“Determinants of Islamic bank financing in the Middle East: Vector Error Correction Model (VECM)”

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DETERMINANTS OF ISLAMIC BANK FINANCING IN THE MIDDLE EAST: VECTOR ERROR CORRECTION MODEL (VECM)

Abstract

As the world has been struck with a global financial crisis, Middle Eastern countries have been affected as well. Thus, Islamic banks have expanded, and the competitive advantage has become intensive with the increased number of conventional banks in the global banking system. This manuscript is aimed to examine the impact of macroeconomic and bank-specific factors on Islamic bank financing in the Middle Eastern countries. Therefore, the Vector Error Correction Model and the Granger causality test were run from 2009 to 2018 to detect the long- and short-run relationship between the explanatory variables and Islamic bank financing. The results suggest that both inflation and profitability negatively impact Islamic bank financing in the long run. The paper also revealed bidirectional causality between the variables GDP and bank size and Islamic bank financing. It shows that GDP and bank size are highly dominant factors of Islamic bank financing in the short run. Thus, this paper provides evidence that any short-run shock in the variables of GDP, inflation, and bank size will cause a long-term relationship with Islamic bank financing. This article's novelty is to ensure resilience within the Islamic banking system during and after the financial crisis. It provides evidence that Islamic banks can cushion their financial activities from economic volatility during the crisis. The results found can be used to predict the growth of Islamic bank financing in upcoming years in the Middle East and all emerging countries.

Keywords Islamic finance, interest rate, inflation, profitability, co-integration, causality

JEL Classification E50, G21

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INTRODUCTION

Islamic finance gained great attention after the 2008 global financial crisis. Its financial services have been growing faster globally in the last decade as the Islamic bank financing is growing not only in Arab and Islamic economies but also in various African and European economies. Citak and Hesse (2010) mentioned that Sharia-compliant financing and Islamic bank investments had been one of the fastest-growing sectors across 75 developed and developing countries. IFSB (2019) reported that Islamic banks' total assets are currently at USD 1.75 trillion and are expected to surpass USD 2.2 trillion in 2022. It is also expected that they will continue to grow within the coming years. This indicates that customers have sought alternative financial choices in funding their needs, depending not only on conventional banks but also on Islamic ones. Thus, Islamic banks comply with Islamic law and strive to increase their market share over their conventional counterparts (Kassim, 2016). Recently, Islamic banks had occupied more than twenty percent of the global banking system (IFSB, 2019). Moreover, Islamic banks achieved remarkable stability during the global financial crisis due to the realized assets compared with conventional loans (Selyowati, 2019). Indeed, this industry established a solid financing

system, which has been more resilient to the global crisis and contributed significantly towards economic growth on a worldwide scale and in the Middle Eastern economies (Sakarya, 2016).

The adverse consequences of economic uncertainty tend to slow down Islamic bank financing. Furthermore, negative bank financial indicators could shrink the volume of Islamic bank financing (Shaikh, 2014). This paper aims to explain unexplored key drivers of Islamic bank financing and enrich existing prior works in different ways. First, this paper empirically examines the long-term and short-term relationship between the explanatory variables (macroeconomic and bank-specific factors) and Islamic bank financing during the 2008 financial crisis. Thus, it employs a randomly selected annual dataset between 2009 and 2018 from some developing countries: Jordan, Palestine, Lebanon, Kuwait, and Qatar. Second, it aims to provide good knowledge in modeling factors of Islamic finance in emerging countries. This contribution increases the awareness of customers' behavior who may be concerned about macroeconomic and bank-specific factors when deciding their modes of financing, especially Murabaha contracts. To the best of our knowledge, no previous work has applied the vector error correction model in the area of Islamic finance and Middle Eastern countries. The novelty of this research is that the results found by using the VECM model can be used to predict the expected growth of Islamic bank financing in upcoming years, not only in the Middle East but also in all other emerging money markets.

1. LITERATURE REVIEW AND HYPOTHESES

1.1. Islamic finance theory

The topic of Islamic finance received attention from many academics and practitioners worldwide due to its resilience against the global financial crisis in 2008 (Hasan & Dridi, 2010). Shahid and Abbas (2012) confirmed that the Islamic bank can adapt more efficiently than the conventional financial system during the global financial crisis. Similarly, Chakroun and Gallali (2015) stated that Islamic banks are less fragile than traditional banks as they were hit harder by the consequences of the financial crisis. Meanwhile, Cihák and Hesse (2010) argued that Islamic bank financing achieved better performance during the crisis than conventional financing as they had invested in real and liquid assets. This argument is supported by many scholars such as Bakri et al. (2017), Sakarya (2016), Rajhi and Hassairi (2013), and Kasri (2010).

From an Islamic perspective, profit-loss sharing (risk) is considered the foundation of Islamic financial transactions. Moreover, Islamic principles prohibit all financial investments that rely on interest (Riba), which is considered the root cause of the global financial crisis (Hasan & Dridi, 2010). In this manner, Tariq and Masih (2016) stated that interest does not impact Islamic funding. Similarly, Mushtaq and Siddiqui (2017) found that Muslims who invest their money in Islamic banks tend to be indifferent about fluctuations in interest rates. Indeed, the absence of interest provides some confidence and trust between borrowers and creditors. Nevertheless, Abdul Kader and Leong (2009) and Ibrahim and Sufian (2014) found the interest rate to be the driving force behind Islamic banks' financial operations.

On the other hand, Islamic finance prohibits illegal activities such as gambling, gaharrar, mayser and speculations, and financing in pork or drugs (Mirakhor & Iqbal, 2007). Thus, all financial transactions are bounded by Islamic principles and Sharia law. Hence, Islamic banks provide alternative modes of financing against interest-bearing loans, including; Murabaha contracts that allow the bank to buy an asset or commodity from a third party and later resell it again to another buyer at a price higher than the purchased price and then the bank got a markup (Moghul & Ahmed, 2003). In the Ijara agreement, the sale of commodities is set at a specific time. In Ijara-based financing, the rental commission fees are paid to the buyer of goods, usually the bank (Selim, 2020). As for the Mudarabah contract, the bank provides the project's financing, and the other partner (speculator) manages the business through effort and time. While the bank incurs all losses

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in investment; however, when profit is retained, it is distributed between the two upon ratio agreed between the two parties (Ellahi et al., 2010). For the Musharakah agreement, the partners agree to contribute to capital based on profit and loss sharing. Thus, all parties are share risks and reward associated with it (Hanif & Iqbal, 2010).

1.2. Factors of Islamic bank financing

Regarding the investigation of the determinants of Islamic bank financing, Cham (2018) analyzed Islamic bank financing factors in the MENA region in the years 2007–2010 using a generalized linear model. It was found that oil prices, domestic prices, and capital resources positively affect Islamic bank financing. Meanwhile, Naha and Sarker (2016) investigated the influence of various macroeconomic factors on Islamic bank financing in Muslim and non-Muslim countries between 2004 and 2013. Their findings indicated that the higher growth in GDP and inflation move Islamic bank financing forward. However, the exchange rate had a negative impact on Islamic bank financing of the selected countries.

In Pakistan, Nawaz (2019) investigated the factors that determine Islamic bank financing growth using structural equation modeling. It was found that the main determinants of banking growth are assets and equity. However, GDP has no significant impact on Islamic bank financing. Similarly, Zahid and Basit (2018) investigated the impact of GDP, inflation rate, money supply, total saving, and interest on Islamic banking growth in Pakistan from 1985 to 2015. They found that GDP and money supply had a positive effect on Islamic banks' growth, while interest rates, savings, and inflation rates were all found to be negatively correlated with Islamic banks' growth.

In Indonesia, Setyowati (2019) examined the factors that influence Islamic bank development. It was found that interest, exchange rates, and inflation have long-term asymmetric effects on Islamic bank financing, providing evidence that economic instability impacts Indonesian Islamic banks. Furthermore, Nursyamsiah (2017) examined the impact of real GDP, interest, and international trade on Islamic bank financing using a causality test and a vector autoregressive model. They found that Islamic bank financing is sensitive to the declines in real output, interest, and international trade.

In Malaysia, Quan et al. (2019) examined the determinants of Islamic bank performance using ordinary least squares methods. They found that inflation is negatively correlated to Islamic bank performance. Furthermore, Bakri et al. (2017) examined the determinants of Islamic bank financing using linear and nonlinear vector autoregressive models. The results concluded that there was no asymmetric relationship between profit rate and Islamic bank financing. However, Ibrahim and Sufian (2014) evaluated the interrelation between key economic factors and Islamic bank financing using the structural VAR model. They found that Islamic bank financing responds positively to the change in GDP and is impacted negatively by the positive inflation and interest rate shock.

Given the limitations of prior works, this paper expands upon financial literature by adding new bank-specific factors, such as bank size and profitability, alongside macroeconomic factors to determine their effects on Islamic bank financing. To the best of the researcher's knowledge, this paper is considered the newest of its kind as it primarily explores the influence of Islamic bank financing determinants in some Middle Eastern countries using the Vector Error Correction Model (VECM).

1.3. Research hypotheses

Based on the debating of previous studies, this paper seeks to fill the research gap by examining the long-term and short-term impact of macroeconomic and bank-specific factors on Islamic bank financing in Middle Eastern countries. Therefore, this paper puts forward the following hypotheses:

H_1: *There is a statistically significant long-term impact of the variables GDP, inflation, interest, bank size, and return on assets on Islamic bank financing in Middle Eastern countries from 2009 to 2018.*

H_2: *There is a statistically significant short-term impact of the variables GDP, inflation, interest, bank size, and return on assets on Islamic bank financing in Middle Eastern countries from 2009 to 2018.*

To confirm or reject the two hypotheses, this paper is conducted using some statistical methods as follows. First, unit root and Johansen's tests to check the stationery and long-term co-integration amongst research variables, respectively. Second, a residual test is used to check all VEC assumptions and the stability of the VEC model. Third, Vector Error Correction Model and Granger causality test are analyzed and presented to determine the long-term and short-term relationships between the research variables and Islamic bank financing. Fourth, the impulse response function is used to test the dynamic short-run shock of Islamic bank financing in response to the change in macroeconomic and bank-specific factors.

2. METHODS

2.1. Data collection and variables measurement

As mentioned before, this article aims to examine the influence of the economic and bank-specific factors on Islamic bank financing in some Middle Eastern countries, including Jordan, Palestine, Lebanon, Kuwait, and Qatar. The data of Islamic bank financing (IF) were collected from the World Bank country database and each country's financial stability reports from 2009 to 2018. The following variables are used as independent variables: gross domestic product (*GDP*), inflation (*INF*), interest on debt (*I*), bank size (*SIZE*), and profitability (*ROA*). However, GDP and bank size are expressed in terms of the logarithm to unify the data variables. Thus, the definition of the research variables is shown in Table 1.

2.2. Stationary test

This paper assumes that all data variables involved are stationary to test con-integration between the research variables (*GDP*, *I*, *INF*, *ROA*, *SIZE*, and *IF*). Thus, a unit root test is required to avoid spurious regression in data analysis, as mentioned by Gujarati (2004). Hence, this paper proceeds with stationarity for data series using ADF (Dickey & Fuller, 1981) and PP (Phillips & Perron, 1988) tests.

2.3. Co-integration test

After that, the paper tests the optimal lag criteria-based on Akaike Information Criterion (AIC) method to detect co-integration amongst the variables. All endogenous variables must be non-stationary in autoregressive distributed lag to use a co-integration test (Enders, 1995). Therefore, Johansen's co-integration test is used to determine the long-term relationship amongst the research variables, which the paper uses to tell the direction of causality between research variables (Johansen, 1988). Thus, the vector autoregressive model can be written as follows, as developed by Pesaran et al. (2001):

$$\Delta IF_t = \beta_0 + \sum_{k=1}^{n} \beta_k \Delta IF_{t-k} + \\ + \sum_{k=0}^{n} \delta_k \Delta x_{t-k} + \varphi_1 IF_{t-1} + \varphi_2 x_{t-1} + \mu_t, \quad (1)$$

Table 1. Variables definition and previous works used

Group	Acronym	Definition	Empirical works
Economic factors	GDP	Gross domestic product (current USD) is annually measured for each country (log of GDP)	Nawaz (2019), Cham (2018)
	INF	Inflation rate is measured by consumer price index (annual %) for each country	Setyowati (2019), Ibrahim and Sufian (2014)
	I	Lending interest rate (%) is defined as the bank rate that usually meets the short- and medium-term loans. This rate is normally differentiated according to the creditworthiness of borrowers. The terms and conditions attached to these rates differ by country, however, limiting their compatibility. Thus, conventional interest is measured in USD currency for each country	Nursyamsiah (2017), Mushtaq and Siddiqui (2017), Tariq and Masih (2016)
Bank-specific	Size	The bank size is calculated by total Islamic banks assets in each country (log of annual total assets)	Haron (2004)
	ROA	The average return of assets for Islamic banks in each country is measured by net income divided by total assets (annually)	Bakri et al. (2017)
Dependent	IF	The growth of Islamic bank financing in each country is measured by the annual percentage change in financing (total Sharia-compliant financing excluding interbank financing) to total assets	Nursyamsiah (2017), Adebola et al. (2011)

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where ΔIF_t is the change in the dependent variable (Islamic bank financing), β_0 denotes an intercept, x_{t-k} refers to the vector of regressors, φ_1 and φ_2 denote the speed of adjustment in which IF_t returns to long term equilibrium due to change in x. β_k and δ_k refer to the short-term coefficients of relationships, $k=1$ indicates the optimal lag order of the research variables, and $_t$ indicates the disturbance term.

2.4. VECM, causality, and impulse response function

In this case, if the data variables are nonstationary, then the study utilizes ARDL to detect long-term dynamics of series between IF and the explanatory variables (Granger & Engle, 1987). Thus, the paper replaces the long term ARDL components $\left(\varphi_1 y_{t-1}+\varphi_2 x_{t-1}\right)$ with φz_{t-1} or ECT_{t-1} to adjust the speed of long-term equilibrium. Z_{t-1} measures the OLS residuals from long-term co-integration regression. Hence, the traditional Error Correction Model (ECM) for co-integrated series is expressed by the following equation:

$$\Delta IF_t=\beta_0+\sum_{k=1}^{n}\beta_k\Delta IF_{t-k}+ \\ +\sum_{k=0}^{n}\delta_k\Delta x_{t-k}+\varphi z_{t-1}+\mu_t. \quad (2)$$

In the context of VECM, further analysis should be used to evaluate the economic policy in the selected countries. The Granger causality test can be used to check whether the variables' time series is useful in predicting each other (Granger, 1969). However, suppose the Granger causality test does not completely interpret the interaction between explanatory variables. In that case, the impulse response function can be used to understand the short-run shock for the dynamic system in response to the changes in some external factors.

3. EMPIRICAL RESULTS

3.1. Descriptive analysis

Table 2 exhibits the descriptive statistics of the mean and standard deviation (in first-order lag). The results show that Islamic bank financing across Palestine, Jordan, Lebanon, Kuwait, and Qatar recorded positive average changes of 7.1% per year, while the mean values of GDP and bank size saw positive changes at 6% and 3.9%, respectively. However, the remaining variables inflation, interest rate, and ROA displayed negative average yearly changes at –52.3%, –2%, and –7.2%. This indicates that negative growth was recorded in economic factors throughout the study due to the impact of the global crisis between 2009 and 2018. In terms of standard deviation, Islamic bank financing had shown slight volatility throughout the study at 6.9%.

Table 2. Descriptive statistics

	ΔIF	*ΔGDP*	*ΔINF*	*ΔI*	*ΔSIZE*	*ΔROA*
Mean	0.071	0.060	–0.523	–0.020	0.039	–0.072
St. deviation	0.069	0.122	1.840	0.0813	0.0648	1.106
Skewness	0.848	–0.607	–1.776	–0.1808	0.631	–4.569
Kurtosis	3.349	4.998	8.908	3.569	4.770	29.993
Jarque-Bera	6.246	11.398	99.013	0.942	9.855	1692
p-value	0.044	0.003	0.000	0.624	0.007	0.000
Observation	50	50	50	50	50	50

Note: Observation value equals the five countries multiplied by 10 years (2009–2018).

3.2. Unit root test

Table 3 shows the unit root test results, including intercepts and trends, to detect stationarity amongst Islamic bank financing and the explanatory variables (Dickey & Fuller, 1981). The ADF and PP tests results provide evidence that the variables are stationarity at the level *I*(0) except the variable SIZE. Therefore, *t*-values of ADF and PP are less than the critical value and significant at the level of 1% in *I*(0), except *SIZE* integrated at first difference *I*(1). Therefore, it is appropriate to build up the VECM model in the first difference of the variables *I*(1).

Table 3. The results of unit root test

Series	Augmented Dickey-Fuller		Philips-Perron	
	At level	1st order	At level	1st order
D{*IF*(–1)}	–5.13*	–4.19*	–5.10*	–35.6*
D{*GDP*(–1)}	–5.62*	–4.10*	4.16*	–13.8*
D{*INF*(–1)}	–6.76*	–8.06*	–6.76*	–17.3*
D{*INT*(–1)}	–4.73*	–4.43*	6.35*	–28.9*
D{*SIZE*(–1)}	–1.67	–7.73*	–4.04	–16.4*
D{*ROA*(–1)}	5.68*	–7.71*	–5.67*	–34.3*

Note: * denotes significance at 1% level.

The next step is to select the optimal number of lags for the estimated model. It depends on the lowest value of the Akaike Information Criterion (AIC) as the primary selection method. The result indicated that the optimal lag for all variables is number four at a 1% level of significance as estimated by EViews. Thus, one proceeds with further tests at lag (4) with a minimum AIC of –2.2479.

3.3. Co-integration analysis

Table 4 illustrates the results of the Johansen co-integration test. The result indicates that trace values are greater than critical values amongst the series; *IF*, *GDP*, *INF*, *INT*, *SIZE*, and *ROA*. Thus, the test result rejects the null hypothesis (H_0: $r = 0$) under the 5% level, and three positive relationships exist. The result provides evidence of 4 co-integrating equations amongst the endogenous variables at the 5% level. The result indicated that the selected series are stable with long-term equilibrium. Thus, VECM is more appropriate in conducting research findings.

Table 4. The results of the co-integration rank test (Trace)

Trend: Linear deterministic trend			Lag interval (at first differences): 1 to 4	
Co-integration eq. No.	**Eigenvalue**	**Trace statistics**	**Critical value**	***p*-value**
None*	0.816545	202.8082	95.75366	0.0000
At most 1*	0.791836	126.4978	69.81889	0.0000
At most 2*	0.435575	55.87352	47.85613	0.0047
At most 3*	0.305491	30.13590	29.79707	0.0457

Note: Trace value denotes 1 co-integration equation at 5% level of significance.

The results of error correction $\left(ECT_{t-1}\right)$ at first co-integration order provides a co-integration equation between the variables *IF*, *GDP*, inflation, interest, bank size, and return on assets as shown in equation (3) (long-run model):

$$ECT_{t-1} = 1.000\left(IF\right) - 0.813\left(GDP\right) - \\ -0.043\underset{(0.009)}{\left(INF\right)} - 0.466\left(INT\right) - \\ -1.523\left(SIZE\right) - 0.0369\underset{(0.013)}{\left(ROA\right)} + 0.004. \quad (3)$$

Source: Author's estimation.

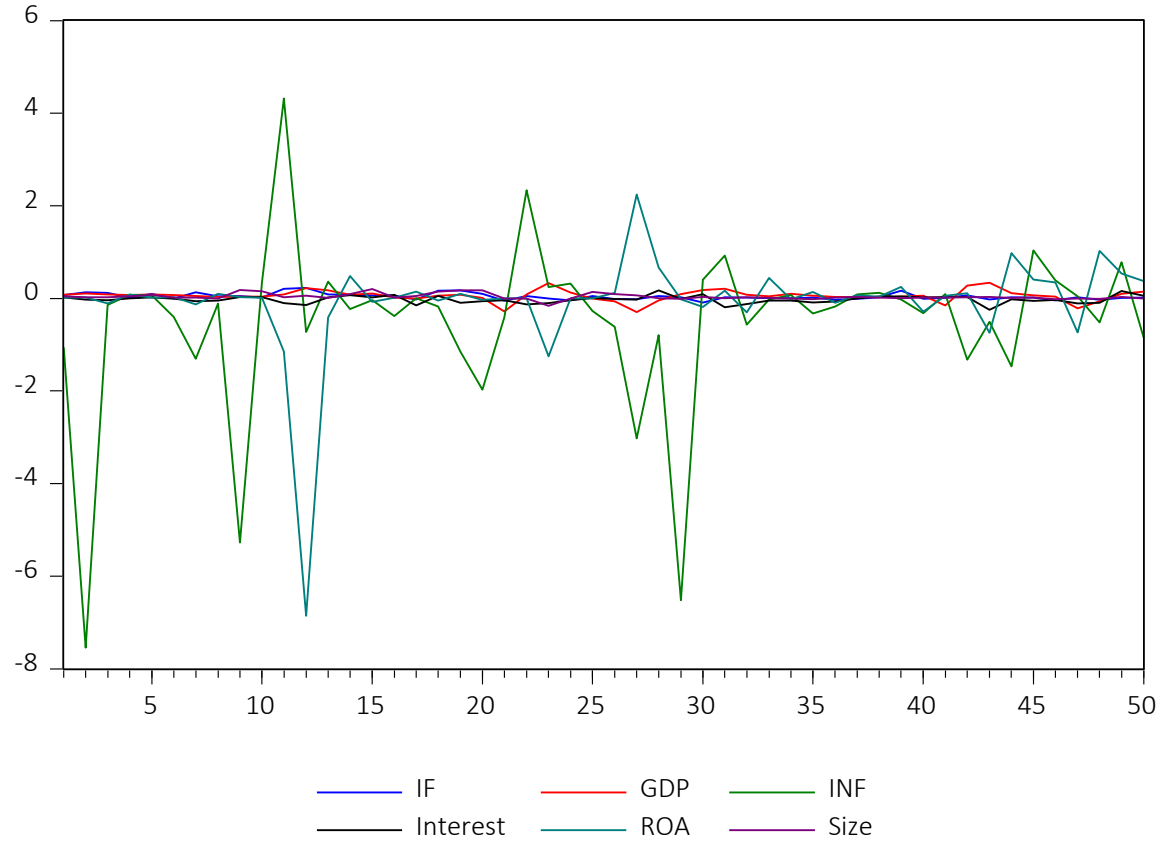

Figure 1. Co-integration relationships

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Table 5. VEC residual tests

Source: Author's estimation.

Residual test	Statistical approach	Chi-squared	Prob.	Decision
Normality (joint)	Skewness	3.950205	0.6834	Normal
	Kurtosis	1.647960	0.9491	
	Jarque-Bera	5.598165	0.9350	
Autocorrelation	LM test	Rao F-stat	Prob.	No serial correlation
Lag 1		1.293565	0.1785	
Lag 2		0.928031	0.5886	
Lag 3		0.800173	0.7650	
Heteroscedasticity	Joint test	Chi-squared	Prob.	Homoscedastic
		818.4130	0.3004	

Based on the co-integration equation (3), it can be indicated that only inflation and return on assets have a long-term relationship with Islamic bank financing. This means that each percentage increase in inflation will decrease Islamic bank financing by 4.3%, and this estimate was significant at the 5% level. Similarly, one percent appreciation in Islamic banks' profit is likely to reduce Islamic bank financing by 3.69%. Moreover, Figure 1 presents the stability line and long-term relationship equilibrium among the endogenous variables. It can be seen that there is a large fluctuation in the inflation rate and profitability of Islamic banks across the Middle Eastern countries over the 10 years due to the impact of the 2008 global financial crisis. This implies that short-term variability in this period significantly deviated from the long-term relationship. Nevertheless, Islamic bank financing is steadily stable despite the financial and political crises.

Table 5 shows the validity of VECM; residual test series should be normally distributed, with no serial correlation, and homoscedastic. This paper uses the VEC residual normality test to check the normality of the dataset. The result indicates the series is jointly followed a normal distribution and *the p*-value of Jarque-Bera (0.9350) is greater than the 5% significance level. Furthermore, this paper uses Lagrange Multiplier (LM) test to check the serial autocorrelation among endogenous variables. The result of LM test reveals no autocorrelation at lag *h*. This proves the absence of autocorrelation up to lag 3. In case of heteroscedasticity, this paper applies white VEC residuals heteroscedasticity test. The result concludes that the series are homoscedastic with a high Chi-squared value of 818.4 and *p*-value of 0.3004 above the 5% level. Thus, VECM is stable and valid to use in testing the research hypotheses.

3.4. The results of VECM

This model is used to detect the presence of the long-term relationships between the endogenous variables. Consequently, the VAR model can be estimated at first-order $I(1)$, including the error correction term $\left(ECT_{t-1}\right)$ with the same optimal lag (k) minus 1 $\left(K-1=3\right)$ to estimate the Vector Error Correction Model (VECM).

Table 6 exhibits that the powers of determination are greater than 0.5 ($R^2 < 0.5$), and that the likelihood is large (157.1329) and AIC is relatively small (–1.353606), which implies well-fitting VECM estimation. Thus, this supports alternative Hypothesis 1 (H_1), indicating that inflation and profitability have long-term equilibrium with Islamic bank financing in three co-integrating equations. The results provide evidence that inflation has a negative correct sign with Islamic bank financing. Thus, the decline in Islamic bank financing is related to the increase in the inflation rate. However, profitability (ROA) has the same negative sign after correction. It is commonly believed that an economy with a low inflation rate exhibits growth in Islamic bank financing as credit facilities' prices increase in conventional counterparts. This action attracts more deposits to Islamic banks and enables more customers to obtain funds in different Islamic bank financing ways. Nevertheless, higher ROA tends to decline the demand for Islamic bank growth. Thus, ECM can be written, as shown in equation (4):

Table 6. Results of VECM estimates

Source: Author's estimation.

Error correction	D(*IF*)	D(*GDP*)	D(*INF*)	D(*INT*)	D(*SIZE*)	D(*ROA*)
CointEq1	–0.052702	0.904432	–6.441145	–0.030502	2.065531	0.218931
D(*IF*(–1))	–0.538502	–0.486061	–6.469055	0.075744	–7.290897	–0.070039
D(*IF*(–2))	–0.413025	–1.263063	–13.71218	0.563873	–2.531979	0.220413
D(*IF*(–3))	–0.793002	–0.908207	–3.997302	0.208975	–0.533775	–0.435760
D(*GDP*(–1))	–0.287463	0.103084	–0.833455	–0.275259	0.080684	–0.110635
D(*GDP*(–2))	0.095817	–0.051926	0.221303	–0.093989	0.118030	0.239231
D(*GDP*(–3))	–0.257118	–0.203901	3.011519	–0.256753	–0.774626	–0.043948**
D(*INF*(–1))	–0.018238**	0.009313**	–0.892102	–0.003315**	–0.210904	0.001498**
D(*INF*(–2))	–0.003127**	–0.021099**	–0.412734	0.008324**	–0.057689	0.002449**
D(*INF*(–3))	–0.016224**	–0.018796**	–0.161104	0.004163**	0.161522	–0.010903
D(*INT*(–1))	0.239222	–0.560148	5.544194	–0.631144	–3.162169	–0.007944
D(*INT*(–2))	–0.095206	–0.770204	7.393485	–0.369487	–3.693103	–0.120839
D(*INT*(–3))	–0.057068	–0.677489	3.895044	–0.225528	–2.987197	–0.117077
D(*SIZE*(–1))	0.536745	1.071253	–7.696275	0.320367	5.478933	0.218657
D(*SIZE*(–2))	–0.245659	0.178366	1.089315	–0.564264	5.223341	–0.303299
D(*SIZE*(–3))	0.334186	0.642632	1.450627	–0.279844	–2.631669	–0.088315
D(*ROA*(–1))	–0.011373**	0.012686**	–0.878319	0.033422**	–0.469426	0.026577**
D(*ROA*(–2))	–0.037193**	–0.010434**	–0.896628	0.016481**	–0.141520	–0.000463**
D(*ROA*(–3))	–0.011582**	0.008637**	–0.360573	0.009715**	–0.209570	–0.011827**
C	–0.004870**	–0.002942**	0.043238	0.000495**	–0.011191	–0.001688**
R-squared	0.663441	0.716491	0.540119	0.683099	0.707234	0.687432
Log likelihood	157.1329					
AIC	–1.353606					

Note: ** denotes the significance level at 5%.

$$\begin{pmatrix} \Delta(IF) \\ \Delta(GDP) \\ \Delta(INF) \\ \Delta(INT) \\ \Delta(SIZE) \\ \Delta(ROA) \end{pmatrix} = \begin{pmatrix} -0.005 \\ -0.003 \\ 0.043 \\ 0.001 \\ -0.011 \\ -0.002 \end{pmatrix} + \begin{pmatrix} -0.54 & -0.49 & -6.47 & -0.08 & -7.29 & -0.07 \\ -0.29 & 0.10 & -0.83 & -0.28 & 0.08 & -0.11 \\ 0.02 & 0.01 & -0.89 & -0.00 & -0.21 & 0.00 \\ 0.24 & -0.56 & 5.54 & -0.63 & -3.12 & -0.00 \\ 0.54 & 1.07 & -7.69 & 0.32 & 5.47 & 0.22 \\ -0.01 & 0.01 & -0.88 & 0.03 & -0.47 & 0.03 \end{pmatrix} \begin{pmatrix} \Delta(IF_{k-1}) \\ \Delta(GDP_{k-1}) \\ \Delta(INF_{k-1}) \\ \Delta(INT_{k-1}) \\ \Delta(SIZE_{k-1}) \\ \Delta(ROA_{k-1}) \end{pmatrix} +$$

$$+ \begin{pmatrix} -0.41 & -1.26 & -13.7 & 0.56 & -2.53 & 0.22 \\ 0.10 & -0.05 & 0.22 & -0.09 & 0.12 & 0.24 \\ -0.00 & -0.02 & -0.41 & 0.01 & -0.06 & 0.00 \\ -0.10 & -0.77 & 7.39 & -0.37 & -3.69 & -0.12 \\ -0.24 & 10.8 & 1.09 & -0.56 & 5.22 & -0.30 \\ -0.03 & 0.01 & -0.89 & 0.02 & -0.14 & -0.00 \end{pmatrix} \begin{pmatrix} \Delta(IF_{k-2}) \\ \Delta(GDP_{k-2}) \\ \Delta(INF_{k-2}) \\ \Delta(INT_{k-2}) \\ \Delta(SIZE_{k-2}) \\ \Delta(ROA_{k-2}) \end{pmatrix} +$$

$$+ \begin{pmatrix} -0.79 & -0.91 & -3.99 & 0.21 & -0.53 & -0.43 \\ -0.26 & -0.20 & 3.01 & -0.26 & -0.77 & -0.04 \\ -0.02 & -0.02 & -0.16 & 0.00 & 0.16 & -0.01 \\ -0.06 & -0.67 & 3.89 & -0.22 & -2.89 & -0.12 \\ 0.33 & 0.64 & 1.45 & -0.28 & -2.63 & -0.09 \\ -0.01 & 0.01 & -0.36 & 0.01 & -0.21 & -0.01 \end{pmatrix} \begin{pmatrix} \Delta(IF_{k-3}) \\ \Delta(GDP_{k-3}) \\ \Delta(INF_{k-3}) \\ \Delta(INT_{k-3}) \\ \Delta(SIZE_{k-3}) \\ \Delta(ROA_{k-3}) \end{pmatrix}. \quad (4)$$

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3.5. Granger causality analysis

The co-integration equation indicates long-term relationships between three variables, namely *IF*, *INF*, and *ROA*. However, in terms of short-term relationships, further causality testing is required. The Granger causality analysis is used to detect if the endogenous variables help predict a dependent variable based on the past values and endogenous variables (Granger & Yoon, 2002).

Table 7 shows the Granger causality test's findings to detect the short-run relationship between *IF* and other endogenous variables. The results show that bidirectional causality between the variables *GDP*, bank size, and *IF*. Therefore, this supports Hypothesis 2 (H_2). Indeed, higher GDP and large banks move Islamic bank financing forward and boost Islamic banks to provide more funds to their customers. This argument is consistent with Setyowati (2019) and Bakri et al. (2017). The result also shows that higher inflation rates could cause growth in Islamic bank financing, indicating unidirectional causality with Islamic bank financing, which is in line with Setyowati's (2019) results who mentioned that CPI does ganger cause Islamic bank financing in Indonesia. However, the other variables, such as interest and return on assets, did not cause Islamic bank financing changes. This means that a higher interest rate and Islamic profit rate do not intend to change the Islamic bank financing in the short run. This means that Islamic banks' customers will not compare the conventional interest rate with the profit margin in the Islamic banking system when they obtain funds.

3.6. Impulse response function

Figure 2 presents the impulse response function for the research variables following in response to Cholesky's one standard deviation to further analyze the dynamic impact of VECM responding to certain shocks of economic crises and the variables themselves. The results show that Islamic bank financing positively responds to the shock itself during the last 10 years. Moreover, Islamic bank financing positively responds to the changes in the variables of GDP, interest, and bank size in the short run. However, financing responds negatively to the variation in both inflation and ROA in the third year of the study and gets stable over the rest of the period.

4. DISCUSSION

This research has modeled the long-term and short-term relationship between GDP, inflation, interest, size, profitability, and Islamic bank financing in the Middle Eastern countries of Jordan, Palestine, Lebanon, Kuwait, and Qatar. Therefore, the researcher used ADF and PP tests to detect the stationary amongst the research variables. The results indicated that *t*-values of all research variables are stationary at the first difference *I*(1). It was concluded that VECM is appropriate for estimating long-term co-integration amongst the research variables.

The next step is to eliminate the autocorrelation case in the VAR model by determining the optimal lag length. Using the smallest value of the

Table 7. The results of block exogeneity Wald test (short-run)

Source: Author's estimation.

Null hypothesis	Chi-squared	*p*-value	Granger status	Direction	Conclusion
GDP does not Granger cause (*IF*)	10.775	0.0130	Yes	Bidirectional	Reject
IF does not Granger cause (*GDP*)	16.756	0.0008	Yes		Reject
INF does not Granger cause (*IF*)	18.054	0.0004	Yes	Unidirectional	Reject
IF does not Granger cause (*INF*)	5.144	0.1615	No		Accept
INT does not Granger cause (*IF*)	5.136	0.1623	No	Non	Accept
IF does not Granger cause (*INT*)	6.043	0.1095	No		Accept
ROA does not Granger cause (*IF*)	8.875	0.0760	No	Non	Accept
IF does not Granger cause (*ROA*)	6.740	0.0806	No		Accept
SIZE does not Granger cause (*IF*)	9.719	0.0021	Yes	Bidirectional	Reject
IF does not Granger cause (*SIZE*)	15.321	0.0002	Yes		Reject

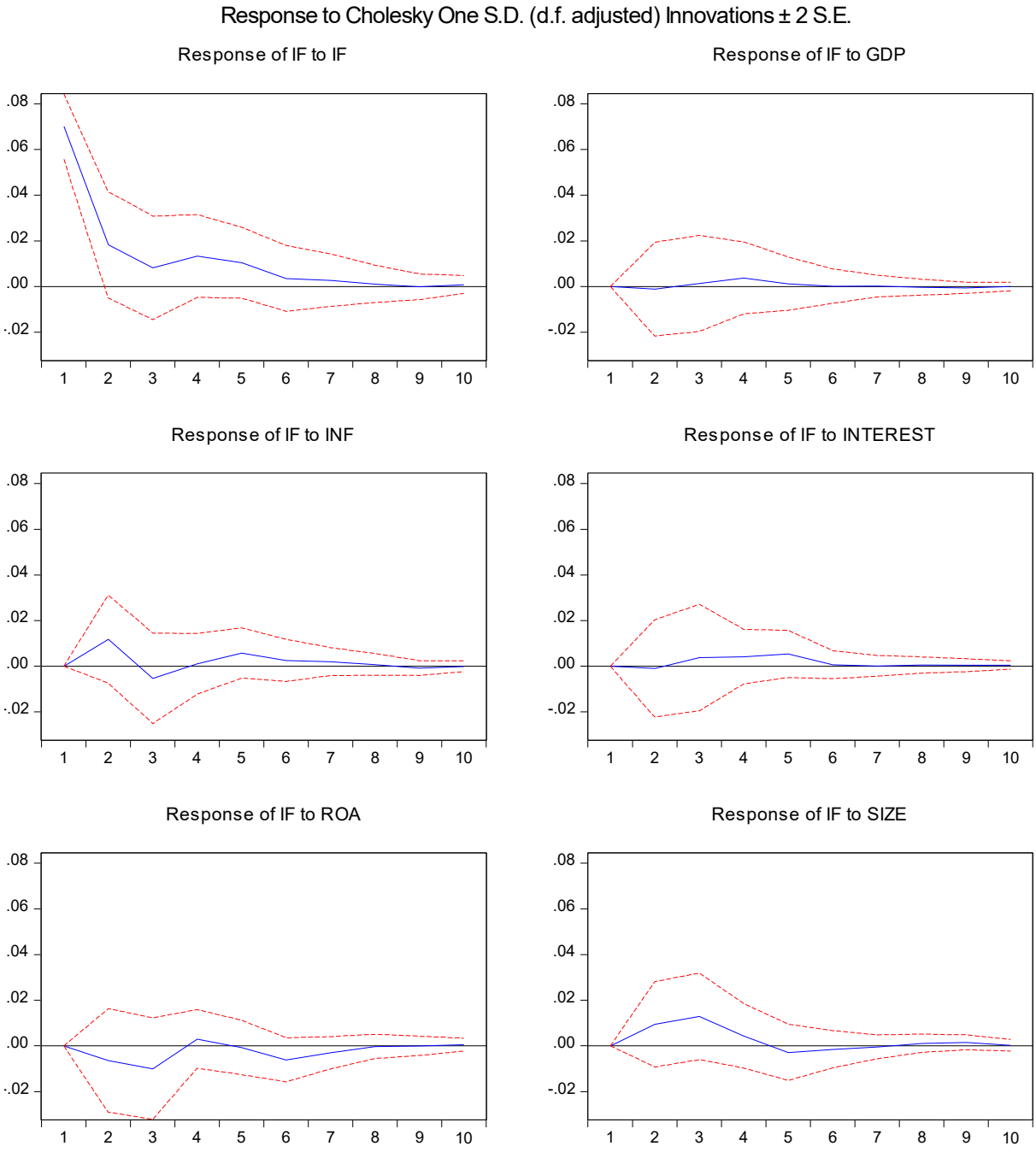

Figure 2. Dynamic responses of financing to the explanatory variables

Akaike Information Criterion (AIC), it can be concluded that the optimal lag number is 4. This indicates that all the variables are affected by each other in the current period and previous periods. After that, this paper used the Johansen co-integration test to see the existence of a long-term relationship amongst the variables in the model.

The result of VECM provides evidence that the growth of Islamic bank financing is not affected by the fluctuation of the business cycle that reflects the variability of GDP. This argument is contrary to that of Nursyamsiah (2017) and Ibrahim and Sufian (2014); however, it is consistent with the findings of Nawaz (2019). Moreover, interest was found to have no impact on Islamic bank financing, indicating that interest is prohibited given Islamic bank ideology. Therefore, the conventional interest rate change will not lead to a change in Islamic banks' growth. This result is consistent

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with Tariq and Masih (2016) and Mushtaq and Siddiqui (2017). The inflation rate as a measure of the price level was shown to have a significant negative impact on Islamic bank financing in the long run, which means when there is an increase in consumer price index by 4.3%, there will be a decrease of 1% in Islamic bank financing. This indicates the continuous increase in prices of goods and services, which leads to a decline in the supply of funding in Islamic banks. This result is consistent with Setyowati (2019) and Ibrahim and Sufian (2014) findings.

As for long-run bank-specific factors, the result shows that bank size has a limited predictor of Islamic bank financing. This indicates that different sizes of Islamic banks in Middle Eastern counties are not essential in predicting Islamic finance growth. Therefore, the current study provides new evidence in modeling Islamic bank financing, indicating that large bank size is not considered a crucial factor of Islamic bank financing. This result conflicts with Haron (2004) who argued that bank size positively affects bank growth. However, ROA has a negative long-term association with Islamic bank financing in Middle Eastern countries, which means that a 1% increase in ROA reduces Islamic banking's capacity to provide funds by 3.69%. This provides evidence that lower profitable Islamic banks tend to increase the level of their financing.

In the case of a short-term relationship, the current study shows a bidirectional causality between GDP and Islamic bank financing, indicating that Islamic bank financing will rise when there is an increase in GDP and vice versa. This result accelerates the business process and boosts Islamic banks toward funding production to attain more profits. On the other hand, the Granger causality test result shows that inflation and Islamic bank financing have unidirectional causality. This means that customers purchasing consumption goods through a Murabaha contract tend to increase the demand and prices of purchasing items, which causes higher inflation (Setyowati, 2019). However, inflation does not Granger cause growth in Islamic bank financing.

The current study found no causality between the interest rate and financing (IF), which indicates that Islamic banks prohibit interest rates from being gained and paid in their financial activities. This argument is in line with the findings of Kassim et al. (2009) and Tariq and Masih (2016). The results also show no casualty between profitability and Islamic bank financing in the short run. A variation in ROA would not have any effect on Islamic bank financing. Nevertheless, the results show bidirectional causality between bank size and Islamic bank financing, showing the higher value of assets leads to move Islamic bank financing forward and vice versa. This result pushes Islamic banks toward expansion and raising their capital to invest in real assets and gain more profits.

Finally, the impulse function results indicate that Islamic bank financing reacts positively to itself during all periods of the study (2009–2018) despite the crisis and political instability in the Middle East. It provides evidence that Islamic banks can cushion their financial stability and foster financing growth (Hasan & Dridi, 2010). Islamic bank financing shows a positive response to changes in GDP, where this response gets stable during all the periods; this result is confirmed by the Granger causality between GDP and Islamic bank financing. Similarly, the results indicate a positive response of Islamic bank financing towards the variability of interest rate as this response was stable over the last 10 years (2009–2018). This result clearly explains how Islamic banks protect themselves from the financial crisis (Bakri et al., 2017). Moreover, Islamic bank financing responds negatively to the shock in inflation and ROA. These responses have high volatility in the third year for both inflation and profitability factors. The changes in bank size cause positive responses in the first two periods of study. After that, it remains stable over the rest of the period. This indicates that a large bank size moves Islamic bank financing forward in the short run.

CONCLUSION

This article aimed to examine the influence of macroeconomics, such as GDP, Inflation, and interest, and bank-specific factors, the ROA and size, on Islamic bank financing in Middle Eastern countries. Based on VECM, the result supports Hypothesis 1, indicating the existence of a long-term relationship between the variables inflation and ROA and Islamic bank financing. Inflation and ROA are shown to have a negative impact on Islamic bank financing. Furthermore, the Granger causality test of VEC found that any short-run shock in GDP, inflation, and bank size will give rise to a long-term relationship with Islamic bank financing. Therefore, the results support Hypothesis 2. Moreover, the impulse response function indicated that Islamic bank financing got stable during the financial crisis. The dynamic responses are stable despite the economic cycle volatility in these countries. This enables Islamic banks to cushion economic instability, attract more customers, and provide more funds.

Operating under complicated circumstances, Islamic banks are not immune from the economic and political conditions in the Middle Eastern countries. Therefore, it seems exposed to some systematic risks such as price level shock and inflation, which needs to be accounted for by Islamic banking sector credit management. Finally, this article suggests further research directed in the dynamic response of Islamic bank financing during the 2020 COVID-19 pandemic crisis.

AUTHOR CONTRIBUTIONS

Conceptualization: Mohammed Abusharbeh.
Data curation: Mohammed Abusharbeh.
Formal analysis: Mohammed Abusharbeh.
Funding acquisition: Mohammed Abusharbeh.
Investigation: Mohammed Abusharbeh.
Methodology: Mohammed Abusharbeh.
Project administration: Mohammed Abusharbeh.
Resources: Mohammed Abusharbeh.
Software: Mohammed Abusharbeh.
Supervision: Mohammed Abusharbeh.
Validation: Mohammed Abusharbeh.
Visualization: Mohammed Abusharbeh.
Writing – original draft: Mohammed Abusharbeh.
Writing – review & editing: Mohammed Abusharbeh.

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