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An Econometric Analysis of the Financial Nexus: Islamic Banking and the Philippine Economy

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ABSTRACT

This study examines the development of Islamic banking in the Philippines. It empirically analyses the role played by the Philippine economy in its financial performance over time, and the reciprocal impacts of Islamic banking on the national economy of the country. It uses unit root, Johansen cointegration, Vector Error Correction Model (VECM), Granger causality, and Impulse Response Function (IRF) analyses to analyze the growth of Islamic banking, proxied by its total asset value from the 1st quarter of 2002 to the 4th quarter of 2023, while economic growth was represented by the inflation rate, Gross Domestic Product (GDP) and the country's growing population on the same time period. The Vector Error Correction Model (VECM) test results indicate the presence of a long-term relationship between the economic variables inflation, and the GDP with the Islamic banking total asset value. Granger causality analysis result revealed only GDP and Islamic banking in the country were found to have an immediate and bidirectional relationship. This study also found a unidirectional relationship coming only from inflation rate to Islamic banking asset value in the country. IRF analysis revealed that GDP is positively associated with Islamic bank in the country while inflation rate is found to have a negative impact on the bank. The study concludes that the Philippine economy as a whole and Islamic banking in the country can be complementary in mutual growth and development.

Keywords: Islamic banking; Vector Error Correction Model; Amanah Islamic Bank; Philippine Islamic Banking

INTRODUCTION

Islamic Banking Development and Economic Growth Nexus: Evidence from the Philippines

This study delves into the intricate relationship between the Islamic bank and the Philippine economy, examining how these two vital sectors influence and interact with one another given that Islamic banks generally are incompatible with conventional economy that allows interest-baring profit like that of the Philippines'. By employing a rigorous economic analysis, the authors aimed to unravel the complex web of connections between Islamic and key economic indicators.

Understanding the relationship between Islamic banking and economic growth is crucial for policymakers, investors, and researchers. It can provide valuable insights into the potential contributions of Islamic banking to

economic development and inform the development of effective policies and strategies to promote its growth and sustainability in the Philippines. By examining the causal linkages between Islamic banking and key economic indicators, this study seeks to shed light on the following questions: How does economic growth (as measured by GDP, and inflation rate also knowns as the real GDP) influence the performance of Islamic banking institution in the Philippines and, is what is the nature of the relationship between Islamic banking and the broader Philippine economy?

METHODS AND ECONOMETRIC MEASURES

This study empirically examines the effects of the Philippine macroeconomic indicators on the Islamic banking institution in the Philippines using quarterly data from the 1st quarter of 2002 to the 4th quarter of 2023. The variables that took place in the model are named as: “”Islamic_banking” to stand for the asset value of the first and only Islamic bank in the Philippine, the al-Amanah Islamic Investment Bank of the Philippines; “GDP” stands for the Philippine Gross Domestic Product; “inflation” meaning the inflation rate of the country over time, and “population” stands for the population growth of the country which in this study used as exogenous variable to control for autocorrelation in order to avoid spurious results.

Model Specification

This stud used the following econometric model to account for the growing Islamic banking asset value and the Philippine economy and the nature of relationship of these two entities. The formula used is as follows:

$$\log Y = \beta_0 + \beta_1 [\log X_1] + \beta_2 [\log X_2] + \beta_3 [X_3] + \mathcal{E} \quad (1)$$

Where:

Y = Islamic banking (based on its asset values)

β_0 = intercept

β_1 until β_3 = estimate equation

X_1 = Open, referring to economic variables like the GDP, inflation and population growth.

$\mathcal{E}$ = error term

Before analyzing the long-run and short-run relationship between the variables, the unit root test and model selection criteria were applied to assure the stationarity of the data using the Augmented Dickey Fuller (ADF) test by Dicky and Fuller supplemented by the Fisher Chi-square test. Stationarity of data is confirmed after differencing as indicated by *p*-value 0.05 alpha level of significance and below, (Abdul Manap et al., 2012).

Table 1 Unit Root Test

Group Unit Root Test: Summary								
Series: ISLAMIC_BANK, GDP, POPULATION, INFLATION								
Date: 10/21/24 Time: 09:20								
Sample: 2002Q1 2023Q4								
Exogenous variables: Individual effects								
Automatic selection of maximum lags								
Automatic lag length selection based on SIC: 2 to 10								
Newey-West automatic bandwidth selection and Bartlett kernel								
At level					**First Level Differencing**			
Method	Statistic	Prob.**	Crosss-sections	Obs	Statistic	Profb.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)								
ADF - Fisher Chi-square		0.71	3	239	40.07	0.0000	3	239
PP - Fisher Chi-square	7.23	0.29	3	261	29.91	0.0000	3	258
** Probabilities for Fisher tests are computed using an asymptotic Chi								
-square distribution. All other tests assume asymptotic normality.								

Table 1 shows that altogether variable Islamic_bank, GDP, inflation and population indicates that at level, the ADF-Fisher Chi-square statistic = 3.68484, p-value 0.71 and PP -Fisher Chi-square = 7.23601, with a p-value = 0.29. Being p > 0.05 alpha level of significance, it means that it cannot reject the H0 meaning that the data is not stationary at level. However, at first level differencing, the series, with ADF-Fisher Chi-square statistic = 40.0715, p-value = 0.00 and PP – Fisher Chi-square = 29.9178, p-value = 0.00 rejects the H0 as the data became stationary a first level differencing, (Maulia et al., 2018).

Table 2. VAR Lag Order Selection Criteria

Endogenous variables: LOG(ISLAMIC_BANK) LOG(GDP) LOG(INFLATION)						
Exogenous variables: LOG(POPULATION(-30))						
Date: 10/24/24 Time: 20:24						
Sample: 2002Q1 2023Q4						
Included observations: 58						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-323.05	NA	15.33	11.24	11.35	11.28
1	255.86	1077.98	0.00	-8.41	-7.98	-8.24
2	355.06	174.46	0.00	-11.52	-10.77	-11.23
3	393.35	63.38	0.00	-12.53	-11.46	-12.11
4	405.10	18.23	0.00	-12.62	-11.24	-12.08
5	413.01	11.46	0.00	-12.59	-10.88	-11.92
6	472.34	79.80	0.00	-14.32	-12.30	-13.53
7	495.38	28.60	0.00	-14.81	-12.46	-13.89
8	502.93	8.59	0.00	-14.76	-12.09	-13.72
9	513.20	10.62	0.00	-14.80	-11.82	-13.64
10	527.14	12.98	0.00	-14.97	-11.67	-13.68
* indicates lag order selected by the criterion						
LR: sequential modified LR test statistic (each test at 5% level)						
FPE: Final prediction error						
AIC: Akaike information criterion						
SC: Schwarz information criterion						
HQ: Hannan-Quinn information criterion						

Econometric measures are very sensitive to lags. At one point a finding may be significant but on the other hand may not be so depending on the number of lags specified, (Karras, 2006; Muhammad & Rasheed, 2002). To identify the number of optimal lags needed, this study used all lag length selection criteria provided by Eviews 10 software and select the lags based on the suggested lag length criteria indicated by the presence of asterisk sing (*) in the dataset as shown in the works of Uremadu et al., (2014). Table 2 reveals that since most of the lag selection criteria suggested for 7 lags (LR=28.59973*, FPE=8.40e-11*, AIC= -14.97036*, -SC= -12.46163* HQ= -13.89299*), this study used 7 lags to identify for the presence of cointegrating vectors among the variables.

Table 3. Johansen Cointegration Test Result

Date: 10/24/24 Time: 20:27	
Sample (adjusted): 2009Q3 2023Q4	
Included observations: 58 after adjustments	
Trend assumption: Linear deterministic trend	
Series: LOG(ISLAMIC_BANK) LOG(GDP) LOG(INFLATION)	
Exogenous series: LOG(POPULATION(-30))	
Warning: Critical values assume no exogenous series	
Lags interval (in first differences): 1 to 7	

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.400760	44.16706	29.79707	0.0006
At most 1	0.211481	14.46563	15.49471	0.0710
At most 2	0.011739	0.684881	3.841466	0.4079
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.400760	29.70144	21.13162	0.0024
At most 1	0.211481	13.78074	14.26460	0.0595
At most 2	0.011739	0.684881	3.841466	0.4079
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table no. 3 shows the cointegration test result. Cointegration of variable is ascertained when trace statics is greater than the critical value and further confirmed by a *p*-value of 0.05 and below. Table 3 shows that trace test identified at least 1 cointegrating vectors in the series (trace statistic = 44.17, critical value 29.79, *p*-value = 0.00) and Maximum Eigenvalue indicated at least 1 cointegrating vectors also (Max-Eigen value = 29.70, critical value = 21.13, *p*-value = 0.00). With the presence of at least 1 cointegrating vectors, it suggests that the Vector Error Correction Model (VECM) could be utilized to empirically measure for both the long-run and short-run relationships, (Basuki & Karima, 2017; Khater Arabi, 2014).

EMPIRICAL RESULTS AND DISCUSSIONS

Table 4. Vector Error Correction Estimates

Date: 10/24/24 Time: 20:31			
Sample (adjusted): 2009Q3 2023Q4			
Included observations: 58 after adjustments			
Standard errors in ( ) & t-statistics in [ ]			
Cointegrating Eq:	CointEq1		
LOG(ISLAMIC_BANK(-1))	1.000000		
LOG(GDP(-1))	-0.339175		
	(0.21042)		
	[-1.61192]		
LOG(INFLATION(-1))	0.122995		
	(0.05547)		
	[2.21716]		
C	-10.52924		
Error Correction:	D(LOG(ISLAMIC_BANK))	D(LOG(GDP))	D(LOG(INFLATION))
CointEq1	-0.056490	0.029933	-0.713150
	(0.02344)	(0.00725)	(0.45658)
	[-2.41031]	[4.12681]	[-1.56194]

Table 4 shows the Vector Error Correction Estimates. It reveals the speed of adjustment to equilibrium or the error correction term. The presence of a long-run relationship is ascertained with a negative coefficient of the CointEq1 and a *t*-statistic value of > 1.99495 (Choiriyah & Kafi, 2020; Ikramina & Sukmaningrum, 2021). The table indicates that CointEq1 coefficient is negative (-0.056490) and the *t*-statistic (-2.41031), was greater than the 1.99495 level of significance, this means that there is a long-run relationship between Islamic banking financial

performance in the Philippines and economic growth in the country. It suggests that in the long run, a developed Islamic banking institution in the Philippines leads to a better economic growth in the country and *vice-versa.* The presence of a long-run relationship between the economic growth and Islamic banking development has been also observed in Indonessia by Abduh & Azmi Omar, (2012) in Oman by Mubeen et al., (2014) and among 78 Islamic banks in 25 countries by Noor & Ahmad, (2011). They stated that the overall business of Islamic banks was impacted by the country's economic growth.

Table 5.1 VEC Granger Causality/Block Exogeneity Wald Tests

Date: 10/24/24 Time: 09:24 Sample: 2002Q1 2023Q4 Included observations: 58			
Dependent variable: D(LOG(ISLAMIC_BANK))			
Excluded	Chi-sq	df	Prob.
D(LOG(GDP))	113.6060	7	0.0000
D(LOG(INFLATION))	75.66773	7	0.0000
All	185.5252	14	0.0000

After identification of the presence of a long-run relationship between Islamic banking and economic growth using the Vector Error Correction Model (VECM), it is co-equally interesting to identify the presence of an immediate or short-run relationship between the variables, Table 5 shows the Vector Error Correction Granger Causality blocking Exogenous Variables via Wald test. Granger causation on dependent variable is established with *p*-value < 0.05 alpha level of significance, (Abusharbeh, 2020).

Table 5.1 indicates that when Islamic banking asset value was analyzed as dependent variable, tested against the independent variables GDP, the test result showed a Chi-sq = 113.60, df=7 and a *p*-value = 0.00). Being $p < 0.05$ alpha level of significance, it indicates that GDP granger causes Islamic banking asset value. This finding is consistent with the works of Mobin & Masih, (2014) in the case of Malaysia's Islamic banks and its national economy, particularly its GDP.

The table also showed variable inflation with a Chi-sq = 75.66, df = 7 and a *p*-value = 0.00. It indicates that the country's inflation rate granger causes Islamic banking asset value. The finding of this study further aligns with earlier cited works of Mobin & Masih, (2014) who also found that aside from GDP, inflation rate in Malaysia is also connected to the Islamic banking financial performance in the country and in similar ways in Turkey, Andriana et al., (2023).

Taken altogether; variables GDP and inflation, (Chi-sq = 185.52, df=14) with a *p*-value = 0.00. Being $p < 0.05$ alpha level of significance, it means that macro-economic variables altogether granger cause Islamic banking asset value. Similar finding was also noted by Elhachemi & Othman, (2016) in the case of Iranian economy and its Islamic banking financial performance in the country.

Table 5.2 VEC Granger Causality/Block Exogeneity Wald Tests

Table Dependent variable: D(LOG(GDP))			
Excluded	Chi-sq	df	Prob.
D(LOG(ISLAMIC_BANK))	14.50694	7	0.0429

Table 5.2 presents the VEC Granger Causality/Block Exogeneity Wald Tests showing the reverse causation analysis result from Islamic banking to GDP growth. The table indicates that on the null hypothesis "GDP does not Granger cause Islamic Bank" the test result indicates a Chi-sq value = 14.50 and a *p*-value of 0.04. Being $p < 0.05$ alpha level of significance, it succeeds to reject the H_0 of no granger causation and accepts the H_a of the presence of causality. Meaning, Islamic banking asset value granger causes GDP growth in the country. This findings is in line with the study of Osmanovic et al.,(2020) in the case of the Islamic banks and is effect on the economy of the United Arab Emirates, in Pakistan by Sarwer et al., (2013) and in MENA region by Boukhatem & Ben Moussa, (2018) who noted that there is a positive impact of Islamic banking financial development on economic growth but could be hindered by underdeveloped institutional frameworks in the region.

The presence of causal effect of Islamic bank on GDP in table 5.2 and the reverse causation of the same variables as indicated in table 5.1 suggest that there is a bidirectional short-run relationship running from Islamic bank to the GDP and *vice-versa*. This bidirectional relationship between Islamic banking and GDP is also observed by Ali et al., (2018) in Brunei where they noted that GDP is one of the most significant determinants of Islamic banking profitability in the county.

Table 5.3 VEC Granger Causality/Block Exogeneity Wald Tests

Dependent variable: D(LOG(INFLATION))

Excluded	Chi-sq	df	Prob.
D(LOG(ISLAMIC_BANK))	5.239707	7	0.6307

Table 5.3 shows the VEC Granger Causality/Block Exogeneity Wald Tests showing the reverse causation analysis result of the effect of Islamic banking on inflation. The table indicates that on the null hypothesis "Islamic Bank does not Granger Cause Inflation" the test result shows a Chi-sq = 5.23 and a *p*-value of 0.63. Being $p > 0.05$ alpha level of significance, it failed to reject the H_0 of no causal effect. This means that Islamic banking asset value does not granger cause inflation rate in the Philippines. The absence of causal effect of Islamic banking asset value on inflation is consistent with the findings of Ascarya, (2012) in Indonesia This suggest that there is a unidirectional causal effect between Islamic banking financial performance and inflation rate in the country. That is, while there is a causal effect of inflation rate on Islamic banking asset values as indicated in table 5.1, table 5.3 ascertains that there is not enough evidence to suggest the reverse causation between them.

Impulse Response Function Analysis

The impulse Response Function or IRF is an econometric method of identifying the response of dependent variable on 1 positive shock to the preidentified independent variable. Since the shock may be transmitted to the dependent variable via lag structure in the Vector autoregression model, IRF plots the response of the dependent variable making visualization of the nature of response possible, (Ayuniyyah et al., 2013). One on the advantages of IRF is it tells the nature of response which either may be positive or negative that cannot be captured by the Granger causality, nor the VECM long-run and short-run test.

Figure 1 shows the response of the Islamic banking financial performance on a 1 positive shock as an innovation to the independent variable GDP in the VAR system. It depicts that in the first few quarters, the Islamic bank indicated an unstable response to the shock introduced in the GDP. However, starting from period 51, it showed continued positive response till the end of the specified period. This means that in the long-run, GPD will have a stable and positive impact on Islamic banking asset value. It further suggests that as the economy grow, the Islamic bank in the country grows with it as well.

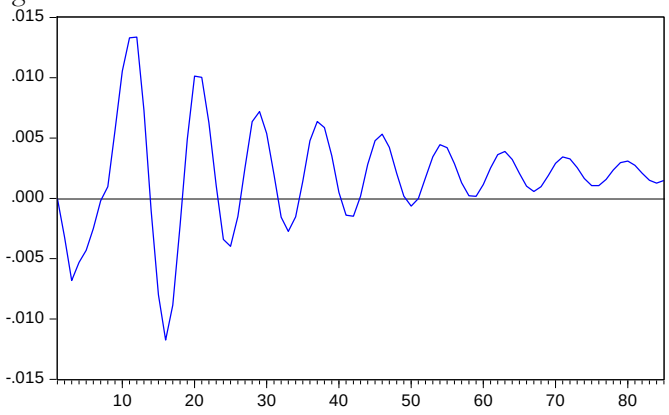

Figure 1. Response of LOG(ISLAMIC_BANK) to LOG(GDP) Innovation using Cholesky (d.f. adjusted) Factors

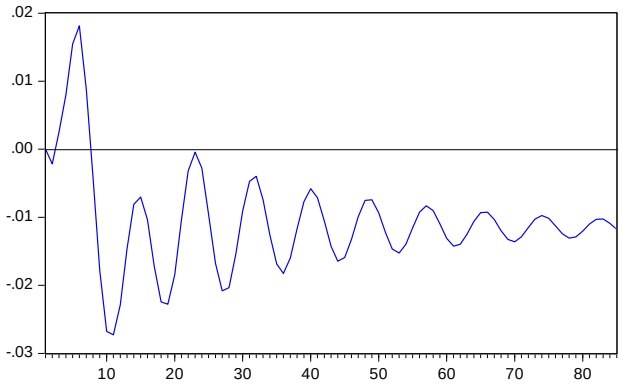

Figure 2. Response of LOG(ISLAMIC_BANK) to LOG(INFLATION) Innovation using Cholesky (d.f. adjusted) Factors

While table 5.1 shows the presence causal effect of inflation on Islamic bank asset value, it cannot tell whether the causal effect is positive or negative. Figure 2 shows that a 1 positive shock innovation on independent variable inflation resulted to generally negative response of the Islamic bank (until -0.03) suggesting negative relationship. This means that the growth of inflation rate is detrimental to the Islamic bank asset value of the al-Amanah Islamic Investment Bank of the Philippines.

Diagnostic Test Results

Table 6. Summary of Diagnostic Test Results

Diagnosis	***p*-value**
Breusch-Godfrey Serial Correlation LM Test	0.24
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.27
Jarque-Bera	0.11
R-squared	0.97
CUSUM test	Stable

Table 6 shows that the VECM used in this study passed the Breusch-Godfrey Serial Correlation LM Test for autocorrelation (p = 0.24), the Heteroskedasticity Test: Breusch-Pagan-Godfrey (p = 0.27) assuring that the variance of the error term is not consistent over time. Jarque-Bera test (p = 0.11) ascertaining where the sample data have skewness and kurtosis consistent with normal distribution, R-squared (p = 0.97) a statistical method that measures the proportion of the variance in the dependent variable that is measured by the independent variable in the model. CUSUM (Cumulative Sum) used to assess the stability of the coefficients in a time series model. It helps to determine whether the model's parameters remain constant over time or if they exhibit structural breaks.

CONCLUSION

This study investigated the complex relationship between the development of Islamic banking and the non-Islamic economy of the Philippines. It seeks to analyze the development of the bank given that it is situated in the conventional economy of the country where interest-based (*riba*) profits are allowed. This study confirms the presence of relationship between the Philippine economy and Islamic banking financial development. Despite continued economic growth and persisting downtrends in the Islamic bank's financial performance suggesting negative correlation, this study empirically found that the relationship is positive. That is, as the economy grow, the Islamic bank in the country also grows with it. The downtrend in the Islamic banking financial performance could be due to other variables not relating to macroeconomic indicators. Hence, this study recommends for future researchers to explore other variables affecting Islamic banking performance in the country. This could be the internal operations of the bank for lacking technical expertise to manage Islamic financing, lack of customer trust on the bank as being an Islamic bank given that it opens dual window offering conventional financial alternatives, lack of regulatory frameworks protecting it from double taxation making it more expensive for customers to do business with the bank. By addressing these issues in a helpful and collaborative manner, we can create an environment that understands better and thus supports the continued development and growth of Islamic banking industry in the county.

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Table 9: Serial correlation test result

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	8.905869	Prob. F(52,2)	0.1060
Obs*R-squared	57.75059	Prob. Chi-Square(52)	0.2712

Table 10: Heteroskedasticity Test Result

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.312687	Prob. F(3,54)	0.2797
Obs*R-squared	3.942272	Prob. Chi-Square(3)	0.2678
Scaled explained SS	1.661099	Prob. Chi-Square(3)	0.6456