented in Table 4.7. Based on the results, IBAD Granger causes EG in the long and short run estimation with the same feedback from EG. Also, IBSD Granger causes EG also in both runs, whereas EG Granger causes IBSD solely in the long run, while IBAD and IBSD Granger causes FC in the long run. Meanwhile, FC Granger causes IBSD in both runs and FC Granger causes IBAD solely in the long run.

Table 4.7 Granger causality results

Variable	Δ EG	Δ FC	Δ IBAD	Δ IBSD	ECT(-1)
Δ EG	-	3.51*	3.67*	3.04*	23.82***
Δ FC	0.17	-	0.09	0.01	37.19***
Δ IBAD	14.10***	0.52	-	27.44***	8.61***
Δ IBSD	0.73	6.45***	35.42***	-	52.62***

*, **, *** Imply 10%, 5%, and 1% level of significance respectively. The null hypothesis is no Granger causality. The chi-square statistics are reported for the variables, while the t-statistic is reported for the ECT.

Judging from the results in Tables 4.8 and 4.9, it is evident that a bi-directional causality relationship is present between EG and IBAD in both runs (long and short), while a supply-leading hypothesis is evident from IBSD to EG in the short run, and a bi-directional causality relationship in the long run. It can therefore be concluded that Islamic banking development (size and activity) plays a significant role in economic growth and financial crisis in the context of the Islamic Republic of Iran.

Table 4.8 Summary of IBAD, EG and FC Results on Granger-causality Tests

Variables	Hypotheses	Short run	Long run
IBAD \longrightarrow FC	Unidirectional	NO	-
IBAD \longrightarrow EG	Supply leading	-	-
EG \longrightarrow IBAD	Demand following	-	-
FC \longrightarrow IBAD	Unidirectional	NO	-
IBAD \longleftrightarrow EG	Bidirectional	YES	YES
IBAD \longleftrightarrow FC	Bidirectional	NO	YES

Notes: The \longrightarrow and \longleftrightarrow connotes (unidirectional, Supply leading or Demand following) and bidirectional causality respectively

Table 4.9 Summary of IBSD, EG and FC Results on Granger-causality Tests

Variables	Hypotheses	Short run	Long run
IBSD → FC	Unidirectional	NO	-
IBSD → EG	Supply leading	YES	-
EG → IBSD	Demand following	NO	-
FC → IBSD	Unidirectional	YES	-
IBSD ↔ EG	Bidirectional	NO	YES
IBSD ↔ FC	Bidirectional	NO	YES

Notes: The arrows → and ↔ connotes (unidirectional, Supply leading or Demand following) and bidirectional causality respectively

Conclusion

In consideration of the above analysis, it is evident that in case of long-run Islamic banking development (activity), it has a significant positive relationship with the economic growth. This result is aligned with that reported by prior studies (i.e. Furqani & Mulyany, 2009; Yusof & Bahlous, 2013; Farahani & Dastan, 2013). This indicates that in Iran, economic growth can be encouraged through the implementation of policies in the Islamic banking activities. Similarly, Islamic banking products, such as Musharakah and Mudarabah that are equity-based have to be marketed. It is important for the concerned authorities to set up policies that enumerate a specific percentage of the entire financing provided by the bank, that has to be reserved for promising sectors such as; manufacturing, agriculture, mining, and electricity. This will in turn, contribute to financing in terms of productivity and growth. More importantly, Islamic banking development (activity) is not impacted by the financial crisis, whereas Islamic banking development (size) is impacted by it in the context of the Islamic Republic of Iran. In order to limit the financial crisis effect and to address issues related to it, the Iranian policy makers should set up policies to improve the development of Islamic banking activities. On the other hand, Islamic banking development (activity) is negatively impacted by economic growth and Islamic banking development (size) insignificantly contributes to the growth of the economy and vice versa in consistent with prior studies (Gheeraert & Weill, 2014; Goaid & Sassi (2010).

Evidently, from the findings, it can be noted that the bi-directional Granger causality hypothesis was the more dominant relationship among the four discussed relationships between Islamic banking activity development and economic growth in both short and long run. This finding is aligned with prior studies like Abduh and Omar (2012), Abdu and Chowdhury (2012), Furqani and Mulyany (2009) that reported a bi-directional Granger causality relationship in the long-run between the two variables.

Specifically, with regards to Islamic banking development (size) and economic growth the researcher found Granger causality relationship in the long run but not in the short run where a supply-leading relationship was found instead. Additionally, financial crisis solely caused Islamic banking development in terms of size in the short run, while in the long-run a bi-directional Granger causality hypothesis was evidenced. This leads to the

importance of Iranian policy makers to set up policies that reinforce and focus on the liquidity and activity of Islamic banks as opposed to its deposit and size, specifically when the country is suffering from economic crisis.

Finally, despite the political and economic blockade implemented on the Islamic Republic of Iran, Iran and Sudan are the only two countries among other Islamic countries that implement a full Islamic financial system in their economies. In this study, the researcher found that the Islamic banking development and an activity-based Islamic banking system contribute in a positive manner to the economy in terms of economic growth and financial crisis. The findings showed that the Islamic banking system, especially in terms of activity, play a major role in countering the effect of the international blockade that has been in effect for thirty years (1980-present time) in Iran, a country that is negatively impacted by such blockade with greater frequency and intensity.

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