

The Contribution of Islamic Banking to Indonesia's Economic Growth: The Evidence from the Vector Error Correction and Variance Decomposition Methods

Nurhastuty Kesumo Wardhany¹, Shaista Arshad²

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Abstract

Purpose: The aim of this study is to empirically understand whether Islamic banks have a positive relationship to economic growth in Indonesia.

Methodology: This study examines the causal relationship amongst several selected variables: real GDP (RY), total deposit (TD), the change in the Consumer Price Index as an inflation proxy (INF), and the ratio of total imports and exports to nominal GDP (OE). In order to accomplish the research objectives of this study, a time series quarterly data spanning from the first quarter of 2003 to the last quarter of 2011 comprising of 36 data points has been used to perform an effective analysis.

Findings: The inference deduced here is twofold; First Islamic banks in Indonesia are still unable to contribute significantly to Indonesia's economic growth. Second, the relationship between Islamic banks and economic growth in Indonesia is positively but weakly correlated.

Research Limitations: For this time series research, the researcher is limited by the small amount of data (2003.Q1 to 2011.Q4).

Keywords: contribution, Islamic bank, VECM, VDC

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¹ Universitas Trisakti

Correspondence address: Faculty of Economics, Universitas Trisakti, Jalan Kyai Tapa (Grogol) Jakarta – 11440 Indonesia, e-mail: titoeyt.cherry@gmail.com.

² Postgraduate Student INCEIF (The Global Institute of Islamic Finance), e-mail: shaistaarshad@gmail.com.

Introduction

Economic development enhances the productive capacity of an economy by using available resources to reduce risks, and remove impediments which otherwise could lower costs and hinder investment. The banking system promotes economic growth and development through financial intermediation. Hence, an effective and efficient banking system can bring about a rapid growth in all sectors of the economy.

Over the last few decades Islamic banks have emerged as a viable and efficient mode of financing. In addition, like their conventional counterparts, they are important in economic development. The Islamic finance industry has come a long way from its humble roots, and has established itself as an important part of the global financial system.

The good performance and tremendous growth of Islamic finance have shown its feasibility. In countries such as Indonesia, Islamic finance has become an integral part of the financial system, hence it is necessary to verify its contribution to the economic development of a country.

The Islamic banks in Indonesia have evolved into a competitive component of the financial system, from only one full-fledged Islamic bank and 76 Islamic rural banks in 1998, to an impressive six full-fledged Islamic banking, 25 Islamic windows, and 139 Islamic rural banks by 2009. In terms of economic growth, Indonesia has had a remarkable record of high growth since the Asian crisis of 1997–98. The GDP increased by 6.5% in 2011 confirming Indonesia's position as one of Asia's fastest growing economies (Husna and Ismar, 2012).

Islamic banking still accounts for a small portion of total banking in Indonesia in spite of its rapid growth over the last couple of years. Indonesia is a Muslim majority economy, so the growth of Islamic banking should have an impact on the economic growth of Indonesia. Considering this fact, we investigate the contribution of Indonesia's Islamic banks to economic development. We use time-series econometric analysis to note these contributions.

This paper consists of six sections. Following the introduction, we study the literature. The research objectives and motivations for the study are discussed in Section 3, followed by the research methodology in section 4. The empirical results and their interpretations are then analyzed in Section 5. Lastly, the conclusion is presented, and limitations and possible avenues for further research are considered.

Literature review

There are four views on the relationship between financial development and economic growth. Goldsmith (1969) stated that financial development has a positive effect on economic growth. Robinson (1952) stated that financial development follows economic growth; "where enterprise leads finance follows". Greenwood and Smith (1997), however, claim that the relationship between financial development and economic growth has bidirectional causality. Lastly, Lucas (1988) explains that financial development and economic growth are not causality related (Al-Yousif, 2002, p. 2).

The question is whether financial development promotes economic growth or vice versa. Many studies have attempted to empirically analyse this causal relationship. These possible directions of causality are termed by Patrick (1966) as the supply-leading and demand-following hypothesis. On the one hand, the supply-leading hypothesis conjectures a causal relationship from financial development to economic growth. On the other hand, the demand-following hypothesis conjectures a causal relationship from economic growth to economic development (Patrick, 1966).

Al-Yousif (2002) concludes that financial development and economic growth are mutually causal, bidirectional. Similarly, Odedokun (1992) and Luintel and Khan (1999) showed parallel results, cementing their rationale that both financial and economic developments are causal and bidirectional. Interestingly, Ajija, Setianto and Hudaifah's (2010) study of Indonesia's economic growth found that total deposits do not have a long-run impact on economic growth but total financing does.

This indicates that savings through Islamic banks do not yet contribute to economic growth. Since the economic growth tends to increase in responses to innovations of total deposits, Islamic banks have to continue to increase their funding. When Bank Indonesia claims that the growth of the third party fund was significantly affected by the competitiveness of the returns offered by Islamic banks, it must keep its return to be competitive compared to the conventional banks, especially on the long-term deposits, which have been dominated by Islamic bank's funds.

According to Masih and Madani (2010, p. 1692), 'finance' affects 'growth' through: investments and/or productivity. Masih and Madani (2010, p. 1693), tried to proxy the investment channel by the real per capita fixed capital formation and the productivity channel by the real interest rate whose positive coefficient might indirectly capture the productivity effects on growth (Luintel and Khan, 1999; Kliesen and Schmid, 2006; Liang and Teng; 2006) and finally, for an open economy highly dependent on

exports, foreign trade is likely to be an important channel through which financial development affects economic growth. So Masih and Madani (2010, p. 1693) brought another conditioning variable represented by the proportion of exports in the GDP.

Masih and Madani (2010) added that in ensuring the size of the financial intermediaries is linked with the provision and quality of financial services, the financial development is proxied by bank deposits/GDP and/or bank credit to the private sector/GDP. In addition, economic growth is usually represented by the real GDP per capita.

Hence in investigating the contribution of Islamic bank to Indonesia's GDP, both theoretically and empirically the issue has remained unresolved. The authors hope to improve on the existing time-series methodology in answering the question about causality.

Research objectives

The aim of this study is to empirically understand whether Islamic banks have a positive relationship with Indonesia's economic growth. The objective is , firstly to examine the contribution of Islamic banks towards promoting economic growth in Indonesia and secondly to explore the relationship between Islamic banks and economic growth in Indonesia.

According to Ajija, Setianto and Hudaifah (2010), in Indonesia, the impact of financial sectors on economic growth has been analyzed by, for example Mulyadi (2004), Ingrid (2006), and Azasyah (2008). Nevertheless, the evidences on the contribution of the financial sector to economic growth remain debatable. This is because earlier studies arrived mixed and inconclusive results (Majid and Salina Kassim, 2010 in: Ajija, Setianto and Hudaifah, 2010).

While several studies have been conducted on the contribution of financial sectors to economic growth, very few have researched the contribution of Islamic banking in Muslim countries, such as Indonesia. According to Masih and Madani (2010), the correlation between financial development and economic growth has been recognized but the direction of causality between them is not yet resolved.

Research methodology

Data source and description

This study examines the causal relationship amongst several variables. This study considered four variables: real GDP (RY), total deposit (TD), the change in the Consumer Price Index as an inflation proxy (INF), and the ratio of total imports and exports to nominal GDP (OE).

In order to accomplish the research objectives of this study, a time series quarterly data spanning from the first quarter of 2003 to the last quarter of 2011 comprising 36 data points has been used for analysis. The data for all the variables were collected from Bank Indonesia's Monthly Statistical Bulletin and Datastream.

Methodology used

The examination of the dynamic relations between the contribution of Islamic banks to a country's economic may be undertaken through either Engle and Granger's (1987) or Johansen and Juselius' (1990) protocols. While Engle and Granger's (1987) two-step error correction model may be used in a multivariate context, Johansen's (1990) VECM yields more efficient estimators of cointegrating vectors. This is because the Johansen's (1990) VECM is a full information maximum likelihood estimation model, which allows for testing cointegration in a whole system of equations in a single step, without requiring a specific variable to be normalized.

In conjunction with the latest techniques of time-series studies, after examining the unit root test and the order of the VAR, the Johansen cointegration test will be applied. This test will enable us to examine the long-run theoretical relationship among the variables. As this paper is based on cointegration we apply the Vector Error-Correction Model (VECM) and variance decomposition methods for testing Granger causality. Hence, the VECM and variance decomposition techniques are used to understand the lead-lag relationship and the relative exogeneity/endogeneity of the variables respectively.

We are further interested in understanding the effects of shocks of specific variables on the long run relationship. For this we undertake the Impulse Response Function (IRF) and the Persistence Profiles. These are premeditated to assess the effect on variables with a specific shock and a system-wide shock.

Empirical results

Below we present the results we obtained through the time series analysis to understand the impact of total deposit on the GDP of Indonesia.

Unit root test

In order for both left-hand and right-hand variables to balance, time series data needs to be stationary. In general, time series data are often assumed to be non-stationary and thus it is necessary to perform a pre-test to ensure a stationary relationship among the variables to avoid the problem of spurious regression. We first transform all the variables into logarithms scale. Next, we create the differenced form for each variable by creating the difference of their log forms. Lastly, we use the Augmented Dickey Fuller (ADF) test on each variable in both their level and differenced form.

Table 1. ADF Test of the Variables in Level and Differenced Form

Variables in level form			
Variable	Test statistic	Critical value	Decision
LRY	-2.5722	-3.5671	Accept null, Variable is non stationary
LTD 1. AIC 2. SBC	-2.6572 -2.8665	-3.5671	Accept null, Variable is non stationary
LCPI	-1.4079	-3.5671	Accept null, Variable is non stationary
LOE 1. AIC 2.SBC	-2.9052 -2.6227	-3.5671	Accept null, Variable is non stationary
Variables in differenced form			
DRY	-2.9687	-2.9665	Reject null, Variable is stationary
DTD	-3.7622	-2.9665	Reject null, Variable is stationary
DCPI	-3.6965	-2.9665	Reject null, Variable is stationary
DOE 1.AIC 2.SBC	-2.5914 -4.3898	-2.9665	Accept null, Reject null

Source: own elaboration.

Based on these results, all variables are I(1). Variables such as LTD and LOE had inconsistent results in AIC and SBC but had the same conclusion in the summary. The authors chose to proceed with the cointegration, as this would not create problems in the analysis later on.

Order of var model

The next empirical result is the determination of the Order of VAR model. Table 2 shows that both AIC and SBC recommend an order of 6.

Table 2. Order of VAR

AIC	SBC
6	6

Source: own elaboration.

From the results, we may suspect that there is no autocorrelation in the variables since there is no conflict between AIC and SBC. However, it is better to check for any autocorrelation:

Table 3. Test for presence of Autocorrelation

Variable	Chi-sq P value	Implication (at 10%)
DRY	.014	Accept null, There is serial correlation
DTD	.519	Reject null, There is no serial correlation
DCPI	.484	Reject null, There is no serial correlation
DOE	.934	Reject null, There is no serial correlation

Source: own elaboration.

As evident from Table 3, there is autocorrelation in 1 out of the 4 variables. Even though our AIC and SBC have the same result, tests show that one variable faces autocorrelation, a problem commonly found in time series data. To determine the number of lags to be used, we choose a lower order than 6. This is because, 1) our data is relatively limited (36 observations), we want to avoid over-parameterization; 3), only one variable

has autocorrelation. Considering the trade-off of lower and higher orders, we have chosen the lower VAR order of 2.

Cointegration result

Cointegration implies that the relationship among the variables is not spurious; in other words there is a theoretical relationship among the variables and that there is equilibrium in the long run. As depicted in Table 4, the maximal eigenvalue, trace, SBC, HQC indicate there is one cointegrating vector but that according to AIC, there are four.

Table 4. Number of Cointegrating Vectors based on different tests

Criteria	Number of Cointegrating Vectors
Maximal Eigenvalue	1
Trace	1
AIC	4
SBC	1
HQC	1

Source: own elaboration.

Statistically, we can conclude that there is one cointegration. Furthermore, we believe that the relationship among the variables (real GDP, consumer price index as inflation, import and export to nominal GDP, and total deposit) is not spurious. There is a theoretical relationship among the variables and [that they are in equilibrium in the long run. It has implications for the extent of effectiveness of a Government's short run macroeconomic policy.

Table 5. Johansen ML results for single cointegrating vectors – real GDP, total Deposits, and change in the Consumer Price Index as an inflation proxy, and ratio of total imports and exports to nominal GDP (2003–2011)

Ho	H1	Statistic	95% Critical Value	90% Critical Value
Maximum eigen value statistics				
$r = 0$	$r \geq 1$	45.64	31.79	29.13
$r \leq 1$	$r \geq 2$	12.83	25.42	23.10

Trace Statistic				
$r = 0$	$r \geq 1$	73.92	63.00	59.16
$r \leq 1$	$r \geq 2$	28.27	42.34	39.34

Source: own elaboration.

In another dynamic relationship, rising GDP creates an increase in the money supply however the stock market needs an increase in GDP to make profits, and higher GDP leads to higher inflation. In a normal or healthy economy, higher GDP will motivate people to save (deposit) more. Hence, from an economic perspective, we are inclined to believe that in our model, there is a comovement among variables and they will be in equilibrium in the long-term. However testing cointegration is not enough for us; we need to know the direction of Granger-causality in order to identify the exogenous and the endogenous.

Long run structural modelling

With the endorsement of one cointegrating relationship amongst the variables, we can now verify the theoretical foundation as earlier discussed about the linkages among the variables of one strong cointegrating relationship. We apply Long Run Structural Modelling (LRSM) to investigate whether the variables are indeed consistent with the theories.

We proceed with LRSM by first normalizing the LRY.³ This leaves us with the inference that only LOE (ratio import and export to nominal GDP) variables and trend are significant.

Table 6. Implication of LRSM with exact identification (LRY = 1)

	Coefficient	Standard Error	t-ratio	Decision
LTD	.027937	.014855	1.88	Variable is insignificant
LCPI	.080145	.048877	1.64	Variable is insignificant
LOE	.052845	.023624	2.24	Variable is significant
Trend	.017590	.0017214	10.21	Trend is significant

Source: own elaboration.

³ We put exactly identifying restriction of LRY=1.

To test the significance of the variables, in order to understand which variable to keep and which to drop, we implement over identifying restrictions on each variable. The results from the Chi-Square p-value of each variable imply that total deposit and consumer price index are still insignificant. From an economic interpretation, both variables are important to our research. We believe that there is always interaction between GDP and inflation.

Table 7. Implications of LRSM at over-identification

	Chi-Sq p-value	Implication
LTD	.107	Accept null, restriction is correct Variable is insignificant
LCPI	.132	Accept null, restriction is correct Variable is insignificant
LOE	.050	Reject null, restriction is not correct Variable is significant

Source: own elaboration.

If the changes in the GDP are smaller than the changes of inflation, it suggests that inflation will insignificantly reduce GDP because we use adjusted GDP to inflation or real GDP. Total deposit in Islamic bank in Indonesia is still insignificant. This is possible since the market share of Islamic bank from total market is still small but we have to keep these variables since this is our core curiosity of knowledge.

From this analysis, we arrive at the following *cointegrating equation* (numbers in parentheses are standard deviations):

$$\text{LRY} + 0.028 \text{ LTD} + 0.08 \text{ LCPI} - 0.05 \text{ LOE} - 0.017$$

$$(0.015) \quad (0.05) \quad (0.023)$$

Vector error correction model

We have established that four of our variables are moving together over long term but we need to know which variable is leading and which variable is following. The vector error correction model does this, allowing policy makers to obtain information on the exogenous and the endogenous (Granger-causality) variables. By knowing the interaction of total deposit in Islamic bank with GDP, policy makers can decide whether the GDP

will affect the total deposit in Islamic banks as capital accumulation or total deposit will contribute to the performance of real GDP.

Table 8. VECM on the variables

Variable	ECM (-1) t-ratio p-value	Implication
dLRY	.000	ECT significant Variable is endogenous
dLTD	.018	ECT significant Variable is endogenous
dLCPI	.659	ECT insignificant Variable is exogenous
dLOE	.934	ECT insignificant Variable is exogenous

Source: own elaboration.

From Table 8, we see that total deposit in Islamic bank and real GDP are endogenous and that the customer price index and economic openness are exogenous. It means in the long term, policy makers, especially the government or central bank need to base their decisions on exogenous variables such as inflation (LCPI) and trade openness (LOE) and it will bring the endogenous variables such as real GDP (RY) and total deposit (LTD) in equilibrium as a result. Therefore, VECM is indicating our independent and dependent variables but it does not mention the degree of exogeneity and endogeneity.

At this point, we need to revisit our thinking about the contribution of Islamic bank to real GDP. On one side, if the central bank wants to take a decision regarding Islamic bank in Indonesia, we can expect that Islamic bank can use total deposit to bring real GDP in the long-run equilibrium. Since Islamic banks still do not possess as much market share as the conventional bank, it is logical that total deposit is still endogenous.

Variance decomposition

The Variance Decomposition Method, decomposes the variance of the forecast error of a particular variable into proportions attributable to shocks (or innovations) in each variable in the system including its own. The relative exogeneity/endogeneity of a variable can be determined by the proportion of the variance explained by its own past shocks.

The variable which is explained mostly by its own shocks (and not by others) is deemed to be the most exogenous of all.

Table 9. Forecast of Variables using Generalized VDC (Percentage Form)

Forecast at Horizon =5				
	LRY	LTD	LCPI	LOE
Δ LRY	72%	5%	8%	15%
Δ LTD	1%	84%	14%	1%
Δ LCPI	2%	1%	90%	7%
Δ LOE	2%	34%	1%	63%
Forecast at Horizon =10				
	LRY	LTD	LCPI	LOE
Δ LRY	68%	5%	8%	20%
Δ LTD	1%	82%	16%	1%
Δ LCPI	2%	1%	90%	8%
Δ LOE	1%	39%	2%	57%

Source: own elaboration.

According to the Table 9, LCPI is most exogenous, consistent with the results obtained from the VECM. Next, in line is LTD, LRY followed by LOE. This proves to be slightly inconsistent with the VECM results as LOE was found to be an exogenous variable and yet here it is the most endogenous variable.

We attempt to explain this inconsistency by looking at the interaction of each variable with the others. Our first endogenous (Real GDP) can not influence other variables. The interaction is only about 1%, 2% and 2% to influence other variables (LTD, LCPI, LOE in horizon=5). Our first exogenous (inflation) highest percentage is about 8%, 16% and 2% to influence other variables (LRY, LTD, LOE). The last 2% is logical since inflation also interacts with exogenous variable (LOE). What is puzzling is that total deposit in Islamic bank has a high percentage (34%) when get interaction with trade openness but from economic interpretation it seems impossible that saving from Islamic bank can influence trade openness. Most of the depositors are retail customer such as worker, student and housewives and only a few are entrepreneurs.

Table 10. List of variables according to their relative Exogeneity

No.	Variable Relative Exogeneity	
	At Horizon=5	At Horizon=10
1	LCPI	LCPI
2	LTD	LTD
3	LRY	LRY
4	LOE	LOE

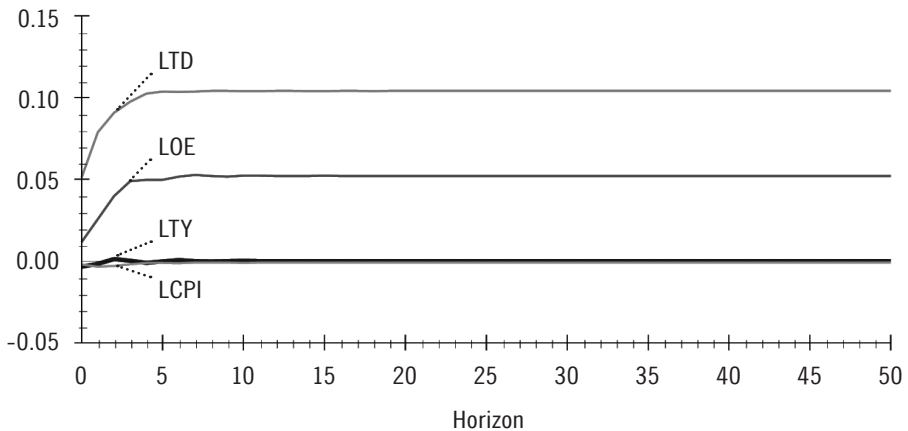
Source: own elaboration.

Moreover revisiting our issue, when we shock total deposit of Islamic bank (LTD) and see the reaction real GDP, it only brings 5% for real GDP in horizon equal to five and ten quarters. It means that the contribution of Islamic banks through total deposit is still not much.

Impulse response function

IRFs map out the dynamic response path of a variable owing to a one-period standard deviation shock to another variable. We already know that total deposit does not contribute to economic growth.

Figure 1. Generalized Impulse Response (s) to one S.E. shock in the equation for LTD



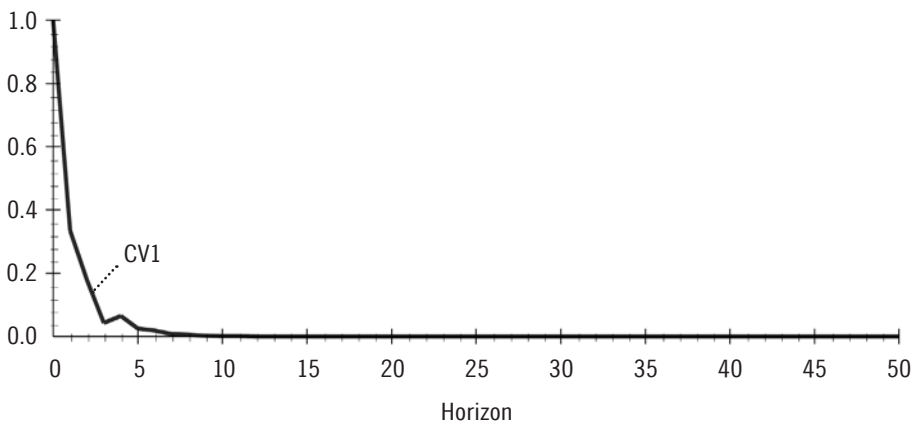
Source: own elaboration.

When there is a shock to endogenous variable (LTD), some variables deviate and others do not. Unfortunately, real GDP and inflation do not deviate at all from the initial equilibrium. However, another exogenous variable, trade openness, deviates very insignificantly at the initial stage.

Persistence profiles

The persistence profile is indicative of the time horizon required to get back to equilibrium when there is a system-wide shock. Unlike IRFs, persistence profiles trace the effects of a system-wide shock on the long-run relations meanwhile the IRFs trace out the effects of a variable-specific shock on the long-run relations. Figure 2 shows the persistence profile for the cointegrating equation of this study.

Figure 2. Persistence Profile of the effect of a system-wide shock to CV'(s)



Source: own elaboration.

The Figure 2 indicates that it would take approximately seven quarters for the cointegrating relationship to return to equilibrium following a system-wide shock.

Conclusions

In this study, we examined the relationship between Islamic banks and their contribution to economic development in Indonesia. We can draw two inferences from the data. The first is that Islamic banks in Indonesia are still unable to contribute significantly to economic growth in Indonesia.

The second finding is that the relationship between Islamic banks and economic growth in Indonesia is positively correlated albeit weak.

Islamic banks in Indonesia must continue to increase their contribution to the national economy. Islamic banks should play a more significant role in Indonesia since 85% of Indonesia's 240 million are Muslim. The central bank should realize the strategic role of Islamic banks in economic growth and move towards improving the financial infrastructure and human capital that will contribute to the growth of Islamic banks.

Moreover, Bank Indonesia, the central banks of Indonesia, claims that the growth of the third party fund (deposit in Islamic banks) was significantly affected by the competitiveness of the returns offered by Islamic banks. This is a positive sign that Islamic bank should keep their returns competitive to those of conventional banks.

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