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# Does the Volatility of Macroeconomic Variables Depress The Profitability of Islamic Banking?

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*Abstract*

*Islamic banks have been growing and expanding fast in Indonesia since 2008. The profitability of Islamic bank depends on Islamic bank characteristics as well as macroeconomic condition. As a country with an open economy, macroeconomic conditions are very volatile. Through exchange rate channel, the exchange rate fluctuation affects inflation so that it affects the Islamic bank's profitability. This present paper analyzes the effect of the instability of the macroeconomic variables covering the exchange rate and inflation on the Islamic bank's profitability. The instability of inflation and exchange rate are measured using Generalized Autoregressive Conditional Heteroskedasticity (GARCH). We apply the Autoregressive Distributed Lag Model (ARDL) using data from January 2011 to June 2018. We show that the exchange rate and inflation instability depress the Islamic bank's profitability in Indonesia. More interestingly, instability of inflation has a greater negative impact than the instability of the exchange rate on Islamic bank's profitability. The Islamic bank characteristics influencing most Islamic banks profit was non-performing financing (NPF).*

**Key words** : macroeconomic variables, instability, Islamic banking and profitability

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## INTRODUCTION

Indonesian Islamic banking has been growing and expanding fast after the Indonesian government enacted the Islamic Banking Law No. 21 in 2008. We have only 5 Islamic banks in 2002 covering 2 Islamic Commercial Banks as well as 3 Islamic Bank units which is conventional bank operating Islamic business units. The number of Islamic banks increased fast until 2018. Nowadays, we have 34 commercial Islamic banks consisting of 14 Islamic commercial bank and 20 Islamic bank units. The asset of Islamic banking along with its deposit funds has been increasing since 2011. The number of assets was IDR 4,045 trillion in 2002 and become IDR 477,327 trillion in 2018. In addition, deposit funds were IDR 2.918 trillion in 2002 and reached IDR 371,828 trillion in 2018.

The Indonesian Central Bank provides a guideline to measure a financial performance of Islamic bank covering five financial performances. Based on financial performance, the Islamic banks was a quite good financial performance from 2014 to 2018. Capital adequacy measured by CAR was 15.74% in 2014 and increased to 19.82% in 2018. During that period, CAR was above the minimum CAR of 12%. Return on assets (ROA) which measures the profitability is a trend to increase. It was was 0.79%, in 2014 and increased to 1.57 % in 2018. The average ROA, however, was below the threshold minimum level of 1.5%. The next financial performance is bad financing which is known as non-performing financing (NPF). The average NPF was 4.06% and was below the threshold of 5%. However, bad financing is close to the threshold. The next measurement is the level of operational efficiency (OER) which is measured by operating costs over operating income. If the OER is less than 94%, Islamic banking is

categorized as very healthy. OER indicate a trend to decline, its value is above 90% in 1994 and then to less than 90% in 2018. Whereas based on financing deposit ratio (FDR), FDR is below 100%. In 2014 it was 91.5% and then amounted to 86.4% in 2018. This FDR is below 100% demonstrating the high commitment of Islamic banks to be careful in financing its fund. Of the five aspects of financial performance, ROA as a measure of Islamic bank performance was still below the minimum value of 1.5%. Figure 1 illustrates the monthly ROA from 2011 to 2018. ROA fluctuates, the value was above 1.5% in January 2011 to October 2013, but it dropped below 1.5% after that year. The average value of ROA was 1.47%. This condition indicates that the profitability of Islamic banking has been moving to decrease recently.
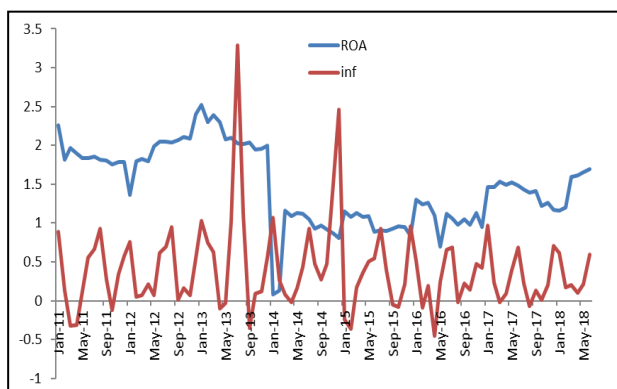


**Figure 1.** ROA and Inflation
2011: M1 to 2018:M6

Islamic Bank as a financial institution is vulnerable to collapse. Therefore, the Islamic bank must have good financial performance. Although on overall the Islamic banking financial performance is good, the financial performance of the Islamic bank as a financial intermediary highly depends on macroeconomic conditions. Indonesia is a country with a high level of economic openness in which the ratio of total exports and imports to GDP are more 50%. In addition, domestic production relies on imported input due to low local content of input so that domestic production is highly influenced by exchange rate fluctuations. Fluctuation the dollar greatly

affects domestic economic activities. Isnowati and Setiawan (2017) find that the exchange rate shock increased import price and also deteriorated national income in Indonesia. Many previous studies also report that the exchange rate increased inflation. Prasertnukul et al. (2010) show that depreciation increases inflation in Indonesia.

Figure 1 pictures the rate of inflation which is highly volatile or unstable. Inflation volatility (instability) is believed from fluctuations in the exchange rate as shown in Figure 2. Inflation instability certainly affects macroeconomic performance. Inflation causes purchasing power to decline so that the demand for goods and services decreases. Many empirical research such as Naceur and Omran (2011), Masood and Ashraf, 2012), among the others report that macroeconomic variable such inflation and economic growth contribute greatly to Islamic bank profit. This present study examines the effect of macroeconomic variable instability, namely price and exchange rate volatility on the Islamic Bank's profitability in Indonesia.
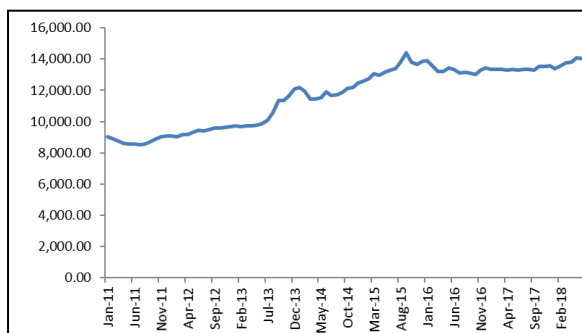


**Figure 2.** Exchange rate IDR per the US$ 2011: M1 to 2018:M6

Many previous empirical studies on Islamic banks' profit have been investigated. Variables affecting profit come from Islamic bank characteristics as well as macroeconomic condition. Ramadan (2011) find only bank characteristics such as size, efficiency and credit risk affecting to profit in

Jordan. Akhtar et al., (2011); Siddique et al., (2012); Mahmood et al. (2014) report that the bank characteristics encompassing liquidity, capital ratio, assets, number of branches and inflation influence profitability in Pakistan. However, their study reports that Islamic bank characteristics were relatively more important than macroeconomic condition. Setyawati et al. (2017) and Widarjono (2018) document that inflation, exchange rate, and non-performing financing affect Islamic banks' profitability.

Several previous research has been investigated the Islamic bank' profitability across countries such as Naceur and Omran (2011); Aliyu and Yusof (2016); Alqahtani et al., (2016), among the others. Naceur and Omran (2011) report that bank size, credit risk, and inflation influence the Islamic bank's profitability in the Middle East and North Africa. Aliyu and Yusof (2016) indicate that bank characteristics such as cost efficiency, operating income and macroeconomic variables such as inflation, exchange rate, and GDP explain profitability in seven countries in the Middle East. Alqahtani et al., (2016) also prove that the economic downturn reduced the Islamic bank's profitability in GCC countries. Other empirical researches have been carried out to examine the profitability of Islamic bank across countries (Masood and Ashraf 2012; Farooq and Zaheer,s 2015; Alharbi, 2017) for across countries as well as within countries (Wasiuzzaman and Tarmizi 2009; Sriyana, 2015; Hosen and Rahmawati 2016).

Our present study contributes to the previous empirical study using panel regression (Sriyana, 2015; Hosen and Rahmawati, 2016). This study examines the profitability of aggregate Islamic banks using time series data. ARDL model is applied because it could catch both short-and-long run condition of the Islamic bank' profit. Second, this study includes bank characteristics and macroeconomic condition such as Widarjono (2018). However,

because price and exchange are very volatile during the period of study, this study applies the instability of macroeconomic condition such as instability of inflation and exchange rate instead of inflation and exchange.

**METHOD**

We investigate the impact of volatility's macroeconomic economy on Islamic bank's profitability in Indonesia. The Islamic bank's profit is an aggregate Islamic bank covering Islamic Commercial Bank as well as Islamic Bank units. We use time series data covering from January 2011 to June 2018. This study selects 2011 as the starting period because of the stability of Islamic banks number.

Following empirical literatures such as Karim et al., (2010); Ramadan (2011); Masood and Ashraf (2012); Siddique et al., (2012); Setyawati et al. (2017); Widarjono (2018), We include both Islamic bank characteristics as well as macroeconomic variables using ARDL in analyzing Islamic bank's profitability. The benefit of ARDL can investigate both short-run condition and long-run condition. The relationship between the profitability of Islamic banking and its independent variables can be expressed as follow:

$$ROA = f(ASSET, FDR, CAR, OER, NFP, INF, EXC) \quad (1)$$

The equation (1) with the instability of economic macro variables can be expressed in term of regression equation as follow:

$$ROA_t = \beta_0 + \beta_1 Log(ASSET)_t + \beta_2 FDR_t + \beta_3 CAR_t + \beta_4 NFP_t + \beta_5 OER_t + \beta_6 VINF_t + \beta_7 VEXC_t + e_t \quad (2)$$

Where VINF is instability of price (inflation) and VEXC is instability of the exchange rate.

The Islamic bank's profit, which is measured by Return on Asset (ROA) in equation (2), is affected by both Islamic bank characteristics and macroeconomic variables.

The Islamic bank characteristics consist of asset, Financing deposit ratio (FDR), Capital Adequacy Ratio (CAR), Operational efficiency ratio (OER), Non-Performing Financing (NPF). The macroeconomic variables consist of Inflation (INF) and the exchange rate (EXC). OER is the ratio of operating expense to operating revenue (%). NFP is the ratio of non-performing financing to total financing (%). Inflation (INF) is monthly inflation which is calculated using the consumer price index (%). The exchange rate (EXC) is a monthly average of the Indonesia rupiah (IDR) against the US dollar (IDR per US$).

Asset measures size of Islamic bank. Larger asset indicates the higher power to create abnormal income so we expect a positive relationship between asset and profit. The FDR indicates an ability of an Islamic bank in providing the fund to the public in term of financing. The high financing leads to a bank to create higher profit. We expect FDR has a positive effect on profit. CAR represents bank' ability to hold its capital. Higher CAR means that an Islamic bank can expand its business to create more profit. The OER, which is a ratio of operating expense to operating revenue, measures the efficiency of an Islamic bank. Higher OER is lower efficiency so we expect that OER negatively links to profit. NPF is bad financing of Islamic bank. Higher NFP shows higher bad financing so it lowers Islamic bank to create profit. Inflation describes the change in the business cycle. The high inflation rate may lower the purchasing power of consumers. Therefore, we expect that higher inflation to be linked to lower profit. The domestic production in Indonesia depends on imported raw materials so that depreciation increases the price of goods and services in the domestic market. We expect the exchange rate negatively affects profit. Table 1 represents the hypothesized sign of all independent variables.

**Table 1.** Variable definition and hypothesized sign

| Variable | Definition | hypothesized sign |
|---|---|---|
| Dependent variable | | |
| ROA | Net profit over the total asset (%). It measures profit. | |
| Independent variable | | |
| Bank Characteristics | | |
| Size | Total asset (IDR Trillions). It measures the size of Islamic banking | + |
| FDR | Financing deposit Ratio (%). It measures financing ability | + |
| CAR | Equity over total assets (%). It determines capital adequacy. | + |
| OER | The ratio of operational expense to operational revenue (%). It determines level of efficiency of bank | - |
| NPF | Non Performing financing (%). It measures bad financing | - |
| Macro variables | | |
| VINF | The volatility of inflation. It measures volatility or instability of price | - |
| VEXC | The volatility of exchange rate. It measures volatility or instability of U.S dollar | - |

Data on inflation and exchange rate volatility are not available and hence was calculated from a GARCH (Bahmani-Oskooee and Aftab, 2017). To produce variance as a measure of the volatility, we apply GARCH (1,1) as follow:

$$ln(Y)_t = \varphi_0 + ln(Y)_{t-1} + \epsilon_t \qquad (3)$$
$$h^2_t = \alpha_0 + \alpha_1 \epsilon^2_{t-1} + \alpha_2 h^t_{t-1}$$

Where Y is inflation or the nominal exchange rate. $h^2_t$ the conditional variance.

The equation (2) can be formulated in an ARDL model:

$$\Delta ROA_t = \tau_0 + \tau_1 ROA_{t-1} + \tau_2 \log (ASSET)_{t-1} + \tau_3 FDR_{t-1} + \tau_4 CAR_{t-1} + \tau_5 NPF_{t-1} + \tau_6 OER_{t-1} + \tau_7 VINF_{t-1} + \tau_8 VEXC_{t-1} + \sum^P_{i=1} \phi_{1i} \Delta ROA_{t-1} + \sum^P_{i=1} \phi_{\_2i} \Delta \log (ASSET)_{t-1} + \sum^P_{i=1} \phi_{3i} \Delta OER_{t-1} + \sum^P_{i=1} \phi_{4i} \Delta NPF_{t-1} + \sum^P_{i-1} \phi_{5i} \Delta VINF_{t-1} + \sum^P_{i=1} \phi_{6i} \Delta VEXC_{t-1} + \sum^P_{i=1} \phi_{7i} \Delta VINF_{t-1} + \sum^P_{i=1} \phi_{8i} \Delta VEXC_{t-1} + e_t \qquad (4)$$

$\Delta$ stands for the first difference variable, , $\pi_0$ is the constant, $\pi_i$ and $\phi_{ij}$ are estimated coefficient. The first until six estimated coefficients $(\delta_1-\delta_8)$ indicate the long-run relationship and the rest of them with summation signs $(\phi_{1i}-\phi_{6i})$ correspond to the short-run dynamics condition.

There are several steps to estimate the ARDL model. The first step starts with the stationary test to examine the equilibrium or disequilibrium condition of data. Due to several tests of stationary data, this study applies two stationary tests in order to lead an unbiased result. Augmented Dickey-Fuller and Phillips-Perron Test are applied. Next step is a cointegration test to investigate the presence of long-rung relationship between ROA, ASSET,

FDR, CAR, OER, NFP, VINF, and VEXC. This study applies Bound testing approach (Pesaran et al., 2001). The null hypothesis is no cointegration against the presence of cointegration. The null hypothesis of no cointegration is as follows:

$$H_0: \tau_1 = \tau_2 = \tau_3 = \tau_4 = \tau_5 = \tau_6 = \tau_7 = \tau_8 = 0 \qquad (5)$$

Alternate hypotheses of cointegration can be written as follows:

$$H_a: \tau_1 \neq \tau_2 \neq \tau_3 \neq \tau_4 \neq \tau_5 \neq \tau_6 \neq \tau_7 \neq \tau_8 \neq 0 \qquad (6)$$

The Bound testing test follows the F test. Pesaran et al., (2001) provides the critical value of cointegration test covering lower bound I (0) and upper bound I (1). Cointegration exists between independent and dependent variables when the computed F value exceeds than I(1). However, when the computed F value is less than I(0) cointegration does not exist. Meanwhile, as the computed F value between I(0) and I(1) then there is no decision about cointegration.

Equation (4) can be rewritten as the error correction model as:

$$\Delta ROA_t = \pi_0 + \sum_{i=1}^{r} \pi_{1i}\Delta ROA_{t-1} + \sum_{i=1}^{r} \pi_{2i}\Delta Log(ASSET)_{t-1} + \sum_{i=1}^{r} \pi_{3i}\Delta FDR_{t-1} + \sum_{i=1}^{r} \pi_{4i}\Delta CAR_{t-1} + \sum_{i=1}^{r} \pi_{5i}\Delta NPF_{t-1} + \sum_{i=1}^{r} \pi_{6i}\Delta OER_{t-1} + \sum_{i=1}^{r} \pi_{7i}\Delta VINF_{t-1} + \sum_{i=1}^{r} \pi_{8i}\Delta VEXC_{t-1} + \pi_9 ECT_t + u_t \qquad (7)$$

## RESULTS AND DISCUSSION

Table 2 picture descriptive statistics for all variables. Average ROA is 1.47% with a standard deviation of 0.51. The average ROA is lower than 1.5% as the threshold number for a healthy Islamic bank. The second important statistic is the average of Non-Performing Financing (NPF) which was 3.84% with a standard deviation of 0.86. Overall NPF is below the threshold number of 5% but NPF has reached above a threshold number. CAR is the only financial performance above the threshold of 12% with an average of 15% and a minimum value of 12%. Among macroeconomic variables, Inflation is relatively stable with an average by 0.4. However, the exchange rate is more instability with standard deviation by 1913.44.

Stationary tests using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) are shown in Table 2. Both tests include constant, constant and trend and employ the Akaike Info Criterion (AIC) to choosing the optimal lag order for the ADF test. ROA, Log(ASSET), CAR, VINF, and VEXC are stationary at the level data. FDR, OER, and NPF are not stationary at level data but those variables are stationary at the first difference data. In conclusion, all variables are on I(1) and none of them are on I(2). These stationary tests affirm that the ARDL model is a suitable and proper model in estimating the Islamic Bank's profitability in Indonesia under a period of study.

**Table 2.** Descriptive Statistics

| Variable | Mean | Maximum | Minimum | Std. Dev. |
|---|---|---|---|---|
| ASSET (Trillion) | 253299.90 | 423966.00 | 95743.00 | 89957.57 |
| CAR (%) | 15.79 | 20.59 | 12.23 | 1.50 |
| EXC (IDR/$) | 11659.69 | 14396.10 | 8526.80 | 1913.44 |
| FDR (%) | 94.20 | 104.83 | 83.72 | 5.90 |
| INF (%) | 0.40 | 3.29 | -0.45 | 0.54 |
| NPF (%) | 3.84 | 5.54. | 2.22 | 0.86 |
| OER (%) | 84.20 | 94.38 | 70.43 | 7.52 |
| ROA (%) | 1.47 | 2.52 | 0.08 | 0.51 |
| VEXC (IDR/$) | 59479.36 | 459919.70 | 2238.69 | 84665.62 |
| VINF (%) | 0.28 | 4.10 | 0.12 | 0.47 |

**Table 2.** Stationary Test: ADF and PP Test

| | Level data | | | | First difference data | | | |
|---|---|---|---|---|---|---|---|---|
| | Constant | | Constant and Trend | | Constant | | Constant and Trend | |
| | ADF | PP | ADF | PP | ADF | PP | ADF | PP |
| ROA | -2.92** | -2.92** | -3.04** | -3.02** | -9.28*** | -11.98*** | -9.29*** | -12.01*** |
| Log(ASSET) | -2.87** | -3.32** | -3.21** | -2.44 | -3.31** | -10.75*** | -3.94** | -11.53*** |
| FDR | -1.33 | -1.20 | -2.54 | -2.46 | -11.27*** | -11.25*** | -11.28*** | -11.33*** |
| CAR | -3.73*** | -3.70*** | -4.20*** | -4.18*** | -11.24*** | -14.28*** | -11.25*** | -18.72*** |
| OER | -1.57 | -2.29 | -1.90 | -2.93 | -15.44*** | -17.54*** | -15.38*** | -17.59*** |
| NPF | -1.43 | -1.94 | -1.62 | -2.07 | -5.68*** | -12.21*** | -5.66*** | -12.16*** |
| VINF | -7.58*** | -7.58*** | -7.57*** | -7.57*** | -14.86*** | -38.11*** | -14.78*** | -38.95*** |
| VEXCH | -3.88*** | -3.88*** | -3.86*** | -3.86*** | -9.49*** | -12.15*** | -9.44*** | -12.20*** |

Note: ***; **;* are stationer at α=1%, 5% and 10% respectively

As a distributed lag model, ARDL is susceptible to the lag order. We apply the AIC method to get the optimum lag. The selected ARDL model is ARDL (1, 0, 0, 2, 2, 0, 5, 3). Table 3 presents the ARDL estimation. The top panel of Table 3 shows ARDL estimation and the bottom panel of Table 2 is a diagnostic test of OLS assumptions. The diagnostic statistic tests of OLS assumptions include Jerque-Berra (JB) test for normality of residual, Autoregressive Conditional Heteroskedasticity (ARCH) test for heteroskedasticity up to order 5, and Lagrange Multiplier (LM) test for autocorrelation up to order 5. The results pass all diagnostic tests of normality, absence of autocorrelation and homoskedasticity. The results of the test prove that our ARDL model fit the OLS assumption so it leads to unbiased and efficient estimators. We reject the null hypothesis for 11 of 22 independent variables at t α = 10% or less.

**Table 3.** ARDL Estimation Results

| Variable | Coefficient | Std. Error | t-Statistic |
|---|---|---|---|
| C | -2.8701* | 1.6803 | -1.7080 |
| $ROA_{t-1}$ | 0.6659*** | 0.0722 | 9.2249 |
| Log (ASSET) | -0.0161 | 0.0871 | -0.1846 |
| FDR | 0.0208*** | 0.0074 | 2.8283 |
| CAR | -0.0153 | 0.0308 | -0.4957 |
| $ROA_{t-1}$ | -0.0181 | 0.0344 | -0.5268 |
| $ROA_{t-2}$ | 0.0861*** | 0.0275 | 3.1355 |
| OER | 0.0050 | 0.0074 | 0.6821 |
| $ROA_{t-1}$ | 0.0040 | 0.0066 | 0.6030 |
| $ROA_{t-2}$ | 0.0094* | 0.0063 | 1.4896 |
| NPF | -0.1696*** | 0.0416 | -4.0768 |
| VINF | 0.0072 | 0.0428 | 0.1675 |
| $VINF_{t-1}$ | -0.0126 | 0.0439 | -0.2870 |
| $VINF_{t-2}$ | -0.0008 | 0.0529 | -0.0149 |
| $VINF_{t-3}$ | 0.0753* | 0.0569 | 1.3223 |
| $VINF_{t-4}$ | -0.0438 | 0.0548 | -0.7984 |
| $VINF_{t-5}$ | 0.2970*** | 0.0522 | -5.6865 |
| VEXC | 0.0000 | 0.0000 | -0.5928 |
| $VEXC_{t-1}$ | 0.0000*** | 0.0000 | -2.1777 |
| $VEXC_{t-2}$ | 0.0000*** | 0.0000 | 2.6094 |
| $VEXC_{t-3}$ | 0.0000*** | 0.0000 | -2.3643 |
| R-squared | 0.9084 | | |
| Diagnistic test | | | |
| JB | 2.1750 | LM (1) | 1.1197 |
| AR (1) | 0.0812 | LM (3) | 4.5861 |
| AR (3) | 1.6913 | LM (5) | 6.1944 |
| AR (5) | 4.8426 | | |

Note: *; **; *** are statistically significant at α=10%, 5% and 1% respectively. J-B is Jarque-Bera test for normality, LM is the Lagrange Multiplier test for autocorrelation and ARCH is autoregressive conditional heteroskedasticity test for heteroskedasticity.

The second step estimates a cointegration test to capture the long-run relationship between a dependent variable and independent variables using bound test. Similar to ARDL estimation, cointegration test is very susceptible to lag order. The Akaike Info Criterion (AIC) method is applied to choose the optimal lag length. Table 4 reports the cointegration test result.

The computed F value is 4.7868. The computed F value exceeds than I(1) at α = 1%. From the Bound testing, we conclude that the dependent variable (ROA) and independent variables (ASSET, FDR, CAR, OER, NPF, VINF, and VEXC) are related in the long-run condition. With this finding, then we can assess the profitability of Islamic bank dynamics and its

relation to all independent variables both short run and long run condition.

**Table 4.** The Bound Test for Cointegration

| Test Statistics | Value | Critical F Value | | |
|---|---|---|---|---|
| | | $\alpha$ | I(0) | I(1) |
| F-statistic | 7.8546 | 10% | 1.92 | 2.89 |
| k | 7 | 5% | 2.17 | 3.21 |
| | | 2.5% | 2.43 | 3.51 |
| | | 1% | 2.73 | 3.90 |

Table 5 reports the short-run coefficient of Error Correction Model (ECM) in the ARDL model. The correct term error that is a lag error (ECt-1) is negative and statistically significant at $\alpha$=1%. We infer that the short-run ARDL model is applicable and long-run relationship between the dependent and independent variables is found. In this short model, some variables, not all variables, affect Islamic bank's profitability i.e CAR, OER, VINF, and VEXC. OER is negative and statistically significant in the short run. This finding proves that the level of efficiency pushes to the higher the profitability. Inflation volatility is a positive and statistically significant up to lag 4, except lag 0. Exchange rate volatility also is positive and statistically significant up to lag 2. Both variables encourage higher profit in the short run. However, these findings are contrary to long-run hypothesis as expected in economic theory.

**Table 5.** Short run estimation: ECM model

| Variable | Coefficient | Std. Error | t-Statistic |
|---|---|---|---|
| $\Delta CAR_t$ | -0.0153 | 0.0232 | -0.6581 |
| $\Delta CAR_{t-1}$ | -0.0861*** | 0.0238 | -3.6205 |
| $\Delta OER_t$ | 0.0050 | 0.0056 | 0.9055 |
| $\Delta OER_{t-1}$ | -0.0094** | 0.0056 | -1.6987 |
| $\Delta VINF_t$ | 0.0072 | 0.0364 | 0.1968 |
| $\Delta VINF_{t-1}$ | 0.2663*** | 0.0445 | 5.9825 |
| $\Delta VINF_{t-2}$ | 0.2656*** | 0.0506 | 5.2524 |
| $\Delta VINF_{t-3}$ | 0.3408*** | 0.0538 | 6.3339 |
| $\Delta VINF_{t-4}$ | 0.2970*** | 0.0440 | 6.7483 |
| $\Delta VINF_t$ | 0.0000 | 0.0000 | -0.7058 |
| $\Delta VEXC_{t-1}$ | 0.0000* | 0.0000 | -1.3474 |
| $\Delta VEXC_{t-2}$ | 0.0000*** | 0.0000 | 2.7606 |
| $EC_{t-1}$ | -0.3341*** | 0.0375 | -8.9179 |
| R-squared | 0.707304 | | |
| Durbin-Watson stat | 2.182195 | | |

Note: *; **;*** are statistically significant at $\alpha$=10%, 5% and 1%.

Finally, we discuss the long-run condition. Table 6 presents the long-run coefficient estimation of ARDL. We reject the null hypothesis for all independent variables at $\alpha$=10% or lower, except assets.

The results find that the bank characteristics variables are consistent with our hypothesis with exception of OER. As expected, FDR is a positive sign and we reject the null hypothesis at $\alpha$=5%. Higher FDR is more powerful bank to

finance so it creates more profit for an Islamic bank. CAR measuring the Islamic bank's ability to expand its business is statistically significant at α=10% with a positive sign. Contrary to the hypothesis, OER is statistically significant at α=5% and negatively influences profit. NFP is a negative sign and statistically significant α=1% as expected in finance theory. All macroeconomic variables i.e. instability of price and exchange rate, which is the main theme of this study, affect negatively and statistically significant at α=5% and at α=1% respectively. These findings imply that instability of price and exchange rate causes a negative impact on Islamic banks' profit.

**Table 6**. Long Run Estimation

| Variable | Coefficient | Std. Error | t-Statistic |
|---|---|---|---|
| C | -8.5908 | 6.0601 | -1.4176 |
| LOG(ASSET) | -0.0481 | 0.2614 | -0.1841 |
| FDR | 0.0624** | 0.0290 | 2.1513 |
| CAR | 0.1577* | 0.1006 | 1.5678 |
| OER | 0.0552** | 0.0308 | 1.7905 |
| NPF | -0.5075*** | 0.1445 | -3.5112 |
| VINF | -0.8135** | 0.3961 | -2.0536 |
| VEXC | 0.0000*** | 0.0000 | -2.7316 |

Note: ***; **;* are statistically significant at α=1%, 5% and 10% respectively

In the short run condition, the characteristic of Islamic banks affecting profit is OER with a negative sign. This negative sign shows that if efficiency weakens then the profitability of Islamic bank decline and vice versa. This finding shows that Islamic bank must be able to reduce operating costs in order to increase profits in the short run. This result links the previous empirical research that lower efficiency reduces the profitability of Islamic bank (Widarjono, 2018). Variable macroeconomics both instability of inflation and exchange affect positively in the short

run. These findings do not fit the hypothesis in which the long-run condition presents an equilibrium condition linked to the economic theory. The short run is a disequilibrium condition for which it needs adjustment for any party in the market in order to get an equilibrium condition. For example, high price is an incentive for companies because consumers have not made adjustments to these price changes in the short run so that we expect the Islamic bank's profit increase in the short run. However, an increase in price lowers purchasing power of consumers in the long run and become a disincentive for companies so that the profit of Islamic bank is expected to decline.

The Islamic bank characteristics which affect profit in the long-run are FDR, CAR, OER, and NPF. FDR that measures the ability of an Islamic bank to financing has a positive impact on the profitability of the Islamic bank. Hosen and Rahmawati ( 2016) also report that higher financing can create more profit. As a proxy of capital adequacy, CAR affects positively on the profitability of Islamic bank. On average, the CAR of Islamic Banking is 15.7% which is above 12%. Financial performance of CAR is an ideal condition for the financial institution in the banking industry. Some previous research such as Akhtar et al., (2011); Aliyu and Yusof (2016) also fund that high capital enables Islamic banks to expand their business to increase profit. Management's efficiency measured by OER has a positive effect on the Islamic bank's profit. This finding is not lined with our hypothesis and previous results such as (Ramadan, 2011); (Akhtar et al., 2011). Based on the short-run condition, the higher operating cost has lower profitability. However, Islamic bank as a new financial industry in Indonesia needs high cost to operate and invest so that we expect the high operational cost can cause higher profit in the long run (Widarjono, 2018). NPF as a proxy of financing risk in Islamic Bank affect negatively to profit as expected which fits

the previous results such as Ramadan (2011); Masood and Ashraf, (2012); Setyawati et al., (2017). This result proves that bad financing resulted in low profitability on the Islamic bank. Therefore, Islamic bank must concern to manage financing risk not only to increase profit but also to reduce bank failures stemming from bad financing.

The previous empirical studies find that Inflation negatively influences on Islamic bank's profitability in the long run which is linked to the previous results such as Naceur and Omran, (2011); Masood and Ashraf, (2012); Siddique et al., (2012); Zarrouk et al., (2016); Aliyu and Yusof, (2016); Alqahtani et al., (2016). Most of the previous empirical studies do not incorporate the exchange rate as a macroeconomic variable in estimating the Islamic bank's profitability. The exchange rate as expected affects negatively to the profitability of the Islamic bank. Aliyu and Yusof, (2016); Widarjono (2018) also report that depreciation of domestic currency lower Islamic bank profit. Because of the instability of price and exchange rate in Indonesia, this study includes instability of inflation and exchange rate using the GARCH model. This study is different from the previous studies which include inflation and exchange rate (Aliyu and Yusof, 2016; Widarjono, 2018). Instability of inflation and exchange rate affect negatively to Islamic bank profit. Instability of inflation and exchange creates economic instability which lessens the Islamic bank's profitability. More precisely, the instability of inflation lowers more profitability than the instability of exchange rate. Rupiah have been tending to depreciate against the US dollar since 2011. Through the exchange rate pass-through, the exchange rate affects the domestic price. However, depreciation has a greater inflationary effect than appreciation. Depreciation of Rupiah since 2011 have been

increasing inflation rate because domestic production mainly depends on imported raw inputs.

Based on these results, this study confirms with previous studies. Islamic bank characteristics and macroeconomic condition influence the level of Islamic bank's profitability in Indonesia. However, some previous studies also report that there are different Islamic bank characteristics affecting the profitability of Islamic bank. We find that NPF as a proxy of bad financing has the greatest impact on profit. Meanwhile, other studies are different variables. Deposit and equity is the main factor for Pakistan (Siddique et al., 2012). Non-interest earning contribute the most for Jordan (Ramadan (2011). Credit risk is the greatest factor for Malaysia (Choong et al., 2012). For macroeconomic condition, this study indicates instability of inflation is as the main factor affecting profit. Some previous study report that GDP is the main macroeconomic condition in affecting profit such as Siddique et al., (2012); Choong et al., (2012); Aliyu and Yusof, (2016). However, some other previous study such as Naceur and Omran (2011); Zarrouk et al., (2016); Alqahtani et al., (2016) find that inflation affects greatly to Islamic bank profit.

## CONCLUSION

The present study analyzes the Islamic Bank's profitability in Indonesia including both Islamic bank characteristics and macroeconomic condition. However, this study includes instability of inflation and exchange rate to measure instability of macroeconomic condition. We show that Islamic bank characteristics, namely FDR, CAR, OER, and NPF affect the profitability of the Islamic bank. The most important Islamic bank characteristics affecting profit is NPF. We conclude that high bad financing lowers the

profitability of the Islamic bank. It implies that management's Islamic bank must concern to reduce financing risk by applying a prudent financing policy. CAR is the second greatest variable to affect profit. With average CAR by 15%, Islamic bank has to maintain it in order to enable to expand prudential financing.

Based on the financial performance, Islamic banking in Indonesia is a healthy bank industry and the probability of bankruptcy is low. However, the Islamic bank as a financial institution is vulnerable to collapse if macroeconomic conditions such as inflation and exchange rate are worse. From this study, the level of bank profits is also strongly influenced by instability of macroeconomic conditions. Instability of price and exchange rate has a negative impact on profits. Furthermore, the instability of price has a more negative impact on profit than the instability of the exhange rate. In order to support and encourage Islamic banking, the policy-makers must design a suitable economic policy in controlling the stability of price and exchange rate.

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