Do profit and loss sharing (PLS) deposits also affect PLS financing? Evidence from Malaysia based on DOLS, FMOLS and system GMM techniques

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Abstract

The paper makes the initial attempt to understand the impact of investment or profit and loss sharing (PLS) deposits on mudarabah and musharakah or PLS financing offered by Islamic banks. The appropriate techniques such as DOLS, FMOLS and System GMM are used for the estimations and causality analysis. As a case study, the paper applies the techniques on panel data from Malaysia for two cross-sections, Islamic banks and Islamic banking schemes, with monthly frequency from January 2010 to January 2015. The results accept the null hypothesis of total investment deposits do not affect mudarabah and musharakah financing offered by Islamic banks. The results tend to indicate the presence of the positive long-run and short-run relationships between total investment deposits and mudarabah and musharakah financing but no causality from the former to the latter. Firstly, the positive long-run and short-run relationships may arise from the long-run and short-run influence of variables other than the microeconomic and macroeconomic variables specified by the empirical investigation. Secondly, the mudarabah and musharakah financing offered by Islamic banks appear driven by financing recipients' preferences on the type of financing contract and not by total investment deposits, assuming the availability of supply of investment or PLS deposits more than or equal to the demand for mudarabah and musharakah or PLS financing. Thus, policymakers' strategy on whether or not to promote PLS deposits to fund suppliers or PLS financing to fund demanders depends on the supply of the former and the demand for the latter.

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1. Introduction

A bank deals with four primary external stakeholders: fund suppliers, fund demanders, competitors and regulators. The difference between an Islamic bank and a conventional bank arises from how each bank deals with the external stakeholders. Existing theoretical literature highlights the use of profit and loss sharing (PLS) products built upon the mudarabah and musharakah contracts as the characteristic which differentiates Islamic banking from conventional banking in theory. However, existing theoretical and empirical literature recognize the minimal use of PLS products in dealings with fund demanders in practice and attributes such occurrences to the moral hazard from fund demanders, the capital adequacy guidelines from regulators and the competition from conventional banks. Nevertheless, to the best of the author's knowledge, existing theoretical and empirical literature mentions nothing regarding the impact of fund suppliers on the use of PLS financing products offered by Islamic banks.

Consequently as an objective, the paper makes the initial attempt to explore the impact of fund suppliers on the use of PLS financing products offered by Islamic banks. Specifically, the paper aims to understand the impact of investment or PLS deposits on mudarabah and musharakah or PLS financing offered by Islamic banks. The appropriate techniques such as dynamic ordinary least squares (DOLS), fully modified ordinary least squares (FMOLS) and system generalized method of moments (GMM) are used for the estimations and causality analysis. As a case study, the paper applies the techniques on panel data from Malaysia for two cross-sections, Islamic banks and Islamic banking schemes, with monthly frequency from January 2010 to January 2015. The results accept the null hypothesis of total investment deposits do not affect mudarabah and musharakah financing offered by Islamic banks. Specifically, the results tend to indicate the presence of the positive long-run and short-run relationships between total investment deposits and mudarabah and musharakah financing but no causality from the former to the latter.

Such an indication appears plausible based on two reasons. Firstly, the positive long-run and short-run relationships between total investment deposits and mudarabah and musharakah financing may arise from the long-run and short-run influence of variables other than the microeconomic and macroeconomic variables specified by the empirical investigation. For example, the simultaneous increase in total investment deposits and mudarabah and musharakah financing may occur due to the increase in the positive perception of Islamic finance and vice versa. Secondly, the mudarabah and musharakah financing offered by Islamic banks appear driven by fund demanders' preferences on the type of financing contract and not by total investment deposits, assuming the availability of supply of investment or PLS deposits more than or equal to the demand for mudarabah and musharakah or PLS financing. Thus, policymakers' strategy on whether or not to promote PLS deposits to fund suppliers or PLS financing to fund demanders depends on the supply of the former and the demand for the latter.

The paper is structured as follows. Section 2 discusses existing theoretical literature while Section 3 discusses relevant empirical literature. Section 4 describes the techniques and data used in the empirical investigation. Section 5 examines the empirical results. Section 6 concludes with a summary of the findings and recommendations for policymakers.

2. Theoretical foundation

2.1 Concept of profit and loss sharing (PLS)

PLS products build upon the mudarabah and musharakah contracts. Firstly, Islamic banks receive PLS deposits from fund suppliers through the unrestricted mudarabah contract which enables Islamic banks to invest the PLS deposits in anything but non-Shariah compliant activities. Secondly, Islamic banks provide PLS financing to fund demanders through the restricted mudarabah contract which subjects the fund demanders to: restrictions on activities; and monitoring. Nevertheless, Islamic banks cannot harm fund demanders through the restrictions and interfere in the utilization of the financing. Based on mudarabah contract stipulations applicable to PLS deposits and financing, the allocation of profits between the contracting parties follow the pre-agreed profit sharing ratio, that is, between the fund demanders and Islamic banks and subsequently between Islamic banks and fund suppliers. In addition, all losses fall upon the principal in absence of negligence and misconduct by the agent, that is, fund demanders free from liability to Islamic banks and subsequently Islamic banks free from liability to fund suppliers. The mudarabah contract also stipulates the prohibition of the agent's guarantee of the principal's funds. Alternatively, Islamic banks can also provide PLS financing to fund demanders through the musharakah contract. The conditions appear similar to the mudarabah contract except for the allocation of losses which depends on the capital contribution of each contracting party (Ismail and Tohirin, 2010).

2.2 Application of profit and loss sharing (PLS) by Islamic banks

A bank deals with four primary external stakeholders: fund suppliers, fund demanders, competitors and regulators. The difference between an Islamic bank and a conventional bank arises from how each bank deals with the external stakeholders. Regarding the dealings with fund suppliers and demanders, Ismail (2011) and Chong and Liu (2009) highlight the use of PLS products as the characteristic which differentiates Islamic banking from conventional banking in theory. However, the articles recognize the minimal use of PLS products in dealings with fund demanders in practice and identify potential reasons for such occurrences.

Ismail (2011) highlights the susceptibility of mudarabah and musharakah to conflict of interest in the principal and agent relationship. The likelihood exists whereby the agent, or fund demanders, shall maximize own utility rather than the principal's, or Islamic banks', utility. Moral hazard, a type of conflict of interest, affects PLS financing built upon mudarabah and musharakah. Since PLS financing entrusts the funds to the demanders who bear no losses in absence of negligence and misconduct, fund demanders appear incentivize to enter into high risk investments. The information asymmetry between Islamic banks and fund demanders regarding the investments which impedes the former's ability to monitor the latter exacerbates the moral

hazard. Although Islamic banks can appoint third parties such as external auditors to monitor the fund demanders, such actions incur additional costs. Nevertheless, Ismail (2011) identifies voting rights and profit sharing and performance bonuses specifications as methods to mitigate the moral hazard in PLS financing.

Ariss and Sarieddine (2007) discuss the inappropriateness of Basel capital adequacy guidelines for Islamic banks. The guidelines only consider the uses of funds and not the sources of funds whereby capital adequacy depends on the riskiness of the uses of funds as a consequence of banks' activities and assumes the guarantee of the sources of funds, primarily deposits. Although applicable to conventional banks, such guidelines appear inappropriate for Islamic banks since the sources of funds also consist of investment deposits which share in the risk arising from Islamic banks' activities. Consequently, investment deposits in Islamic banks require less protection than deposits in conventional banks. Furthermore, the uses of funds differ between conventional banks and Islamic banks. While conventional banks primarily provide debt financing, Islamic banks also provide equity financing aside from Shariah-compliant debt financing. The difference also renders the application of Basel guidelines meant for conventional banks as inappropriate for Islamic banks with different uses of funds and corresponding risks.

Existing theoretical literature attribute the minimal use of PLS financing products in practice to the moral hazard from fund demanders and the capital adequacy guidelines from regulators. Furthermore, existing empirical literature in the subsequent section attributes the minimal use of PLS financing products in practice to the competition from conventional banks. Consequently, such challenges drive Islamic banks to prefer non-PLS financing products in dealings with fund demanders. Nevertheless, existing theoretical and empirical literature mentions nothing regarding the impact of fund suppliers on the use of PLS financing products by Islamic banks, to the best of the author's knowledge. Thus, the paper seeks to explore such a gap.

3. Literature review

As mentioned in the preceding paragraph, Chong and Liu (2009) highlight competition from conventional banks which forces Islamic banks to operate similar to conventional banks. The article obtains such a conclusion based on the relationship between Islamic banking PLS deposit rates and conventional banking deposit rates whereby: a long-run relationship exists between both rates; causality exists from the latter to the former; and Islamic banking PLS deposit rates adjust towards the long-run equilibrium upon deviation from convention banking deposit rates. The empirical findings arise from the application of the Engle-Granger error correction methodology on monthly data from Malaysia of savings and time deposit rates from banks and finance companies, Islamic and conventional, from April 1995 to April 2004. Chong and Liu (2009) also highlight the negligible portion of PLS financing in Islamic banking potentially due to moral hazard, a reason mentioned by Ismail (2011) as well.

Based on best efforts, the paper finds no theoretical and empirical literature, whether or not included or excluded in this paper, with regards to the impact of fund suppliers on the use of PLS financing products by Islamic banks. Thus, the paper seeks to explore such a gap. Specifically, the paper makes the initial attempt to understand the impact of investment or PLS

deposits on mudarabah and musharakah or PLS financing offered by Islamic banks. In order to set up the empirical investigation, the paper turns to relevant existing empirical literature.

Two articles identify the effects of macroeconomic variables on financing offered by banks. First, Imran and Nishat (2013) discover that foreign liabilities, domestic deposits, economic growth, exchange rate and monetary conditions appear significantly related to bank credit to the private sector. In order to obtain such insights, the study applied the autoregressive distributed lag (ARDL) technique on annual data from 1971 to 2010 for Pakistan. Second, Calza et al. (2003) discover the long-run relationship of real loans to the private sector as positive with real GDP and negative with short-term and long-term interest rates. In order to obtain such insights, the study applied the Johansen methodology on monthly data from January 1980 to February 1999 for the euro area. Although applying different econometric methodologies on data from different time periods and countries, both articles identify the effects of macroeconomic variables on financing offered by banks. Thus, the empirical investigation which makes the initial attempt to understand the impact of PLS deposits on PLS financing offered by Islamic banks should control for the effects of macroeconomic variables.

4. Model and Data

As the initial attempt in exploring the aforementioned gap, the paper tests the null hypothesis of PLS or total investment deposits do not affect PLS or mudarabah and musharakah financing offered by Islamic banks. The appropriate techniques such as DOLS, FMOLS and System GMM are used for the estimations and causality analysis. Altogether, panel cointegration techniques consist of unit root tests, cointegration tests and DOLS and FMOLS cointegrating equation estimations while panel causality techniques consist of system GMM vector error correction model (VECM) estimations and Granger causality tests. Firstly, unit root tests seek to identify the presence of long-run characteristics in each variable. Secondly, cointegration tests seek to identify the presence of a long-run relationship among the variables with long-run characteristics. Thirdly, DOLS and FMOLS cointegrating equation estimations seek to estimate or quantify the long-run relationship among the variables. Lastly, system GMM VECM estimations seek to identify the causality among more than two variables, in other words to determine each variable as either endogenous or exogenous, equivalently as either follower or leader respectively. As supplementary to system GMM VECM estimations, Granger causality tests seek to identify the causality between two variables. The subsequent paragraphs explain the techniques in more detail.

The unit root tests include the Levin, Lin and Chu (LLC) test, and the Im, Pesaran and Shin (IPS) test proposed in Levin et al. (2002) and Im et al. (2003) respectively. For each variable, the tests aim to identify the order of integration or the number of differencing operations to render the series stationary, such as: I(1) for a variable nonstationary in level form and stationary in first difference form; or I(0) for a variable stationary in both level and first difference forms. Although both tests use pooled ADF tests and a similar null hypothesis of unit root, the LLC test uses the alternative hypothesis of no unit root while the IPS test uses the alternative hypothesis of some cross-sections without unit root. The difference arises from the assumption regarding the persistence parameters whereby the LLC test assumes such parameters

as constant across all cross-sections whereas the IPS test allows such parameters to vary freely across cross-sections. Thus when faced with contradictory results, the paper shall favor IPS test results over LLC test results due to the heterogeneity allowed for in the IPS test.

The cointegration tests include the Kao test and the Pedroni tests proposed in Kao (1999) and Pedroni (1999, 2004) respectively. The tests aim to identify the presence of a long-run equilibrium relationship among the variables by extending to panel data the application of the cointegration test from Engle and Granger (1987) which tests the stationarity of the residuals from a spurious regression of I(1) variables whereby I(0) residuals indicate cointegration while I(1) residuals indicate no cointegration. Both panel cointegration tests use the null hypothesis of no cointegration and alternative hypothesis of cointegration, and restrict the cointegrating vector to one. However, the Kao test specifies cross-section specific intercepts and homogenous coefficients while the Pedroni tests allow for heterogenous intercepts and trend coefficients across cross-sections. Thus when faced with contradictory results, the paper shall favor Pedroni test results over Kao test results due to the heterogeneity allowed for in the Pedroni tests.

The cointegrating equation estimations include the application of the pooled DOLS and pooled FMOLS proposed in Kao and Chiang (2000) and Phillips and Moon (1999) respectively. The techniques aim to estimate the long-run equilibrium relationship among the variables identified in prior cointegration tests. DOLS eliminates the endogeneity and serial correlation present in standard ordinary least squares (OLS) by augmenting the panel cointegrating equation with cross-section specific lags and leads of the first differenced regressors. Although DOLS and FMOLS eliminate the endogeneity and small sample biases, FMOLS imposes additional requirements whereby all variables should possess the same order of integration and that the regressors should not appear as cointegrated. Thus, the usage of FMOLS depends on prior unit root tests of all variables and cointegration tests of the regressors. Subsequently, the residuals of the cointegrating equation estimations serve as the error correction term in VECM estimations. Such residuals should appear as I(0) from unit root tests in order to confirm cointegration among the variables and fulfill the VECM requirement for all variables to appear as I(0).

For cointegrating equation estimations, DOLS and FMOLS aim to estimate the following model assuming normalization against mudarabah and musharakah financing, LF_MM:

$$LF\_MM_{i,t} = \alpha + \beta_1 LID\_T_{i,t} + \beta_2 LT1_{i,t} + \beta_3 LNPF_{i,t} + \beta_4 LIP_{i,t} + \beta_5 INF_{i,t} + \beta_6 INT_{i,t} + \varepsilon \qquad [1]$$

where i refers to the cross-section, t refers to the time, α refers to the constant term, LID_T refers to total investment deposits, LT1 refers to tier 1 capital, LNPF refers to non-performing financing, LIP refers to the industrial production index, INF refers to inflation, INT refers to the interest rate and ε refers to the error or residual term. Variables with symbols starting with L undergo natural logarithm transformation to control for scale differences and obtain regression results of elasticity. Since the paper seeks to investigate the impact of investment or PLS deposits on mudarabah and musharakah or PLS financing, LF_MM and LID_T appear as the dependent and focal independent variables respectively assuming normalization against LF_MM. Furthermore, the model includes LT1 and LNPF as core independent variables to capture the effect of the capital adequacy guidelines from regulators and the moral hazard from fund demanders respectively, both of which affect mudarabah and musharakah financing as

highlighted in Ariss and Sarieddine (2007) and Ismail (2011). Aside from the microeconomic variables, the model includes macroeconomic control independent variables such as LIP, INF and INT to control for macroeconomic effects on financing as seen in Imran and Nishat (2013) and Calza et al. (2003). The description of all variables appears in Table 1.

Table 1: Description of variables

Variable	Symbol	Description
Mudarabah and musharakah financing	LF_MM	Financing received from Islamic banks using the mudarabah and/or musharakah contract
Total investment deposits	LID_T	Deposits placed in Islamic banks using the mudarabah and/or musharakah contract
Tier 1 capital	LT1	Equity capital and disclosed reserves of banks
Non-performing financing	LNPF	Financing in default for more than a specified time period
Industrial production index	LIP	Economic indicator which measures the output of mining, manufacturing and energy industries
Inflation	INF	Rate of change in the cost of a fixed basket of goods and services for the average consumer
Interest rate	INT	Cost of debt expressed as a percentage of the principal

Note: Variables with symbols starting with L undergo natural logarithm transformation to control for scale differences and obtain regression results of elasticity.

The VECM estimations involve the application of the one-step System GMM proposed in Blundell and Bond (1998). The application of such a technique aims to estimate the short-run relationship among the variables and the speed of adjustment of endogenous variables towards the long-run equilibrium, both of which captured by the first difference variables and error correction term respectively. The technique appears better than standard OLS because one-step system GMM eliminates: cross-section fixed effects through using the first difference of each variable in regressions; correlations between lagged dependent variables and error terms, and endogeneity of some regressors through using instrument variables, more specifically instrumenting first differences with levels and level with first differences. Nevertheless, the technique remains subject to two specification tests: the Sargan test for over-identifying restrictions with the null hypothesis of the independence between instrument variables and error terms; and the Arellano-Bond serial correlation tests for first order correlation (AR1) and second order correlation (AR2) with the null hypotheses of no serial correlation. The acceptance of the null hypotheses of the Sargan test and AR2 test indicates the validity of the instrument variables.

For VECM estimations, the one-step System GMM aims to estimate the following:

$$\Delta LF\_MM_{i,t} = \alpha + \beta_0 \Delta LF\_MM_{i,t-1} + \beta_1 \Delta LID\_T_{i,t-1} + \beta_2 \Delta LT1_{i,t-1} + \beta_3 \Delta LNPF_{i,t-1} + \beta_4 \Delta LIP_{i,t-1} + \beta_5 \Delta INF_{i,t-1} + \beta_6 \Delta INT_{i,t-1} + \beta_7 u_{i,t-1} + \varepsilon \quad [2]$$

$$\Delta LID\_T_{i,t} = \alpha + \beta_0 \Delta LF\_MM_{i,t-1} + \beta_1 \Delta LID\_T_{i,t-1} + \beta_2 \Delta LT1_{i,t-1} + \beta_3 \Delta LNPF_{i,t-1} + \beta_4 \Delta LIP_{i,t-1} + \beta_5 \Delta INF_{i,t-1} + \beta_6 \Delta INT_{i,t-1} + \beta_7 u_{i,t-1} + \varepsilon \quad [3]$$

$$\Delta LT1_{i,t} = \alpha + \beta_0 \Delta LF\_MM_{i,t-1} + \beta_1 \Delta LID\_T_{i,t-1} + \beta_2 \Delta LT1_{i,t-1} + \beta_3 \Delta LNPF_{i,t-1} + \beta_4 \Delta LIP_{i,t-1} + \beta_5 \Delta INF_{i,t-1} + \beta_6 \Delta INT_{i,t-1} + \beta_7 u_{i,t-1} + \varepsilon \quad [4]$$

$$\Delta LNPF_{i,t} = \alpha + \beta_0 \Delta LF\_MM_{i,t-1} + \beta_1 \Delta LID\_T_{i,t-1} + \beta_2 \Delta LT1_{i,t-1} + \beta_3 \Delta LNPF_{i,t-1} + \beta_4 \Delta LIP_{i,t-1} + \beta_5 \Delta INF_{i,t-1} + \beta_6 \Delta INT_{i,t-1} + \beta_7 u_{i,t-1} + \varepsilon \quad [5]$$

$$\Delta LIP_{i,t} = \alpha + \beta_0 \Delta LF\_MM_{i,t-1} + \beta_1 \Delta LID\_T_{i,t-1} + \beta_2 \Delta LT1_{i,t-1} + \beta_3 \Delta LNPF_{i,t-1} + \beta_4 \Delta LIP_{i,t-1} + \beta_5 \Delta INF_{i,t-1} + \beta_6 \Delta INT_{i,t-1} + \beta_7 u_{i,t-1} + \varepsilon \quad [6]$$

$$\Delta INF_{i,t} = \alpha + \beta_0 \Delta LF\_MM_{i,t-1} + \beta_1 \Delta LID\_T_{i,t-1} + \beta_2 \Delta LT1_{i,t-1} + \beta_3 \Delta LNPF_{i,t-1} + \beta_4 \Delta LIP_{i,t-1} + \beta_5 \Delta INF_{i,t-1} + \beta_6 \Delta INT_{i,t-1} + \beta_7 u_{i,t-1} + \varepsilon \quad [7]$$

$$\Delta INT_{i,t} = \alpha + \beta_0 \Delta LF\_MM_{i,t-1} + \beta_1 \Delta LID\_T_{i,t-1} + \beta_2 \Delta LT1_{i,t-1} + \beta_3 \Delta LNPF_{i,t-1} + \beta_4 \Delta LIP_{i,t-1} + \beta_5 \Delta INF_{i,t-1} + \beta_6 \Delta INT_{i,t-1} + \beta_7 u_{i,t-1} + \varepsilon \quad [8]$$

where Δ refers to first difference, t-1 refers to a one period lag and u refers to the error correction term, aside from all other notation described in Equation 1. In order to prevent the anticipated instrument proliferation, estimations combine instruments without dropping any lags by grouping and then forming smaller sets through summation of GMM style moment conditions in each group. The combination of instruments creates one instrument for each variable and lag distance rather than one instrument for each time period, variable and lag distance.

The Granger causality tests include the stacked test and Dumitrescu-Hurlin (2012) test which aim to identify the Granger causality between two variables. According to Granger (1969), one variable, *x*, Granger causes another variable, *y*, if the lagged values of *x* help in the prediction of *y* aside from the lagged values of *y* itself. Although testing for Granger causality in panel data, the stacked test and Dumitrescu-Hurlin test use different assumptions about the coefficients across cross-sections whereby the former assumes homogeneity while the latter assumes heterogeneity. Thus when faced with contradictory results, the paper shall favor Dumitrescu-Hurlin test results over stacked test results due to the heterogeneity allowed for in the Dumitrescu-Hurlin test.

Using the aforementioned panel cointegration and causality techniques, the paper tests the null hypothesis of total investment deposits, LID_T, do not affect mudarabah and musharakah financing, LF_MM, offered by Islamic banks. The rejection of the null hypothesis occurs only if: in cointegrating equation estimations, the β_1 correlation coefficient of LID_T in Equation 1 appears statistically significant and non-zero; in VECM estimations, the β_7 correlation coefficient of the error correction term, u_{t-1}, in Equation 2 appears statistically significant; and in Granger causality tests, LID_T causes LF_MM. Such results indicate the presence of a long-run relationship between LID_T and LF_MM, and causality from LID_T to LF_MM, thus rejecting the null hypothesis. On the other hand, the acceptance of the null hypothesis occurs if at least one of the aforementioned results appears other than described. Although DOLS and FMOLS eliminate the endogeneity bias, the identification of causality in VECM estimations and Granger causality tests should precede the interpretation of the correlation coefficients in cointegrating equation estimations of Equation 1. The precedence of causality tests serves to validate the assumption of normalization against LF_MM or causality

from LID_T to LF_MM in Equation 1, which in turn verifies the correlation coefficients in the cointegrating equation estimations.

The paper applies the panel cointegration and causality techniques on data from Malaysia as a case study. The panel data for two cross-sections with monthly frequency spans from January 2010 to January 2015. The microeconomic data for mudarabah and musharakah financing, total investment deposits, tier 1 capital and non-performing financing originate from Bank Negara Malaysia, the central bank of Malaysia. Such data appears available for two cross-sections: Islamic banks; and Islamic banking schemes or conventional banks which offer Islamic banking products. On the other hand, the macroeconomic data for the industrial production index, inflation and interest rates originate from Datastream. Interest rate data includes the overnight policy rate (OPR) and the Kuala Lumpur Interbank Offer Rate (KLIBOR) for the overnight (ON), 1-month (1M) and 3-month (3M) tenors. Since the data pertains to only one country, both cross-sections use the same macroeconomic data. Such a data limitation requires caution in the interpretation of results pertinent to macroeconomic variables. Future research can address the data limitation by applying the panel cointegration and causality techniques on data from more than one country. The descriptive statistics of all variables appear in Table 2.

Table 2: Descriptive statistics

Variable	Unit	Mean	Med.	Max.	Min.	Std. Dev.	Skewness	Kurtosis	Obs.
Microeconomic									
Cross-section 1: Islamic banks									
F_MM	RM bil	10.527	10.129	23.364	2.413	6.291	0.404	1.954	61
ID_T	RM bil	107.989	104.950	130.411	88.566	12.544	0.399	1.757	61
T1	RM bil	22.068	21.676	30.158	16.477	4.014	0.468	2.045	61
NPF	RM bil	4.672	4.358	6.541	3.791	0.697	0.470	2.055	61
Cross-section 2: Islamic banking schemes									
F_MM	RM bil	0.389	0.389	0.481	0.275	0.065	-0.080	1.686	61
ID_T	RM bil	3.036	3.103	4.738	1.127	0.823	-0.254	2.374	61
T1	RM bil	1.519	1.643	2.109	0.924	0.392	-0.101	1.713	61
NPF	RM bil	0.011	0.010	0.016	0.008	0.002	1.244	4.214	61
Macroeconomic									
IP	None	107.985	105.900	121.700	99.500	5.691	0.603	2.300	61
INF	%	0.179	0.190	0.841	-1.073	0.237	-1.853	14.863	61
OPR	%	2.914	3.000	3.250	2.000	0.266	-1.799	6.601	61
KLIBOR_ON	%	2.867	2.970	3.200	1.990	0.281	-1.857	6.134	61
KLIBOR_1M	%	2.975	3.070	3.380	2.090	0.288	-1.733	5.902	61
KLIBOR_3M	%	3.113	3.160	3.810	2.130	0.341	-1.070	5.142	61

Note: The descriptive statistics appear for all variables prior to natural logarithm transformation. Refer to Table 1 for the description of variables.

5. Estimation Results

5.1 Statistical Interpretation

The LLC and IPS unit root tests in Table 3 present contradictory results. On one hand, the LLC test identifies only OPR, KLIBOR_ON and KLIBOR_1M as I(1) variables. On the other hand, the IPS test identifies all variables as I(1) except for OPR, KLIBOR_ON and KLIBOR_1M. Due to the heterogeneity allowed for in the IPS test, the paper shall favor IPS test results over LLC test results. Although OPR, KLIBOR_ON and KLIBOR_1M appear as I(0) variables based on the IPS test, KLIBOR_3M which appears as an I(1) variable can serve as a proxy for INT. Thus, the data from Malaysia for all variables in Equation 1 appear as I(1) based on the IPS test with 5 lags, implying the presence of long-run characteristics in each variable which in turn enables cointegration tests.

Table 3: Unit root tests for all variables

Variable	Levin, Lin and Chu t*		Im, Pesaran and Shin W-stat	
	Level	First Difference	Level	First Difference
LF_MM	-0.759	-0.024	0.115	-2.247**
	(0.224)	(0.490)	(0.546)	(0.012)
LID_T	6.156	5.814	1.914	-2.602***
	(1.000)	(1.000)	(0.972)	(0.005)
LT1	2.562	5.463	1.152	-2.095**
	(0.995)	(1.000)	(0.875)	(0.018)
LNPF	2.821	3.601	1.147	-2.358***
	(0.998)	(1.000)	(0.874)	(0.009)
LIP	-1.432*	1.755	0.144	-5.773***
	(0.076)	(0.960)	(0.557)	(0.000)
INF	10.236	20.401	-0.429	-2.956***
	(1.000)	(1.000)	(0.334)	(0.002)
OPR	-0.917	-4.068***	-2.254**	-5.664***
	(0.180)	(0.000)	(0.012)	(0.000)
KLIBOR_ON	-0.927	-1.491*	-1.738**	-3.332***
	(0.177)	(0.068)	(0.041)	(0.000)
KLIBOR_1M	-0.322	-1.532*	-1.328*	-3.388***
	(0.374)	(0.063)	(0.092)	(0.000)
KLIBOR_3M	3.590	-0.176	1.996	-2.224**
	(1.000)	(0.430)	(0.977)	(0.013)

Note: Both constant and trend terms are included in the tests of level variables while only the constant term is included in the tests of first difference variables. The table displays results based on 5 lags. The p-values appear in parentheses: *Significance at 10% level; **Significance at 5% level; ***Significance at 1% level.

The Kao and Pedroni cointegration tests present contradictory results for all variables in Table 4 Panel (a) but consistent results for regressors only in Table 4 Panel (b). For all variables in Table 4 Panel (a), the statistically insignificant t-statistic of the Kao test indicates no cointegration while the statistically significant v-statistic of the Pedroni test indicates cointegration. Due to the heterogeneity allowed for in the Pedroni tests, the paper shall favor Pedroni test results over Kao test results. Thus, the data from Malaysia for all variables in Equation 1 appear cointegrated, implying the presence of a long-run equilibrium relationship among the variables which in turn enables the estimation of Equation 1 using DOLS. For regressors only in Table 4 Panel (b), the statistically insignificant t-statistic of the Kao test and v-statistic of the Pedroni test indicate no cointegration. Thus, the data from Malaysia for the regressors in Equation 1 appear not cointegrated, implying the absence of a long-run equilibrium relationship among the regressors which in turn enables the estimation of Equation 1 using FMOLS as well. Moreover, the usage of FMOLS appears valid since the data from Malaysia for all variables in Equation 1 possess the same order of integration, I(1), from the IPS unit root test.

Table 4: Cointegration tests

(a) All variables

Kao Residual Cointegration Test

Test	t-Statistic
ADF	-1.255
	(0.105)

Pedroni Residual Cointegration Test

Test	Panel		Group
	Statistic	Weighted Statistic	Statistic
v	3.971***	5.674***	
	(0.000)	(0.000)	
rho	1.323	0.745	0.985
	(0.907)	(0.772)	(0.838)
PP	1.009	-0.090	-0.123
	(0.843)	(0.464)	(0.451)
ADF	2.334	2.948	3.858
	(0.990)	(0.998)	(1.000)

(b) Regressors only

Kao Residual Cointegration Test

Test	t-Statistic
ADF	0.142
	(0.444)

Pedroni Residual Cointegration Test

Test	Panel		Group
	Statistic	Weighted Statistic	Statistic
v	0.968	0.543	
	(0.166)	(0.294)	
rho	-0.636	0.021	0.392
	(0.262)	(0.508)	(0.652)
PP	-1.361	-0.627	-0.428
	(0.087)	(0.265)	(0.334)
ADF	0.807	-0.160	0.389
	(0.790)	(0.437)	(0.652)

Note: The Kao test involves the individual intercept while the Pedroni tests involve the individual intercept and individual trend. The table displays results based on 5 lags. The p-values appear in parentheses: *Significance at 10% level; **Significance at 5% level; ***Significance at 1% level.

The cointegrating equation estimations using DOLS in Panel (a) and FMOLS in Panel (b) of Table 5 present similarities and differences. Although both estimations exhibit high adjusted R-squared values of 99.5% and 97.0% for DOLS and FMOLS respectively, DOLS estimations violate the normality assumption due to the statistical significance of the Jarque-Bera statistic. DOLS and FMOLS estimations similarly present the statistical significance and direction of the correlation coefficients for LID_T, LT1 and LIP but differently present the statistical significance of the correlation coefficients for LNPF, INF and KLIBOR_3M. Specifically, both estimations identify the long-run relationship between LF_MM and LID_T as positive, between LF_MM and LT1 as negative, and between LF_MM and LIP as positive. Although DOLS and FMOLS eliminate the endogeneity bias, the paper shall not further interpret the correlation coefficients in cointegrating equation estimations due to the exogeneity of LF_MM identified in subsequent VECM estimations and Granger causality tests. Consequently, the exogeneity of LF_MM challenges the validity of the assumption of normalization against LF_MM or causality from LID_T to LF_MM in Equation 1. On another note, the residuals of the cointegrating equation estimations serve as the error correction term in subsequent VECM estimations. Such residuals should appear as I(0) from unit root tests in order to confirm cointegration among the variables and fulfill the VECM requirement for all variables to appear as I(0).

Table 5: Cointegrating equation estimations

Variable	(a) Dynamic OLS	(b) Fully modified OLS
LID_T	1.727***	1.239***
	(0.000)	(0.000)
LT1	-2.232***	-1.374***
	(0.000)	(0.000)
LNPF	-0.255	-0.739***
	(0.628)	(0.000)
LIP	16.849***	7.755***
	(0.000)	(0.000)
INF	-62.685*	-3.621
	(0.099)	(0.542)
KLIBOR_3M	1.976	59.866***
	(0.942)	(0.000)
Observations	110	120
R-squared	0.998	0.971
Adjusted R-squared	0.995	0.970
Jarque-Bera	5.820*	1.227
	(0.054)	(0.542)

Note: The table displays results based on 5 lags. The p-values appear in parentheses: *Significance at 10% level; **Significance at 5% level; ***Significance at 1% level.

The LLC and IPS unit root tests in Table 6 present contradictory results for DOLS residuals but consistent results for FMOLS residuals. For DOLS residuals, the LLC test does not identify the residuals as I(0) while the IPS test identifies the residuals as I(0). Due to the heterogeneity allowed for in the IPS test, the paper shall favor IPS test results over LLC test results. Hence, DOLS residuals confirm the cointegration among the variables in Equation 1 and fulfill the VECM requirement to appear as I(0). For FMOLS residuals, the LLC and IPS tests do not identify the residuals as I(0). Hence, FMOLS residuals fail to both confirm the cointegration among the variables in Equation 1 and fulfill the VECM requirement to appear as I(0). Therefore, DOLS residuals which appear as I(0) remain eligible as data for the error correction term in VECM estimations and support the usage of DOLS in cointegrating equation estimations.

Table 6: Unit root tests for residuals of cointegrating equation estimations

Variable	Levin, Lin and Chu t*	Im, Pesaran and Shin W-stat
	Level	Level
DOLS residuals	-0.549	-1.461*
	(0.291)	(0.072)
FMOLS residuals	1.749	0.279
	(0.960)	(0.610)

Note: Both constant and trend terms are included in the tests of level variables. The table displays results based on 5 lags. The p-values appear in parentheses: *Significance at 10% level; **Significance at 5% level; ***Significance at 1% level.

The VECM estimations for DLF_MM, DLID_T, DLT1 and DLNPF, or Equations 2 to 5 respectively, in Table 7 without the Arrelano-Bond robust standard error estimator and Table 8 with the Arrelano-Bond robust standard error estimator appear acceptable based on the diagnostics tests. For Table 7, the statistically insignificant test statistics accept the null hypotheses of the Sargan test and AR2 test, indicating the validity of the instrument variables for Equations 2 to 5. Furthermore, VECM estimations in Table 7 avoid instrument proliferation since the instrument rank, or number of instruments, appears less than the number of observations. For Table 8, the statistically insignificant test statistics accept the null hypothesis of the AR2 test, indicating the validity of the instrument variables for Equations 2 to 5. The application of the Arrelano-Bond robust standard error estimator renders the distribution of the Sargan test unknown, hence incalculable. Nevertheless, VECM estimations in Table 8 avoid instrument proliferation since the instrument rank appears less than the number of observations.

The VECM estimations for DLF_MM, DLID_T, DLT1 and DLNPF, or Equations 2 to 5 respectively, in Table 7 and Table 8 present contradictory results on the endogeneity and exogeneity of variables although results in both tables appear acceptable based on the diagnostics tests. The statistical significance or insignificance of the correlation coefficients of the error correction terms indicates endogeneity or exogeneity respectively. On one hand, Table 7 identifies LID_T as endogenous and LF_MM, LT1 and LNPF as exogenous. On the other hand, Table 8 identifies LT1 and LNPF as endogenous and LID_T and LF_MM as exogenous. Even so, both Table 7 and Table 8 identify LF_MM as exogenous. On a related note, the VECM estimations for DLIP, DINF and DKLIBOR_3M, or Equations 6 to 8 respectively, in both Table 7 and Table 8 appear unacceptable possibly due to the data limitation of similar macroeconomic data from one country, Malaysia, for both cross-sections. Consequently, the paper assumes LIP, INF and KLIBOR_3M as exogenous since a higher likelihood exists for causality from macroeconomic to microeconomic variables versus that for causality from microeconomic to macroeconomic variables. Aside from the endogeneity and exogeneity of variables, the VECM estimations for DLID_T, or Equation 3, in Table 8 indicate the presence of a positive short-run relationship between DLF_MM(-1) and DLID_T based on the statistically significant and positive correlation coefficient of DLF_MM(-1). The interpretation of other correlation coefficients regarding short-run relationships appears immaterial to the test of the null hypothesis of LID_T does not affect LF_MM offered by Islamic banks.

Table 7: VECM estimations without the Arrelano-Bond robust standard error estimator

Variable	DLF_MM	DLID_T	DLT1	DLNPF	DLIP	DINF	DKLIBOR_3M
DLF_MM(-1)	0.658***	0.289	0.015	0.060	-0.021	-0.001	-0.001
	(0.000)	(0.410)	(0.880)	(0.795)	(0.779)	(0.856)	(0.515)
DLID_T(-1)	-0.009	-0.170*	-0.030	-0.063	-0.007	0.005**	-0.001**
	(0.781)	(0.077)	(0.378)	(0.416)	(0.748)	(0.035)	(0.011)
DLT1(-1)	0.091	0.389	-0.129	0.455	-0.246***	-0.013	-0.001
	(0.413)	(0.338)	(0.186)	(0.114)	(0.003)	(0.173)	(0.622)
DLNPF(-1)	0.040	-0.208	-0.060	-0.170*	0.034	-0.001	-0.001
	(0.420)	(0.246)	(0.287)	(0.063)	(0.355)	(0.874)	(0.388)
DLIP(-1)	0.002	0.253	-0.054	-0.120	-0.374***	-0.021**	-0.003*
	(0.985)	(0.553)	(0.660)	(0.676)	(0.000)	(0.031)	(0.058)
DINF(-1)	-0.468	-8.184*	1.025	-0.755	1.817*	-0.007	-0.004
	(0.711)	(0.076)	(0.435)	(0.807)	(0.058)	(0.944)	(0.837)
DKLIBOR_3M(-1)	-0.627	-21.372	-1.928	36.186**	4.675	-0.910*	0.022
	(0.917)	(0.333)	(0.759)	(0.015)	(0.307)	(0.074)	(0.807)
ECT(-1)	-0.004	0.222*	-0.016	0.060	0.031	-0.006**	-0.001**
	(0.905)	(0.088)	(0.658)	(0.486)	(0.259)	(0.034)	(0.012)
Constant	0.003	-0.016	0.014***	-0.018**	0.007**	0.000	0.000***
	(0.382)	(0.215)	(0.000)	(0.041)	(0.013)	(0.477)	(0.000)
Observations	108	108	108	108	108	108	108
Instrument rank	61	61	61	61	59	59	59
Sargan	54.70	53.12	65.23	40.29	102.51***	105.72***	122.04***
	(0.373)	(0.431)	(0.103)	(0.881)	(0.000)	(0.000)	(0.000)
AR(1)	-5.16***	-3.21***	-2.92***	-3.28***	-7.16***	-3.64***	-5.54***
	(0.000)	(0.001)	(0.003)	(0.001)	(0.000)	(0.000)	(0.000)
AR(2)	1.59	-0.87	-1.15	0.36	-0.54	1.18	0.24
	(0.111)	(0.387)	(0.250)	(0.717)	(0.589)	(0.238)	(0.813)

Note: Estimations use the one-step System GMM technique. The p-values appear in parentheses: *Significance at 10% level; **Significance at 5% level; ***Significance at 1% level.

Table 8: VECM estimations with the Arrelano-Bond robust standard error estimator

Variable	DLF_MM	DLID_T	DLT1	DLNPF	DLIP	DINF	DKLIBOR_3M
DLF_MM(-1)	0.658***	0.289***	0.015	0.060	-0.021***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.754)	(0.575)	(0.000)	(0.000)	(0.000)
DLID_T(-1)	-0.009	-0.170***	-0.030	-0.063***	-0.007	0.005***	-0.001***
	(0.670)	(0.000)	(0.134)	(0.001)	(0.535)	(0.000)	(0.000)
DLT1(-1)	0.091*	0.389	-0.129***	0.455***	-0.246***	-0.013**	-0.001*
	(0.090)	(0.163)	(0.000)	(0.000)	(0.000)	(0.015)	(0.093)
DLNPF(-1)	0.040	-0.208***	-0.060***	-0.170***	0.034***	-0.001	-0.001
	(0.563)	(0.000)	(0.000)	(0.000)	(0.000)	(0.382)	(0.262)
DLIP(-1)	0.002***	0.253	-0.054**	-0.120*	-0.374***	-0.021***	-0.003***
	(0.000)	(0.549)	(0.020)	(0.081)	(0.000)	(0.000)	(0.000)
DINF(-1)	-0.468***	-8.184	1.025*	-0.755	1.817***	-0.007	-0.004**
	(0.000)	(0.101)	(0.077)	(0.402)	(0.000)	(0.569)	(0.035)
DKLIBOR_3M(-1)	-0.627	-21.372***	-1.928	36.186*	4.675***	-0.910***	0.022
	(0.327)	(0.000)	(0.207)	(0.094)	(0.000)	(0.000)	(0.401)
ECT(-1)	-0.004	0.222	-0.016***	0.060**	0.031***	-0.006***	-0.001***
	(0.516)	(0.203)	(0.000)	(0.025)	(0.000)	(0.000)	(0.000)
Constant	0.003	-0.016**	0.014***	-0.018***	0.007***	0.000***	0.000***
	(0.634)	(0.028)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	108	108	108	108	108	108	108
Instrument rank	61	61	61	61	59	59	59
AR(1)	-1.17	-1.14	-1.26	-1.15	-1.41	-1.41	-1.41
	(0.242)	(0.256)	(0.209)	(0.249)	(0.158)	(0.157)	(0.158)
AR(2)	1.24	-0.98	-1.41	0.77	-1.15	1.41	1.27
	(0.216)	(0.327)	(0.160)	(0.441)	(0.250)	(0.159)	(0.205)

Note: Estimations use the one-step System GMM technique. The p-values appear in parentheses: *Significance at 10% level; **Significance at 5% level; ***Significance at 1% level.

The stacked and Dumitrescu-Hurlin tests for Granger causality in Table 9 and Table 10 respectively present consistent results except for LID_T. The statistical significance or insignificance of the test statistics respectively indicates the presence or absence of Granger causality from one variable to another variable. Both test results indicate the absence of Granger causality from LID_T to LF_MM. Furthermore, both test results suggest the exogeneity of LF_MM with respect to the microeconomic variables based on the absence of Granger causality from the microeconomic variables to LF_MM. Both test results also indicate the endogeneity of LT1 and LNPF based on the presence of Granger causality from at least one microeconomic variable to LT1 and LNPF respectively. Nevertheless, the two tests present contradictory results for LID_T. On one hand, the stacked test results indicate the endogeneity of LID_T with respect to the microeconomic variables based on the presence of Granger causality from LT1 to LID_T. On the other hand, the Dumitrescu-Hurlin test results indicate the exogeneity of LID_T with respect to the microeconomic variables based on the absence of Granger causality from the microeconomic variables to LID_T. Due to the heterogeneity allowed for in the Dumitrescu-Hurlin test, the paper shall favor Dumitrescu-Hurlin test results over stacked test results. Thus, LID_T appears as exogenous with respect to the microeconomic variables. On a related note, the presence of Granger causality from microeconomic variables to the macroeconomic variables of LIP, INF and KLIBOR_3M in both Table 9 and Table 10 occur possibly due to the data limitation of similar macroeconomic data from one country, Malaysia, for both cross-sections. Similar to VECM estimations, the paper assumes LIP, INF and KLIBOR_3M as exogenous since a higher likelihood exists for causality from macroeconomic to microeconomic variables versus that for causality from microeconomic to macroeconomic variables.

Table 9: Granger causality tests using stacked tests

Causality	To						
From	LF_MM	LID_T	LT1	LNPF	LIP	INF	KLIBOR_3M
LF_MM	-	0.039	0.689	0.638	0.759	1.229	0.801
	-	(0.999)	(0.633)	(0.672)	(0.581)	(0.301)	(0.551)
LID_T	1.355	-	4.128***	1.775	0.316	2.004*	0.953
	(0.248)	-	(0.002)	(0.125)	(0.903)	(0.084)	(0.450)
LT1	0.724	2.562**	-	4.172***	2.464**	0.502	2.502**
	(0.607)	(0.032)	-	(0.002)	(0.038)	(0.774)	(0.035)
LNPF	1.450	0.674	2.432**	-	0.432	0.091	1.237
	(0.213)	(0.644)	(0.040)	-	(0.826)	(0.993)	(0.298)
LIP	0.549	1.944*	1.347	0.417	-	2.239*	6.614***
	(0.739)	(0.094)	(0.251)	(0.836)	-	(0.056)	(0.000)
INF	0.510	1.503	1.070	0.908	1.304	-	1.983*
	(0.768)	(0.196)	(0.381)	(0.479)	(0.268)	-	(0.088)
KLIBOR_3M	2.272*	2.077*	1.366	1.338	2.502**	2.607**	-
	(0.053)	(0.074)	(0.243)	(0.255)	(0.035)	(0.029)	-

Note: The table uses the null hypothesis of no Granger causality from one variable to another variable. The table reports the F-statistics above the p-values in parentheses: *Significance at 10% level; **Significance at 5% level; ***Significance at 1% level.

Table 10: Granger causality tests using Dumitrescu-Hurlin tests

Causality	To						
From	LF_MM	LID_T	LT1	LNPF	LIP	INF	KLIBOR_3M
LF_MM	-	1.625	-0.435	0.444	4.287***	2.239**	1.922*
	-	(0.104)	(0.664)	(0.657)	(0.000)	(0.025)	(0.055)
LID_T	0.518	-	2.024**	-1.258	-0.241	0.441	0.215
	(0.605)	-	(0.043)	(0.208)	(0.810)	(0.659)	(0.830)
LT1	-0.459	0.759	-	1.774*	5.876***	-0.607	3.336***
	(0.646)	(0.448)	-	(0.076)	(0.000)	(0.544)	(0.001)
LNPF	-1.545	-0.326	-0.246	-	-0.542	0.364	0.372
	(0.122)	(0.744)	(0.806)	-	(0.588)	(0.716)	(0.710)
LIP	-0.763	1.398	2.334**	-1.082	-	-0.096	3.752***
	(0.445)	(0.162)	(0.020)	(0.279)	-	(0.923)	(0.000)
INF	-1.404	1.382	-0.649	2.468**	-0.920	-	-0.322
	(0.160)	(0.167)	(0.516)	(0.014)	(0.358)	-	(0.747)
KLIBOR_3M	3.069***	1.355	0.746	0.984	0.135	0.227	-
	(0.002)	(0.175)	(0.456)	(0.325)	(0.893)	(0.820)	-

Note: The table uses the null hypothesis of no homogenous causality from one variable to another variable. The table reports the Zbar-statistics above the p-values in parentheses: *Significance at 10% level; **Significance at 5% level; ***Significance at 1% level.

Panel cointegration and causality results accept the null hypothesis of total investment deposits, LID_T, do not affect mudarabah and musharakah financing, LF_MM, offered by Islamic banks. In the DOLS cointegrating equation estimations in Table 5, the β_1 correlation coefficient of LID_T in Equation 1 of 1.727 appears statistically significant and non-zero. Additionally, in VECM estimations for DLID_T or Equation 3 in Table 8, the β_0 correlation coefficient of DLF_MM(-1) of 0.289 appears statistically significant and non-zero. Nevertheless, the acceptance of the null hypothesis still occurs because: in VECM estimations in Table 7 and Table 8, the β_7 correlation coefficient the error correction term, u_{t-1}, in Equation 2 appears statistically insignificant, indicating LF_MM as exogenous; and in Granger causality tests in Table 9 and Table 10, LID_T does not cause LF_MM. Collectively, such results tend to indicate the presence of the positive long-run and short-run relationships between LID_T and LF_MM but no causality from LID_T to LF_MM, thus accepting the null hypothesis.

5.2 Economic Interpretation

The presence of the positive long-run and short-run relationships between LID_T, total investment deposits, and LF_MM, mudarabah and musharakah financing, but no causality from the former to the latter appears plausible. Firstly, the positive long-run and short-run relationships may arise from the long-run and short-run influence of variables other than the microeconomic and macroeconomic variables specified in Equation 1. For example, the simultaneous increase in LID_T and LF_MM may occur due to the increase in the positive

perception of Islamic finance and vice versa. Chong and Liu (2009) attribute the growth of Islamic finance worldwide to the Islamic resurgence since the late 1960s. Secondly, the exogeneity of LF_MM which indicates no causality from LID_T to LF_MM may suggest that the financing decisions by Islamic banks and fund demanders may depend on variables other than that in Equation 1. For example, the mudarabah and musharakah financing offered by Islamic banks may depend on the Islamic banks' and fund demanders' preferences on the type of financing contract. Nevertheless, VECM estimations in Table 8 identify LT1 as endogenous and LF_MM as exogenous, among others. Since LT1 appears as a variable within Islamic banks' control, the causality from LF_MM to LT1 and not vice versa may indicate Islamic banks' adaptability to fund demanders' preferences on the type of financing contract. Furthermore, the ratio of average LF_MM against average LID_T for both cross-sections of approximately 1/10, or less than one, as inferred from Table 2 serves as a prerequisite which enables fund demanders to exercise preferences on the type of financing contract. The prerequisite pertains to the supply of PLS deposits which enables the fulfillment of existing and potential demand for PLS financing depending on fund demanders' preferences on the type of financing contract. In conclusion, the mudarabah and musharakah financing offered by Islamic banks appears driven by fund demanders' preferences on the type of financing contract and not by total investment deposits, assuming the availability of supply of investment or PLS deposits more than or equal to the demand for mudarabah and musharakah or PLS financing.

6. Conclusion

The paper makes the initial attempt to explore the impact of fund suppliers on the use of PLS financing products offered by Islamic banks. Specifically, the paper aims to understand the impact of investment or PLS deposits on mudarabah and musharakah or PLS financing offered by Islamic banks. The appropriate techniques such as DOLS, FMOLS and System GMM are used for the estimations and causality analysis. For the empirical investigation, the microeconomic variables include mudarabah and musharakah financing, total investment deposits, tier 1 capital and non-performing financing while the macroeconomic variables include the industrial production index, inflation and interest rates. As a case study, the paper applies the techniques on panel data from Malaysia for two cross-sections, Islamic banks and Islamic banking schemes, with monthly frequency from January 2010 to January 2015. Since the data pertains to only one country, both cross-sections use the same macroeconomic data. Future research can address such a data limitation by applying the panel cointegration and causality techniques on data from more than one country. For now, the paper tests the null hypothesis of PLS or total investment deposits do not affect PLS or mudarabah and musharakah financing offered by Islamic banks.

Panel cointegration and causality results accept the null hypothesis of total investment deposits do not affect mudarabah and musharakah financing offered by Islamic banks. The results tend to indicate the presence of the positive long-run and short-run relationships between total investment deposits and mudarabah and musharakah financing but no causality from the former to the latter. Such results appear plausible based on two reasons. Firstly, the positive long-run and short-run relationships may arise from the long-run and short-run influence of variables other than the microeconomic and macroeconomic variables specified by the empirical

investigation. For example, the simultaneous increase in total investment deposits and mudarabah and musharakah financing may occur due to the increase in the positive perception of Islamic finance and vice versa. Secondly, the mudarabah and musharakah financing offered by Islamic banks appear driven by fund demanders' preferences on the type of financing contract and not by total investment deposits, assuming the availability of supply of investment or PLS deposits more than or equal to the demand for mudarabah and musharakah or PLS financing.

Policymakers' strategy on whether or not to promote PLS deposits to fund suppliers or PLS financing to fund demanders depends on the supply of the former and the demand for the latter. If the demand for PLS financing appears more than the supply of PLS deposits, policymakers should promote PLS deposits to fund suppliers in order to avoid higher risk PLS financing being funded by lower risk non-PLS financing. Furthermore, the increase in the supply of PLS deposits can enable the growth of PLS financing. If the demand for PLS financing appears less than the supply of PLS deposits, policymakers should promote PLS financing to fund demanders in order to enable more rational risk-taking to potentially realize more returns. In both scenarios, policymakers can promote PLS deposits and financing by enabling attractive rates through methods such as lower tax charges on such products. Furthermore, policymakers can increase the awareness among fund suppliers and demanders regarding the incremental benefits of PLS products versus non-PLS products. The widespread use of PLS products by fund suppliers and demanders due to policymaker actions shall drive Islamic banking towards the ideal and away from conventional banking.

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