CHAPTER IV

DATA ANALYSIS AND DISCUSSIONS

4.1 Descriptive Statistics of Research Variables

This descriptive statistics analysis will explain the description of research variable data. The descriptive statistics elaborates the character of research variables. This analysis contains the information such as sum of population, maximum and minimum value, mean and standard deviation of each research variable. The sample of this research consists of 48 data of four time-series variables which are LFINC, LDEPT, LGDP, and LGFCF quarterly through 2003-2014. The table below is the descriptive analysis of each variable.

Table 4.1

The Descriptive Statistics of Research Variables

	LFINC	LDEPT	LGDP	LGFCF
Mean	10.53148	10.53428	13.19029	11.72359
Median	10.56487	10.53053	13.18877	11.73992
Maximum	12.19237	12.29160	13.52134	12.14815
Minimum	8.206038	8.117909	12.86552	11.21646
Std. Dev.	1.162112	1.183286	0.198914	0.268792
Jarque-Bera	2.118532	2.289165	3.088987	2.522511
Probability	0.346710	0.318357	0.213420	0.283298
Observations	48	48	48	48

The basic statistical values of the variables are calculated in the first phase of this study. Based on the data of Table 4.1, the mean value of financing (LFINC) is 10.53148. The standard deviation value is 1.162112. Meanwhile the data value spreads from the minimum value 8.206038 to the maximum value 12.19237 with the median 10.56487.

At the second column of the table, the mean value of deposit (LDEPT) is 10.53428. The standard deviation value is 1.183286. Meanwhile the data value spreads from the minimum value 8.117909 to the maximum value 12.29160 with the median 10.53053.

For gross domestic product (LGDP), the mean value is 13.19029. The standard deviation value is 10.198914. Meanwhile the data value spreads from the minimum value 12.86552 to the maximum value 13.52134 with the median 13.18877.

For gross fixed capital formation (LGFCF), the mean value is 11.72359. The standard deviation value is 10.268792. Meanwhile the data value spreads from the minimum value 11.21646 to the maximum value 12.14815 with the median 11.73992.

Results obtained from Jarque-Bera statistic confirm that none of the series are normally distributed. The probabilities of LFINC (0.346710), LDEPT (0.318357), LGDP (0.213420), and LGFCF (0.283298) are more than the 5% percent level of significance. The null hypotheses of Jarque-

Bera test (data follow normal distribution) are rejected in all the cases at 5% percent level of significance.

4.2 Unit Root Test Result

The null hypotheses of Augmented Dickey-Fuller Test (ADF Test) is that the data consist unit roots or the data is not stationer with the criterion if the t-statistic is higher than the critical value means the null hypotheses is rejected which mean the data is already stationer. ADF unit root test is utilized the results are summarized in Table 4.2. The result indicates that all variables are stationary in the first difference.

Table 4.2

Stationary Test Result

Variables	ADF τ-Statistics	
	Level	First Difference
LGDP	-2.596662	-12.03204
LGFCF	-0.905780	-3.800844
LFINC	-3.231147	-4.917125
LDEPT	-2.995309	-6.325958
1% Critical Value	-3.577723	-3.581152
5% Critical Value	-2.925169	-2.926622
10% Critical Value	-2.600658	-2.601424
Note: Critical τ -Statistic values obtained from Davidson and MacKinnon (1993).		

4.3 Co-Integration Test Result

Before the data proceed with co-integration test, the optimal lag length must be decided. The optimum lag length decided by comparing the value of Akaike Information (AIC). Besides that, there are others four criterion lag length indicator such as LR, FPE, SC (SIC) and HQ (HQC). The best optimum lag length is where the lag that as the most criterions. The selection of optimum lag length result analyzed in financing and deposit model in the tables below.

Table 4.3

Selection of Optimum Lag Length: Financing Model

VAR Lag Order Selection Criteria
Endogenous variables: LNFINANCING LNRGDP LNGFCF
Exogenous variables: C
Date: 01/15/16   Time: 08:33
Sample: 2003Q1 2014Q4
Included observations: 45

Lag	LogL	LR	FPE	AIC	SC	HQ
0	141.3030	NA	4.30e-07	-6.146800	-6.026356	-6.101899
1	283.8832	259.8128	1.14e-09	-12.08370	-11.60192	-11.90410
2	297.8489	23.58651	9.17e-10	-12.30440	-11.46129	-11.99009
3	321.5097	36.80577*	4.85e-10*	-12.95599*	-11.75155*	-12.50698*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
VAR Lag Order Selection Criteria

Table 4.4

Selection of Optimum Lag Length: Deposit Model

VAR Lag Order Selection Criteria

Endogenous variables: LNDEPOSIT LNGFCF LNRGDP

Exogenous variables: C

Date: 01/15/16   Time: 08:35

Sample: 2003Q1 2014Q4

Included observations: 45

Lag	LogL	LR	FPE	AIC	SC	HQ
0	135.7291	NA	5.50e-07	-5.899072	-5.778628	-5.854172
1	278.1334	259.4922	1.47e-09	-11.82815	-11.34637*	-11.64855*
2	286.3560	13.88718	1.53e-09	-11.79360	-10.95049	-11.47930
3	300.6985	22.31050*	1.22e-09*	-12.03104*	-10.82660	-11.58204

* 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

Based on the result in table 4.3, the optimum lag length of financing model is lag 3 which supported by all criterions. Meanwhile based on the table 4.4, the optimum lag for deposit model is lag 3 as well as the optimum lag length for financing model. It is chosen since supported by most of the criterion which are LR, FPE, and AIC.

Having confirmed that all-time series are integrated of the same order, i.e., I(3) the Johansen efficient maximum-likelihood approach (Johansen, 1988) has been applied to detect independently the possibilities existence of co-integration

relation among the variables under concerns. Table 4.5 provides Johansen co-integration results.

Table 4.5

Johansen Co-Integration Test Results

Model	Hypothesis		Trace Test Statistics			Maximum Eigenvalue Statistics				
	H0	H1	Statistics	Critical	SIG. 5%	H0	H1	Statistics	Critical	SIG. 5%
FINC	$r = 0$	$r \geq 1$	19.34687	15.49471	0.0125	$r = 0$	$r \geq 1$	19.19080	14.26460	0.0077
	$r \leq 1$	$r = 2$	0.156061	3.841466	0.6928	$r \leq 1$	$r = 2$	0.156061	3.841466	0.6928
	$r = 0$	$r \geq 1$	27.01517	15.49471	0.0006	$r = 0$	$r \geq 1$	24.56589	14.26460	0.0009
	$r \leq 1$	$r = 2$	2.449279	3.841466	0.1176	$r \leq 1$	$r = 2$	2.449279	3.841466	0.1176
DEPT	$r = 0$	$r \geq 1$	23.66117	15.49471	0.0024	$r = 0$	$r \geq 1$	23.53854	14.26460	0.0013
	$r \leq 1$	$r = 2$	0.122626	3.841466	0.7262	$r \leq 1$	$r = 2$	0.122626	3.841466	0.7262
	$r = 0$	$r \geq 1$	16.00752	15.49471	0.0418	$r = 0$	$r \geq 1$	12.23341	14.26460	0.1022
	$r \leq 1$	$r = 2$	3.774116	3.841466	0.0520	$r \leq 1$	$r = 2$	3.774116	3.841466	0.0520

Notes: Asterisks (*) denotes statistical significance at 5%. r stands for the number of co-integrating vectors.

Based on the results in table 4.5, in the financing model, for LFINC-LGDP, the value of trace test statistics 19.34687 is bigger than the critical value 15.49471 with the significance level of 0.0125 (1.25%) less than 5%. The value of maximum eigenvalue statistics 19.19080is bigger than the critical value 14.26460with the significance level of 0.0077 (0.77%) less than 5%.Meanwhile, for LFINC-LGFCF, the value of trace test statistics 27.01517 is bigger than the critical value 15.49471 with the significance level of 0.0006 (0.06%) less than 5%. The value of maximum eigenvalue statistics 24.56589 is bigger than the

critical value 14.26460 with the significance level of 0.0009 (0.09%) less than 5%.

In the deposit model, for LDEPT-LGDP, the value of trace test statistics 23.66117 is bigger than the critical value 15.49471 with the significance level of 0.0024 (0.24%) less than 5%. The value of maximum eigenvalue statistics 23.53854 is bigger than the critical value 14.26460 with the significance level of 0.0013 (0.13%) less than 5%. Meanwhile, for LDEPT-LGFCF, the value of trace test statistics 16.00752 is bigger than the critical value 15.49471 with the significance level of 0.0006 (0.06%) less than 5%. The value of maximum eigenvalue statistics 12.23341 is smaller than the critical value 14.26460 with the significance level of 0.1022 (10.22%) more than 5%. In this term, the result of trace statistic and maximum eigenvalue is contrary. The value of trace statistic stated that there is co-integration meanwhile the maximum eigenvalue is no co-integration. In this case, the writer refers to Lüutkepohl, Saikkonen, and Trenkleer (2001) which conclude that based on the simulations they have a preference for the trace test. This result justifies the common practice in empirical work to use either both types of tests simultaneously or apply the trace tests exclusively. So that in this case, the results is preference to the trace statistics value meaning that there is co-integration.

Based on the result above, the null hypothesis in financing model (LFINC-LGDP and LFINC-LGFCF) and deposit model (LDEPT-LGDP and LDEPT-LGFCF) are both rejected which means there are co-integration and also indication the existence of long-term relationship between variables.

4.4 Causality Test Results Based on VECM

After we confirmed that all EG and IBD measures are co-integrated, the Granger Causality test and VECM based causality tests are conducted using Johansen co-integrating vectors. The results of the Granger causality tests based on the VECM for both financing and deposits models are presented in Table 4.6 and Table 4.7.

Table 4.6

Granger Causality Test Result

Null Hypothesis	Obs.	F-Statistics	Prob	Causality
GFCF cause FINC	45	3.17627	0.0349	Significant
FINC cause GFCF	45	2.69686	0.0594	Insignificant
GDP cause FINC	45	5.17625	0.0043	Significant
FINC cause GDP	45	21.1005	3.E-08	Significant
GFCF cause DEPT	45	2.56846	0.0686	Insignificant
DEPT cause GFCF	45	3.80616	0.0176	Significant
GDP cause DEPT	45	3.32906	0.0120	Significant
DEPT cause GDP	45	4.16968	0.0120	Significant

Based on the results of Granger causality test in the table 4.6, the null hypothesis of "LGFCF does not Granger Cause LFINC", "LGDP does not Granger Cause LFINC", "LFINC does not Granger Cause LGDP", "LDEPT does not Granger Cause LGFCF", "LGDP does not Granger Cause LDEPT", and "LDEPT does not Granger Cause LGDP" are rejected. Meanwhile the null

hypothesis of "LFINC does not Granger Cause LGFCF" and "LGFCF does not Granger Cause LDEPT" cannot be rejected.

Table 4.7

Vector Error Correction Model (VECM) Results

Model	equation	Short-run		Long-run	
		D	D(-1)	C	D(-1)
financing	5-a	0.343319*	0.237390*	11.23942*	0.184785*
	5-b	0.199371*	0.753822*	60.82435*	5.411697*
	5-c	-0.370175	0.164650	-9.160008	-0.243194
	5-d	0.331247*	1.159115*	37.66550*	4.111951*
deposit	6-a	0.514751*	0.022281*	11.29469*	0.179486*
	6-b	-0.218820	-0.242034	62.92811*	5.571476*
	6-c	0.740179*	0.075197*	9.301927*	0.229693*
	6-d	0.584573	-0.079259	40.49717	-4.353632
Note: Significant at 5% level of significance					

Based on the results showed in table 4.7, in the financing model, equation (5-a), (5-b), and (5-d) are significant at 5% level of significance in short-run and long-run relationship. In short-run, the interpretation of equation (5-a) is if there is increasing as much as 1 percent in financing (LFINC) then it will cause the increasing of gross domestic products (LGDP) as much as 0.022281. The VECM value indicates that it can correct the deviation to short-run equilibrium as much

as 0.343319 in every quarter (three months). The interpretation of equation (5-a) is if there is increasing as much as 1 percent in financing (LFINC) then it will cause the increasing of gross domestic products (LGDP) as much as 0.184785. The VECM value indicates that it can correct the deviation to long-run equilibrium as much as 11.23942 in every quarter (three months).

In short-run, the interpretation of equation (5-b) is if there is increasing as much as 1 percent in gross domestic products (LGDP) then it will cause the increasing of financing (LFINC) as much as 0.753822. The VECM value indicates that it can correct the deviation to short-run equilibrium as much as 0.753822 in every quarter (three months). The interpretation of equation (5-b) is if there is increasing as much as 1 percent in gross domestic products (LGDP) then it will cause the increasing of financing (LFINC) as much as 5.411697. The VECM value indicates that it can correct the deviation to long-run equilibrium as much as 60.82435 in every quarter (three months).

In short-run, the interpretation of equation (5-d) is if there is increasing as much as 1 percent in gross fixed capital formulation (LGFCF) then it will cause the increasing of financing (LFINC) as much as 1.159115. The VECM value indicates that it can correct the deviation to short-run equilibrium as much as 0.331247 in every quarter (three months). The interpretation of equation (5-d) is if there is increasing as much as 1 percent in fixed capital formulation (LGFCF) then it will cause the increasing of financing (LFINC) as much as 4.111951. The VECM value indicates that it can correct the deviation to long-run equilibrium as much as 37.66550 in every quarter (three months).

It can be inferred from financing model that there is bi-directional short-run and long-run causalities running from LFINC to LGDP and LGDP to LFINC. Meanwhile it appears that there is uni-directional short-run and long-run causalities running from LGFCF to LFINC.

In the deposit model, equation (6-a), (6-b), and (6-c) are significant at 5% level of significance in short-run and long-run relationship. In short-run, the interpretation of equation (6-a) is if there is increasing as much as 1 percent in deposit (LDEPT) then it will cause the increasing of gross domestic products (LGDP) as much as 0.022281. The VECM value indicates that it can correct the deviation to short-run equilibrium as much as 0.514751 in every quarter (three months). The interpretation of equation (6-a) is if there is increasing as much as 1 percent in deposit (LDEPT) then it will cause the increasing of gross domestic products (LGDP) as much as 0.179486. The VECM value indicates that it can correct the deviation to long-run equilibrium as much as 11.29469 in every quarter (three months).

In long-run, the interpretation of equation (6-b) is if there is increasing as much as 1 percent in gross domestic products (LGDP) then it will cause the increasing of deposit (LDEPT) as much as 5.411697. The VECM value indicates that it can correct the deviation to long-run equilibrium as much as 60.82435 in every quarter (three months).

In short-run, the interpretation of equation (6-c) is if there is increasing as much as 1 percent in deposit (LDEPT) then it will cause the increasing of gross

fixed capital formation (LGFCF) as much as 0.022281. The VECM value indicates that it can correct the deviation to short-run equilibrium as much as 0.740179 in every quarter (three months). The interpretation of equation (6-c) is if there is increasing as much as 1 percent in deposit (LDEPT) then it will cause the increasing of gross fixed capital formation (LGFCF) as much as 0.229693. The VECM value indicates that it can correct the deviation to long-run equilibrium as much as 9.301927 in every quarter (three months).

It can be inferred from deposit model that there is uni-directional short-run causalities but bi-directional in the long-run causalities running from LDEPT to LGDP and LGDP to LDEPT. Meanwhile it appears that there is uni-directional short-run and long-run causalities running from LDEPT to LGFCF.

4.5 Discussion

Based on the co-integration test result, there is co-integrated relation between Islamic banking development measures (financing and deposit) and economic growth (GDP and GFCF). Because it fulfill the co-integration test, then Granger causality test is conducted. In this term, VECM test is applied because based on the unit root test, all of the variables are stationary at the first difference.

4.5.1. The Causality between Islamic Banking Development and Economic Growth in the short-run

Based on the result, it shows that there is significant causality between financing and GDP. So that H_{1a} can be accepted. It means that financing and GDP can influence each other at least in one direction. Beyond that, the result also shows that there is bi-directional causality between financing and GDP which means that the total financing of Islamic banking in Indonesia will affect the GDP and vice versa. This finding is in line with the previous research by Farahani, Yazdan, Sadr, and Hossein (2012) and Yusof and Usman (2013). These findings show that there is causality between financing and gross domestic product in the short-run.

There is significant causality between financing and GFCF. So that H_{1b} can be accepted. It means that financing and GFCF can influence each other at least in one direction. Beyond that, the result also shows that there is uni-directional causality between financing and GFCF running from GFCF to financing. This means that the gross fixed capital formation affects the total financing of Islamic banks but not in reverse. This finding is in line with the previous research by Furqany and Mulyani (2009) that found the causality between financing and gross fixed capital formation in the short-run.

There is significant causality between deposit and GDP. So that H_{1c} can be accepted. It means that deposit and GDP can influence each other at least in one direction. Beyond that, the result also shows that there is uni-directional causality

between deposit and GDP running from deposit and GDP. This means that the total deposit of Islamic banks affects the gross domestic product but not in reverse. This finding is in line with the previous research by Ogege and Shiro (2013) which found that there is causality between deposit and economic growth in the short-run which in this research gross domestic product was used as the measure of economic growth.

There is significant causality between deposit and GFCF. So that H_{1d} can be accepted. It means that deposit and GFCF can influence each other at least in one direction. Beyond that, the result also shows that there is uni-directional causality between deposit and GFCF running from deposit and GFCF. This means that the total deposit of Islamic banks affects the gross fixed capital formation but not in reverse. This finding is in line with the previous research by Omanklahen (2012) and Furqani and Mulyany (2009) which found that in the short-run, there is causality between deposit and gross fixed capital formation.

From the discussion above, all of the minor hypothesis which are H_{1a}, H_{1b}, H_{1c}, and H_{1d} can be accepted. So, it can be concluded that the major hypothesis (H_1) also accepted. This means that there is causality between Islamic banking development and economic growth in the short-run. This finding is in line with the previous research by Gudarzi Farahani and Dastan (2013) and Abduh and Azmi Omar (2012) that found a significant relationship in short-run periods between Islamic financial development and economic growth.

4.5.2. The Causality between Islamic Banking Development and Economic Growth in the long-run

Based on the result, it shows that there is significant causality between financing and GDP in the long-run. So that H_{2a} can be accepted. It means that financing and GDP can influence each other at least in one direction. Beyond that, the result also shows that there is bi-directional causality between financing and GDP which means that the total financing of Islamic banking in Indonesia will affect the GDP and vice versa. This finding is in line with the previous research by Farahani, Yazdan, Sadr, and Hossein (2012) and Yusof and Usman (2013). These findings show that there is causality between financing and gross domestic product in the long-run.

There is significant causality between financing and GFCF. So that H_{2b} can be accepted. It means that financing and GFCF can influence each other at least in one direction. Beyond that, the result also shows that there is uni-directional causality between financing and GFCF running from GFCF to financing. This means that the gross fixed capital formation affects the total financing of Islamic banks but not in reverse. This finding is in line with the previous research by Furqany and Mulyani (2009) that found the causality between financing and gross fixed capital formation in the long-run.

There is significant causality between deposit and GDP. So that H_{2c} can be accepted. It means that deposit and GDP can influence each other at least in one direction. Beyond that, the result also shows that in the long-run, GDP will affect

the total deposit of Islamic banks. So, there is bi-directional causality between deposit and GDP in the long-run. This means that the total deposit of Islamic banks affects the gross domestic product but and vice versa. This finding is in line with the previous research by Ogege and Shiro (2013) which found that there is causality between deposit and economic growth in the long-run which in this research gross domestic product was used as the measure of economic growth.

There is significant causality between deposit and GFCF. So that H_{2d} can be accepted. It means that deposit and GFCF can influence each other at least in one direction. Beyond that, the result also shows that there is uni-directional causality between deposit and GFCF running from deposit and GFCF. This means that the total deposit of Islamic banks affects the gross fixed capital formation but not in reverse. This finding is in line with the previous research by Omanklahen (2012) and Furqani and Mulyany (2009) which found that in the long-run, there is causality between deposit and gross fixed capital formation.

From the discussion above, all of the minor hypothesis which are H_{2a}, H_{2b}, H_{2c}, and H_{2d} can be accepted. So, it can be concluded that the major hypothesis (H_2) also accepted. This means that there is causality between Islamic banking development and economic growth in the long-run. This finding is in line with the previous research by Farahani and Dastan (2013), Abduh and Omar (2012), Al-Oqool1, Okab, and Bashayreh (2012), also Farahani, Yazdan and Sadr, Hossein (2012) that found a significant relationship in the long-run periods between Islamic financial development and economic growth.

Based on the findings above, the result can be summarized as shown in Table 4.8.

Table 4.8

The Summary of the data result

Hipothesis			
H_{1a}	Accepted	H_{2a}	Accepted
H_{1b}	Accepted	H_{2b}	Accepted
H_{1c}	Accepted	H_{2c}	Accepted
H_{1d}	Accepted	H_{2d}	Accepted
H_1	Accepted	H_2	Accepted