# “Do Islamic banks bear displaced commercial risk? Evidence from Indonesia”


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# DO ISLAMIC BANKS BEAR DISPLACED COMMERCIAL RISK? EVIDENCE FROM INDONESIA

## Abstract

The market share of Islamic commercial banks in Indonesia is small despite the fact that Indonesia is a predominantly Muslim country. This paper investigates the asymmetric effect of the deposit rate of conventional banks on Islamic bank deposits in Indonesia applying a dual banking system. This study employs the Non-linear ARDL (NARDL), using monthly data and covering 2009:M1–2019:M7. The findings clearly confirm the long-run relationship between the Islamic deposit and conventional deposit rate for any maturity. Furthermore, the impact of conventional bank deposit rate is asymmetry on Islamic bank deposit for any maturity, implying that Islamic bank deposits react differently to up and down in conventional bank deposit rates, but it tends to weaken for longer maturity. More interestingly, based on asymmetric results, Islamic bank deposits adjust at a higher speed to an increase in conventional deposit rates compared to a rise in the Islamic deposit rates. The results imply that Islamic bank depositors may transfer their funds to conventional bank deposits as conventional bank deposit rates rise in a dual banking environment known as displaced commercial risk (DCR).

**Keywords** Islamic bank, Islamic bank deposit rate, conventional bank deposit rate, displaced commercial risk

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## INTRODUCTION

An Islamic bank (IB), like a conventional bank (CB), is an intermediary financial institution by linking depositors as a surplus group with borrowers as a deficit group. For that reason, the main source of funding of Islamic banks relies on Islamic depositors' money for their financing purposes. The liquidity of Islamic banks, therefore, is highly dependent on Islamic bank consumers' deposits. However, Islamic bank has limitations in attracting deposits due to limited activity such as a prohibition of interest rate and any speculative activity (Hassan & Aliyu, 2018). As such, an Islamic bank is concerned about the significant fluctuation of the total deposit and therefore it needs to be well managed. One of the most effective ways to manage liquidity is to identify factors that may influence the Islamic bank deposits' vulnerability.

Several studies have shown that Islamic bank consumer behavior is apparently influenced by the products and services provided by conventional banks because consumers are accustomed to interest rate-based conventional banks in the dual banking system (Azmat et al., 2015; Azad et al., 2018). A number of empirical studies found that IB's deposit rate is very responsive to CB's deposit interest rates, such as Chong and Liu (2009), Zainol and Kassim (2010), Anuar et al. (2014), Sukmana and Ibrahim (2017) for Malaysia; Cevik and Charap (2011), Ergeç and Arslan (2013), and Ergec and Kaytanci (2014) for Turkey; and Kasri and Kassim (2009) for Indonesia. Accordingly, Islamic



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bank deposit responds to the conventional deposit rate in the dual baking environment. The CB deposit rate negatively affects Islamic deposits in some countries known as displaced commercial risk (DCR) (Kassim et al., 2009; Abduh, 2015; Aysan et al., 2018).

Indonesia, as the biggest Muslim country, started a dual banking system in 1992. Initially, the Central Bank permits a bank to apply a profit-loss sharing system for its operations through Law No. 7 of 1992. To support these Islamic banks, The Indonesian Ulema Council prohibited interest rates or usury in 2003. Finally, the government approved the Islamic Banking Law No. 23 in 2008, which is a legal basis for the operation of Islamic banking in Indonesia. The Islamic bank has grown rapidly since the government issued the Islamic Banking Law (Widarjono et al., 2020). However, the Islamic bank assets were roughly 5% of the total bank assets in Indonesia in 2019. Their total assets are certainly small compared to the entire Muslim population in Indonesia of 250 million. Plausible reasons come from the fact that most Islamic bank customers still practice dual banking. If conventional banks provide a higher rate of return on deposits, Islamic bank consumers shift their funds to conventional banks (Ismal, 2011). The facts also show that the prohibition of interest from the Indonesian Ulema Council does not cause Muslim consumers to switch to Islamic banks because religious branding is not a key success in attracting Muslim consumers to choose Islamic banks in a dual banking environment (Weill, 2011).

According to above stylized fact, IBs customers in Indonesia are very responsive to products of conventional banks. This study aims to explore the DCR phenomenon in Indonesia. The existing empirical studies examine the DCR using the symmetric effect (Kasri & Kassim, 2009; Abduh, 2015; Mushtaq & Siddiqui, 2017; Solarin et al., 2018). This study, however, assesses the DCR in Indonesian IBs employing the asymmetric effect of CD rates on IB deposits.

## 1. LITERATURE REVIEW

IBs differ from CBs in terms of the types of financing contracts. Islamic banks forbid interest rates in their transactions to be replaced with a profit-loss sharing system (PLS) and non-PLS contracts. Islamic bank deposits consist of Islamic bank wadiah and profit-sharing investment fund. The Islamic bank wadiah consist of demand deposit and saving deposit while the latter encompasses demand deposits, saving deposits, and time-saving deposits. The Islamic bank wadiah is structured under a wadiah contract, a contract between an Islamic bank and its depositor for only custody and safekeeping. By contrast, the profit-sharing investment funds are based on the Mudharaba contract under the profit and loss sharing principle.

The Islamic deposit rate under the Mudharaba contract is very responsive to CB deposit interest rates in countries that practice a dual banking system. By applying the symmetric relationship, some empirical studies found that the IB deposit rate follows the CB deposit rate. Among them are Chong and Liu (2009), Zainol and Kassim (2010) and Anuar et al. (2014) for Islamic banks in Malaysia; Cevik and Charap (2011) and Ergeç and Arslan (2013) and Ergec and Kaytanci (2014) for Islamic banks in Turkey; and Kasri and Kassim (2010) for Indonesian Islamic banks. By employing an asymmetric relationship, Sukmana and Ibrahim (2017) confirmed that IB deposit rates asymmetrically follow IB deposit rates but the IB deposit rates exhibit at a faster speed to increasing CB deposit rates.

Hence, many studies about the behavior of IB deposits clearly include interest rates in determining the fluctuation of IB deposits. Haron and Azmi (2008) examined the impact of Islamic deposit rate and conventional deposit Islamic, including some macroeconomic variables on IB deposit in Malaysia, employing the time-series method from January 1998 to December 2003. The cointegration technique clearly documented that Islamic savings are not affected by the CB deposit rate. Solarin et al. (2018) examined the factor affecting IB deposits in Malaysia employing the residual augmented least squares (RALS) method from January 2007 to September 2016. The results indicate that interest rates positively affect total IB deposits and several components of IB deposits.

Kasri and Kassim (2009) investigated the determinants of Islamic bank savings in Indonesia using a time series model from March 2000 to August 2007. The results show that higher IB deposits are significantly related to lower interest rates and, conversely, high IB deposit rates are correlated with higher Islamic deposits in Indonesia. Ismal (2011), using Linear Probability Model (LPM) from December 2000 into December 2009, also indicates that as CB interest rates increase, Islamic depositors withdraw their funds from the Indonesian Islamic bank. Abduh (2015), applying the time-series method and using monthly data from December 2000 to January 2011, finds that interest rates negatively affect IB deposits in Indonesia.

Aysan et al. (2018) explored the behavioral aspects of IB depositors in a dual banking environment in Turkey. By employing a panel vector autoregression (panel VAR) method and using quarterly data from 2004:Q3 to 2012:Q4, the findings indicate that IB deposits significantly respond to changes in interest rates but that larger IB depositors are very responsive to changes in interest rates in Turkey. These findings imply that IB depositors due to rational consumers withdraw their funds as CB interest rates increase because they obviously yield higher returns so Islamic banks in Turkey suffer the displaced commercial risk (DCR).

Based on the review of the literature overviewed above, IB deposits are very responsive to CB deposit rates. Accordingly, the DCR phenomenon may occur when IB deposit rate is lower than CB deposit rates. Therefore, this study explores the DCR phenomenon in the dual banking system. This study formulates some hypotheses. First, this study hypothesizes that the conventional bank deposit rate negatively influences an Islamic bank deposit. Second, this study hypothesizes that the Islamic bank deposit rate positively affects Islamic bank deposits.

## 2. METHODOLOGY AND DATA

Based on the consumer theory of Islamic deposit products in the dual banking environment, the first step forms an equation of a long-run relationship between the IB deposit and investment returns both IB deposit rate and CB interest rate. Those relationships can be written in the following equation:

$$lid_t = \beta_0 + \beta_1 ir_t + \beta_2 ib_t + \varepsilon_t, \quad (1)$$

where *id* is IB deposit; *ir* is CB deposit rate; and *ib* is IB deposit rate. IB deposit is expressed in the natural logarithm.

Some existing studies have indicated that IB deposit and IB deposit rates are strongly related to CB interest rates. According to a study by Ismal (2011), the IB customer's decision truly depends on which bank benefits the customer at the dual banking system. The previous studies such as Haron and Azmi (2008) and Abduh (2015) documented that IB deposits negatively respond to interest rate, suggesting that IB deposits will decrease for any increase in the interest rate and vice-versa. E utility maximization theory of Muslim customers states that the positive relation between IB deposit rate and IB deposit exists, implying that high IB deposit is significantly correlated with high IB deposit rate and vice versa (Kasri & Kassim, 2009; Abduh et al., 2011).

Asymmetric price is a common phenomenon in various prices because the pace of cost decrease is slower than cost increase. Among them are consumer prices (Baharumshah et al., 2017; Widarjono & Hakim, 2019; Widarjono et al., 2020), stock prices (Kumar, 2019; Sheikh et al., 2020), interest and deposit rate (Apergis & Cooray, 2015; Holmes et al., 2015). The existing empirical literature also documented that the asymmetric link between the Islamic deposit and the conventional deposit rate exists (Sukmana & Ibrahim, 2017). Equation (2) indicates that the link between the Islamic financing rate and conventional lending rate is symmetric. For that reason, it may infer that the impact of CB deposit rate on IB deposit is likely asymmetric too. To test the asymmetric effect of IB and CB deposit rates on IB deposit, equation (1) can be written as follows:

$$lid_t = \pi_0 + \pi_1 ir_t^+ + \pi_2 ir_t^- + \pi_3 ib_t^+ + \pi_4 ib_t^- + \mu_t \quad (2)$$

where $ir_t^+$ and $ir_t^-$ are partial sums of positive and negative change in $ir_t$, $ib_t^+$ and $ib_t^-$ are partial sums of positive and negative change in $ib_t$. Variable $ir_t^+$,


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$ir_t^-$, $ib_t^+$ and $ib_t^-$ are calculated following Shin, Yu, and Greenwood-nimmo (2014) as follows:

$$\begin{aligned} ir_t^+ &= \sum_{t=1}^{k} \Delta ir_{t-1}^+ = \sum_{t=1}^{k} \max(ir_t, 0), \\ ir_t^- &= \sum_{t=1}^{l} \Delta ir_{t-1}^- = \sum_{t=1}^{l} \min(ir_t, 0), \end{aligned} \tag{3}$$

$$\begin{aligned} ib_t^+ &= \sum_{t=1}^{m} \Delta ib_{t-1}^+ = \sum_{t=1}^{m} \max(ib_t, 0), \\ ib_t^- &= \sum_{t=1}^{n} \Delta ib_{t-1}^- = \sum_{t=1}^{n} \min(ib_t, 0). \end{aligned} \tag{4}$$

To examine the asymmetric effects of CB interest rate and IB Islamic rate on IB deposits, this study applies Non-linear Autoregressive Distributed Lag Model (NARDL) (Shin et al., 2014). The NARDL model of equation (2) can be written as:

$$\begin{aligned} &\Delta lid_t = \delta_0 + \delta_1 lid_{t-1} + \delta_2 ir_{t-1}^+ + \delta_3 ir_{t-1}^- + \\ &+\delta_4 ib_{t-1}^+ + \delta_5 ib_{t-1}^- \\ &+\sum_{i=1}^{l} \theta_{1i} \Delta lid_{t-1} + \sum_{i=0}^{p} \theta_{2i} \Delta ir_{t-1}^+ + \sum_{i=0}^{q} \theta_{3i} \Delta ir_{t-1}^- + \\ &+\sum_{i=0}^{r} \theta_{4i} \Delta ib_{t-1}^+ + \sum_{i=0}^{s} \theta_{5i} \Delta ib_{t-1}^- + \varepsilon_t. \end{aligned} \tag{5}$$

The NARDL can examine the long-run and short-run asymmetric effects of CB deposit rate and IB deposit rate on IB deposit. As the asymmetric impact occurs, then IB deposit responds differently to changes in CB deposit rate and IB deposit rate depending on the level of increase or decrease in CB deposit rate and IB deposit rate. The starting step is to check the stationarity of each variable in NARDL to warrant the order of the variable. The second step is the cointegration test that detects the long-run relationship between dependent and independent variables. This cointegration test involves the t-test of the null hypothesis $\delta_1 = 0$ using $t_{BDM}$ (Banerjee et al., 1998) and Wald F test of the null hypothesis $\delta_1 = \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ following $F_{PSS}$ (Pesaran et al., 2001).

As the cointegration is found, the next step is to check the asymmetric effect of CB deposit rate as well as IB deposit rate on IB deposit for both the short run and long run. The short-run asymmetric coefficients of positive and negative of CB deposit rate and IB deposit rate are

$$\begin{aligned} &\pi_1 = \sum_{i=0}^{p} \theta_{2i} \Delta ir_{t-1}^+, \quad \pi_2 = \sum_{i=0}^{q} \theta_{3i} \Delta ir_{t-1}^-, \text{ and} \\ &\pi_3 = \sum_{i=0}^{r} \theta_{4i} \Delta ib_{t-1}^+, \quad \pi_4 = \sum_{i=0}^{s} \theta_{5i} \Delta ib_{t-1}^-, \end{aligned} \tag{6}$$

The long-run asymmetric coefficients of positive and negative CB deposit rate and IB deposit rate are respectively

$$\begin{aligned} &\rho_1 = -\frac{\delta_2}{\delta_1}, \quad \rho_2 = -\frac{\delta_3}{\delta_1}, \\ &\rho_3 = -\frac{\delta_4}{\delta_1}, \quad \rho_4 = -\frac{\delta_5}{\delta_1}. \end{aligned} \tag{7}$$

The null hypotheses of short-run asymmetric effect are $\pi_1 = \pi_2$ and $\pi_3 = \pi_4$. Accordingly, the null hypotheses of the long-run asymmetric effect are $\rho_1 = \rho_2$ and $\rho_3 = \rho_4$. Both tests of asymmetric effects are distributed following the Wald F statistic test. As the asymmetric effect is found, then the IB deposit responds asymmetrically to an increase (a decrease) in CB deposit rate and IB deposit rate.

The last step is to calculate the asymmetric cumulative dynamic multiplier effect for any change in CB deposit rate and IB deposit rate on IB deposit. The asymmetric cumulative dynamic multiplier effect is a change $ir_t^+$ and $ir_t^-$, $ib_t^+$ and $ib_t^-$ on $ib_t$ employing the following formula (Shin et al., 2014):

$$\begin{aligned} &m_k^+ = \sum_{j=0}^{k} \frac{\partial lid_{t+j}}{\partial ir_{t-1}^+}, \quad m_k^- = \sum_{j=0}^{k} \frac{\partial lid_{t+j}}{\partial ir_{t-1}^-}, \\ &k = 0,1,2,\ldots, \\ &\text{where} \quad k \to \infty, \quad m_k^+ \to \theta_1 \quad \text{and} \quad m_k^- \to \theta_2, \end{aligned} \tag{8}$$

$$\begin{aligned} &n_k^+ = \sum_{j=0}^{l} \frac{\partial lid_{t+j}}{\partial ib_{t-1}^+}, \quad n_k^- = \sum_{j=0}^{l} \frac{\partial lid_{t+j}}{\partial ib_{t-1}^-}, \\ &l = 0,1,2,\ldots, \\ &\text{where} \quad l \to \infty, \quad n_k^+ \to \varphi_1 \quad \text{and} \quad n_k^- \to \varphi_2. \end{aligned} \tag{9}$$

This study employs monthly data, covering from 2009:M1 to 2019:M7. Time deposits are time deposits of Islamic banks encompassing 1-month,

3-month, 6-month, and 12-month maturities. Islamic deposit rate for each maturity is the Mudharaba rate. Mudharaba rate is Islamic profits that are shared between the two parties according to a mutually agreed ratio. The Mudharaba rate is the monthly average yield rate of Islamic Commercial Banks and Islamic Business window. Accordingly, the deposit interest rates of the conventional bank correspond to Islamic deposit maturities. The data for this empirical study are from Islamic banking statistics published online by Otoritas Jasa Keuangan (OJK), i.e., the Indonesian Financial Service Authority.

## 3. RESULTS

The Islamic financing and deposits are presented in Table 1. In the upper part, the breakdown of total Islamic financing shows that total financing was IDR (Indonesian Rupiah) 212.996 trillion in 2015 and IDR. 355.182 trillion in 2019, respectively. Of seven types of financing, the Murabaha was the most type of financing. The Murabaha contract accounted for 57.33% in 2015 but it decreased to 45.23% of total financing in 2019. The second biggest type of financing is Musyaraka. The Musyaraka financing was 28.50% of total financing in 2015 and increased to 44.34% of total financing in 2019. Total financing of the PLS contracts was 35.46% in 2015 and increased to 48.22% in 2019 while total financing of the non-PLS contracts was 64.54% and 51.78% in 2015 and 2019, respectively. Based on the financing, most of the financing of Islamic commercial banks is non-PLS contracts because of less risky financing (Widarjono et al., 2022). This implies that the practice of Ibs in Indonesia appears to close to the practice of conventional banks (Sutrisno & Widarjono, 2018). These financings are similar to Malaysian Islamic banking (Chong & Liu, 2009).

Islamic banking deposits consist of Islamic bank wadiah, consisting of demand deposit and saving deposit and profit-sharing investment fund comprising demand deposit, saving deposit and time-saving deposit (1-month, 3-month, 6-month, and 12-month). The breakdown of the total Islamic deposits in the bottom parts shows that total Islamic banking deposits in Indonesia amounted to IDR 225.407 trillion and IDR 416.557 trillion in 2015 and 2019, respectively. The share of Total Islamic bank wadiah and profit-sharing investment fund of total Islamic deposit was 15.78% and 84.22% in 2019, respectively. The profit-sharing investment funds are predominantly 1-month time deposit and then followed by saving deposit and 3-month time deposit.

**Table 1.** Financing and deposits of Islamic commercial banks

Source: Indonesian Authority Financial Service.

| Islamic bank products | 2015 | | 2019 | |
|---|---|---|---|---|
| | (IDR trillion) | (%) | (IDR trillion) | (%) |
| **Islamic Financing** | | | | |
| Mudharaba | 14.820 | 6.96 | 13.779 | 3.88 |
| Musyaraka | 60.713 | 28.50 | 157.491 | 44.34 |
| Murabaha | 122.111 | 57.33 | 160.654 | 45.23 |
| Qardh | 3.951 | 1.85 | 10.572 | 2.98 |
| Istisna | 0.770 | 0.36 | 2.097 | 0.59 |
| Ijarah | 10.631 | 4.99 | 10.589 | 2.98 |
| Salam | – | – | – | – |
| Total Financing | 212.996 | – | 355.182 | – |
| **Islamic Deposit** | | | | |
| **1. Islamic bank wadiah** | | | | |
| Demand deposit | 17.327 | 7.69 | 30.331 | 7.28 |
| Saving deposit | 15.206 | 6.75 | 35.420 | 8.50 |
| **2. Profit-sharing investment fund** | | | | |
| Demand deposit | 3.859 | 1.71 | 27.321 | 6.56 |
| Saving deposit | 53.388 | 23.68 | 97.839 | 23.49 |
| 1-month time deposit | 103.100 | 45.74 | 149.506 | 35.89 |
| 3-month time deposit | 20.615 | 9.15 | 45.642 | 10.96 |
| 6-month time deposit | 6.402 | 2.84 | 15.420 | 3.70 |
| 12-month time deposit | 5.512 | 2.45 | 15.078 | 3.62 |
| Total Islamic deposit | 225.407 | – | 416.557 | – |

*Note:* IDR is Indonesian Rupiah.

Table 2 presents descriptive statistics as a preliminary analysis of the data. This study may infer importing findings from these descriptive statistics. The average IB deposit rates and CB deposit rates are close over the period of observation, but the former is slightly lower than the latter for all maturities. The standard deviation of the CB deposit rate is higher than the IB deposit rate except for the 12-month time deposit. These findings are similar to an Islamic bank in Malaysia, which applies a dual banking system (Chong & Liu 2009; Sukmana & Ibrahim, 2017). The findings imply that CB provides more return but higher risk. Overall, a correlation between CD deposit rate and IB deposit for any maturity is negative and the correlation between them is stronger as moving to


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**Table 2.** Descriptive statistics

| Maturity | IB deposit rate | | CB deposit rate | | Correlation IB deposit and CB deposit rate |
|---|---|---|---|---|---|
| | Mean | S.D | Mean | S.D | |
| 1-month | 6.390 | 0.940 | 6.778 | 1.022 | –0.121 |
| 3-month | 6.675 | 1.051 | 7.271 | 1.230 | –0.359 |
| 6-month | 6.473 | 0.892 | 7.446 | 1.127 | –0.366 |
| 12-month | 6.461 | 1.169 | 7.429 | 1.054 | –0.502 |

**Table 3.** Unit root test

| Variable | Level | | First difference | |
|---|---|---|---|---|
| | ADF | PP | ADF | PP |
| *lid1* | –1.0625 | –0.6829 | –14.6603*** | –14.6603*** |
| *lid3* | –2.2981 | –2.6483 | –6.3735*** | –15.9084*** |
| *lid6* | –3.4337* | –3.4337* | –10.1515*** | –14.5383*** |
| *lid12* | –4.5660*** | –4.0477*** | –22.9386*** | –26.0878*** |
| *ib1* | –3.3816* | –3.0400 | –14.8757*** | –15.4264*** |
| *ib3* | –3.0107 | –2.9529 | –12.3519*** | –12.4746*** |
| *ib6* | –3.6153** | –6.0242 | –12.9984*** | –17.2657*** |
| *ib12* | –2.3331 | –4.4143** | –8.9409*** | –15.5369*** |
| *ir1* | –2.6349 | –3.3423* | –4.7405*** | –7.5333*** |
| *ir3* | –3.4383* | –2.9969 | –3.4969** | –3.4512** |
| *ir6* | –3.5179** | –2.5108 | –4.7810*** | –5.0396*** |
| *ir12* | –2.6651 | –2.5398 | –7.9282*** | –8.8337*** |

*Note:* ***, **, and * report the rejection of null hypothesis at 1%, 5%, and 10%, respectively.

a longer maturity. These results may conclude that Islamic depositors will withdraw their money and transfer it to a conventional bank that provides a higher return.

Before estimating the NARDL model, the first step is the unit root test. This study employs the ADF and PP tests, including both constant and trend. Table 3 reports the unit root test. The findings indicate that some variables are stationary at the level. However, all variables are stationary at the first difference data and none are stationary at the second difference data. These stationary tests prove that the data are suitable for estimating the NARDL as in equation (5).

This study estimates the NARDL model using the Ordinary Least Squares (OLS) method by employing the general to the specific method by dropping lag that is not significant. The maximum lag of the order is up to 12 lags. Table 4 exhibits the estimation results. The top of Table 2 shows the estimated coefficient of the NARDL model for each Islamic deposit maturity, including the coefficient of determination ($R^2$). Table 1 shows a diagnostic test, consisting of the normality test (JB Statistics test), autocorrelation test (LM statistics test), heteroscedasticity (ARCH statistics test), functional from test (RESET test), and parameter stability test (CUSUM and CUSUMQ test). The diagnostic test results show that errors are normal for cases 1- and 6- month maturity. LM and ARCH tests show all maturities are absent of autocorrelation and heteroscedasticity problems, except the 12-month maturity for heteroskedasticity. The absence of functional misspecification is found for all maturities. The CUSUM and CUSUMQ test also indicate that stable coefficients are found for all cases.

The next step is the cointegration test to find out a long-run relationship between variables. Table 4 at the bottom shows the results of the cointegration test with t-test as well as the Wald F test. Cointegration exits at all maturities. These cointegration results indicate that there is a strong long-term relationship between Islamic deposits, CB deposit rates, and IB deposit rates. The asymmetric effect of CB deposit rate and IB deposit rate on IB deposits using the Wald F statistics test is presented in Table 5 for both the long run and the short run. With the exception of the 12-month maturity, the long-run asymmetric effects of interest rate and Islamic rate on Islamic deposit exist in all maturities. The short-run asymmetric ef-

**Table 4.** NARDL estimation

Source: Pesaran et al. (2001).

| Variable | 1-month | | 3-month | | 6-month | | 12-month | |
|---|---|---|---|---|---|---|---|---|
| | Coef. | s.e | Coef. | s.e | Coef. | s.e | Coef. | s.e |
| Constant | 1.851*** | 0.351 | 3.322*** | 0.529 | 2.719*** | 0.464 | 1.867*** | 0.430 |
| $lid_{t-1}$ | –0.195*** | 0.037 | –0.406*** | 0.065 | –0.370*** | 0.065 | –0.259*** | 0.060 |
| $ir^{+}_{t-1}$ | –0.102*** | 0.020 | –0.114*** | 0.023 | –0.041** | 0.017 | –0.075** | 0.034 |
| $ir^{-}_{t-1}$ | 0.000 | 0.009 | 0.041* | 0.021 | 0.007 | 0.023 | –0.038* | 0.023 |
| $ib^{+}_{t-1}$ | 0.061*** | 0.012 | 0.046*** | 0.014 | –0.053** | 0.023 | 0.005 | 0.024 |
| $ib^{-}_{t-1}$ | 0.004 | 0.009 | –0.065*** | 0.020 | –0.091*** | 0.026 | –0.022 | 0.021 |
| $\Delta lid_{t-2}$ | – | – | – | – | – | – | 0.145** | 0.066 |
| $\Delta lid_{t-3}$ | 0.209*** | 0.078 | 0.276*** | 0.075 | –0.223*** | 0.082 | – | – |
| $\Delta lid_{t-8}$ | – | – | – | – | – | – | 0.224*** | 0.061 |
| $\Delta lid_{t-9}$ | – | – | – | – | – | – | 0.110** | 0.055 |
| $\Delta ir^{+}_{t}$ | –0.079** | 0.036 | – | – | – | – | –0.180** | 0.082 |
| $\Delta ir^{+}_{t-2}$ | 0.129*** | 0.036 | – | – | –0.557*** | 0.153 | – | – |
| $\Delta ir^{+}_{t-3}$ | 0.110*** | 0.037 | – | – | – | – | – | – |
| $\Delta ir^{+}_{t-4}$ | 0.081** | 0.036 | 0.309*** | 0.109 | – | – | 0.269*** | 0.092 |
| $\Delta ir^{+}_{t-6}$ | – | – | – | – | – | – | –0.175** | 0.086 |
| $\Delta ir^{+}_{t-7}$ | 0.099** | 0.044 | – | – | – | – | – | – |
| $\Delta ir^{+}_{t-8}$ | 0.084** | 0.035 | – | – | – | – | – | – |
| $\Delta ir^{+}_{t-11}$ | – | – | – | – | – | – | –0.174*** | 0.084 |
| $\Delta ir^{-}_{t-1}$ | 0.111*** | 0.027 | – | – | 0.299*** | 0.104 | – | – |
| $\Delta ir^{-}_{t-3}$ | – | – | – | – | – | – | 0.277*** | 0.098 |
| $\Delta ir^{-}_{t-5}$ | 0.145*** | 0.029 | – | – | – | – | – | – |
| $\Delta ib^{+}_{t}$ | 0.053*** | 0.013 | – | – | – | – | – | – |
| $\Delta ib^{+}_{t-1}$ | –0.025** | 0.011 | – | – | 0.174*** | 0.035 | – | – |
| $\Delta ib^{+}_{t-2}$ | –0.030** | 0.012 | – | – | 0.110*** | 0.032 | 0.090*** | 0.025 |
| $\Delta ib^{+}_{t-7}$ | –0.039*** | 0.013 | – | – | 0.070*** | 0.027 | – | – |
| $\Delta ib^{+}_{t-8}$ | –0.026** | 0.011 | – | – | – | – | – | – |
| $\Delta ib^{+}_{t-9}$ | –0.027** | 0.011 | – | – | – | – | – | – |
| $\Delta ib^{+}_{t-10}$ | – | – | – | – | – | – | 0.081*** | 0.024 |
| $\Delta ib^{+}_{t-11}$ | – | – | – | – | – | – | 0.055** | 0.025 |
| $\Delta ib^{-}_{t-1}$ | – | – | 0.062* | 0.035 | – | – | – | – |
| $\Delta ib^{-}_{t-2}$ | 0.060*** | 0.016 | – | – | 0.121*** | 0.032 | – | – |
| $\Delta ib^{-}_{t-3}$ | – | – | – | – | 0.125*** | 0.033 | – | – |
| $\Delta ib^{-}_{t-4}$ | – | – | – | – | 0.059* | 0.030 | – | – |
| $\Delta ib^{-}_{t-5}$ | – | – | – | – | 0.102*** | 0.029 | – | – |
| $\Delta ib^{-}_{t-6}$ | – | – | – | – | 0.082*** | 0.030 | – | – |
| $\Delta ib^{-}_{t-9}$ | – | – | – | – | – | – | 0.059** | 0.028 |
| $\Delta ib^{-}_{t-11}$ | –0.024** | 0.011 | – | – | – | – | – | – |
| $\Delta ib^{-}_{t-12}$ | 0.039*** | 0.014 | – | – | – | – | – | – |
| $R^2$ | 0.621 | – | 0.363 | – | 0.416 | – | 0.390 | |
| **Diagnostic** | | | | | | | | |
| JB | 2.705 | (0.259) | 31.029 | (0.000) | 1.627 | (0.443) | 61.369 | (0.000) |
| LM | 1.984 | (0.159) | 0.708 | (0.400) | 0.014 | (0.907) | 2.793 | (0.095) |
| ARCH | 0.148 | (0.700) | 0.000 | (0.999) | 0.498 | (0.480) | 6.192 | (0.013) |
| RESET | 0.366 | (0.547) | 0.163 | (0.688) | 1.495 | (0.224) | 0.211 | (0.647) |
| CUSUM | stable | – | stable | – | stable | – | stable | – |
| CUSUMQ | stable | – | stable | – | stable | – | stable | – |
| **Cointegration** | | | | | | | | |
| $t_{BDM}$ | –5.26*** | – | –5.26*** | – | –5.68*** | – | –4.31*** | – |
| $F_{PSS}$ | 11.100*** | – | 8.68*** | – | 6.99*** | – | 4.19* | – |

*Note:* ***, **, and * are statistically significant at 1%, 5%, and 10%, respectively. The p-value is reported in parentheses. Upper bound values for $t_{BDM}$ and $F_{PSS}$ statistics at 1%, 5% and 10% are –4.10, –3.53, –3.21 and 6.36, 4.83, 4.14.



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**Table 5.** Wald test for Long-Run Asymmetric test

| Variable | 1-month | 3-month | 6-month | 12-month |
|---|---|---|---|---|
| | | **Long run ($W_{LR}$)** | | |
| ir | 42.070*** | 36.880*** | 4.040** | 0.900 |
| | (0.000) | (0.000) | (0.047) | (0.342) |
| ib | 91.210*** | 115.800*** | 29.360*** | 4.420** |
| | (0.000) | (0.000) | (0.000) | (0.035) |
| | | **Short run ($W_{SR}$)** | | |
| ib | 2.651 | 8.039*** | 12.51*** | 8.964*** |
| | (0.107) | (0.005) | (0.001) | (0.003) |
| ib | 19.77*** | 3.121* | 4.972** | 14.230*** |
| | (0.000) | (0.080) | (0.028) | (0.000) |

*Note:* $W_{LR}$ and $W_{SR}$ are the Wald test statistics for the long-run and short-run asymmetric effect. Parentheses show probability. ***, **, * are statistically significant at 1%, 5%, and 10%, respectively.

**Table 6.** Long-run coefficient

| Variable | 1-month | 3 -month | 6- month | 12-month |
|---|---|---|---|---|
| $ir^+_t$ | −0.5247*** | −0.2805*** | −0.1267*** | −0.2873*** |
| | (0.0860) | (0.0406) | (0.0397) | (0.0970) |
| $ir^-_t$ | 0.0002 | 0.1008*** | 0.0080 | −0.1476** |
| | (0.0452) | (0.0476) | (0.0602) | (0.0877) |
| $ib^+_t$ | 0.3136*** | 0.1123*** | −0.0937 | 0.0081 |
| | (0.0581) | (0.0354) | (0.0589) | (0.1380) |
| $ib^-_t$ | 0.0189 | −0.1595*** | −0.2003*** | −0.0861 |
| | (0.0458) | (0.0372) | (0.0622) | (0.0782) |

*Note:* ***, **, and * are statistically significant at 1%, 5%, and 10%, respectively. Parentheses show standard error.

fects are found for all maturities, except 1-month maturity. These findings apparently indicate that IB deposit responds asymmetrically as CD deposit rates and IB deposit rates increase and decrease.

Now, turning to the main goal, this study analyzes how IB deposit responds to the CB deposit rate as well as the IB deposit rate. Table 6 presents coefficients of *ir* and *ib* to measure the responsiveness of IB deposit. The long-run coefficient of $ir^+$ is negative and significant for all maturities, ranging from –0.127 for 6-month to –0.5247 for 1-month, meaning that, for instance, for 1-month, a 1% increase in CB deposit rate leads to a decrease in IB deposit by roughly 0.5247%. The long-run coefficient of $ir^-$ is positive and significant for only 3-month, implying that a 1% reduction in 3-month CB deposit rate produces an increase in IB deposit approximately by 0.1008%. The coefficient of $ir^-$ is negative and significant for 12-month but it is unexpected.

Turning to the long-run coefficient of *ib*, the coefficient of $ib^+$ is positive and significant for 1-month (0.3136) and 3-month (0.1123) and the other maturities are not significant. These findings imply that a 1% increase in IB deposit rate is attributed to a rise in IB deposit by roughly 0.3136% and 0.1123% for 1-month and 3-month, respectively. The long-run coefficient of $ib^-$ is negative and significant for 3-month and 6-month and it is not significant for 1-month and 12-month. The results predict that a 1% reduction in the CB deposit rate leads to a fall in IB deposit roughly by 0.1595% for 3-month.

Next, this study figures out asymmetric cumulative dynamic multipliers of IB deposit. Figures 1-4 present the response of IB deposit to rising and falling in CB and IB deposit rates over an 80-month horizon using the bootstrap method with 100 replications and a confidence level of 95%. Those figures obviously show that IB deposit responds to the CB and IB deposit rates. For example, for 1-month maturity, an increase (a decrease) in the 1-month CB deposit rate is responded to by a falling (rising) in the 1-month IB deposit, while an increase (a decrease) in the 1-month IB deposit rate is associated with a rising (falling) in the 1-month IB deposit.

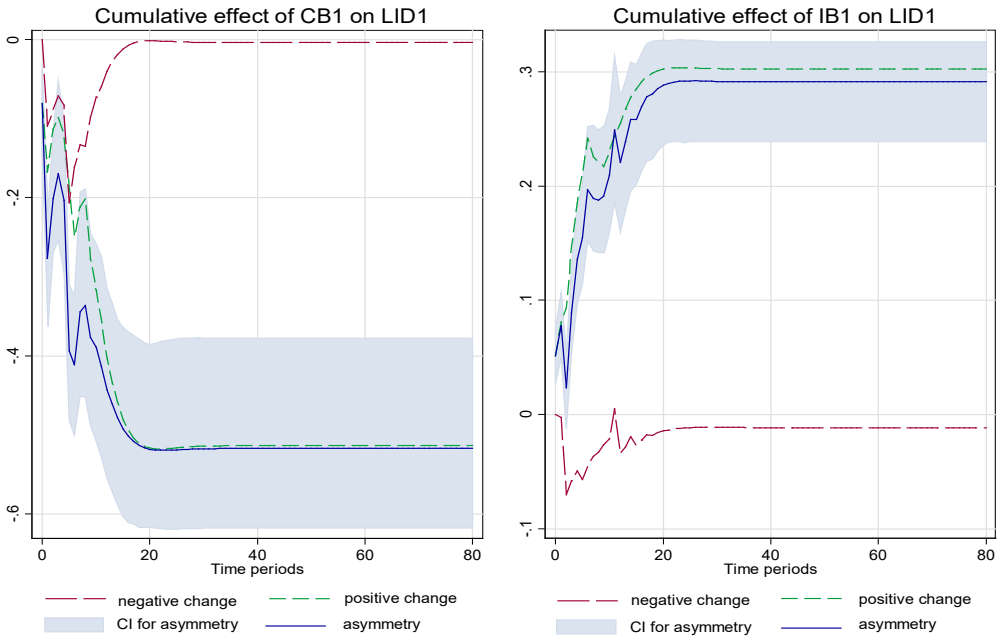


**Figure 1.** Dynamic multipliers, 1-month maturity

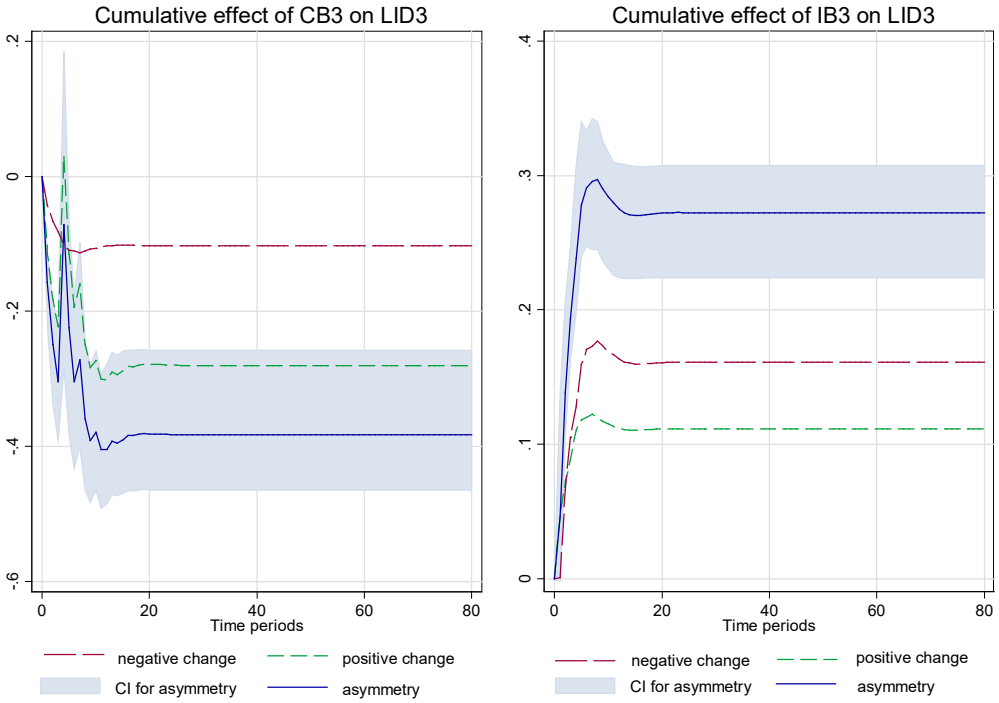


**Figure 2.** Dynamic multipliers, 3-month maturity


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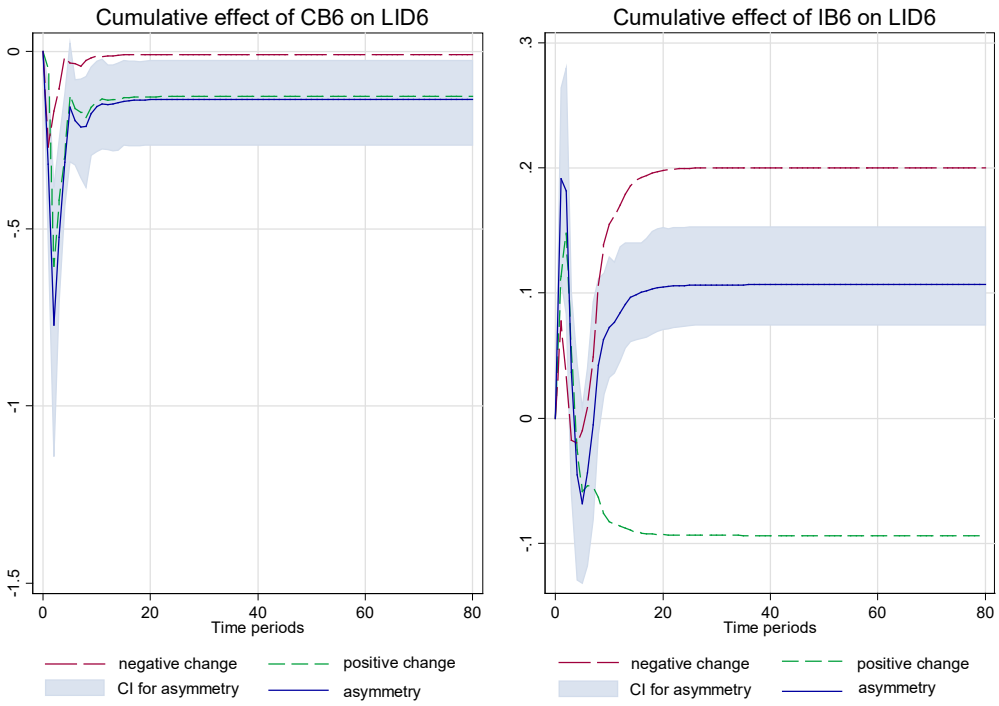


**Figure 3.** Dynamic multipliers, 6-month maturity

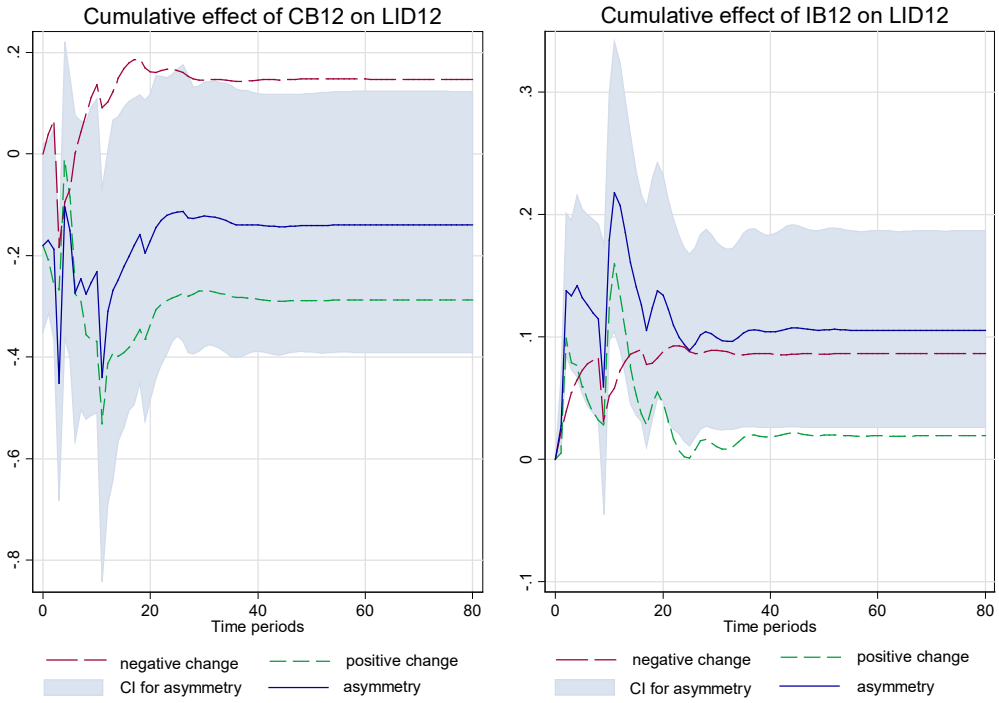


**Figure 4.** Dynamic multipliers, 12-month maturity

## 4. DISCUSSION

This study indicates that Islamic deposits respond asymmetrically to conventional bank interest rates changes. When conventional interest rates rise, Islamic deposits promptly decline for all maturities. However, when interest rates fall, Islamic deposits do not automatically increase. The highest response of Islamic deposits to the interest rate is 1-month maturity but it tends to weaken moving to a longer maturity. More interestingly, based on asymmetric results, the coefficient of $ir^+$ is higher than the coefficient of $ib^+$, implying that IB deposit adjusts at a higher speed to the CB deposit rate. These results prove that IB depositors consider the CB deposit rate as a reference in depositing their funds to maximize high returns (Sukmana & Ibrahim, 2017). IB depositors transfer their funds as the CB deposit rate increases in a dual banking environment called displaced commercial risk (DCR). DCR is persistent as the IB depositors transfer their funds from Islamic banks to the conventional banks because the IB deposit rate is significantly lower than the CB deposit rate of its counterpart.

These findings support the previous empirical studies using symmetric relationships such as Ismal (2011), Kasri and Kassim (2009), and Abduh (2015) for Indonesia, Solarin et al. (2018) for Malaysia and Aysan et al. (2018) for Turkey. IB depositors are responsive to changes in interest rates because IB depositors are rational consumers in the dual banking system (Ismal, 2011). This finding implies that IB depositors, to some extent, have less religious commitments toward Islamic banks (Aysan et al., 2018). The study conducted by Utomo et al. (2021) documented that religiosity does not considerably influence attitude to products of IBs in the dual banking environment.

From an Islamic bank point of view, these findings lead to Islamic banks providing a yield rate equivalent to CB's deposit rate. If not, Islamic bank depositors may withdraw funds from IB to CB. Therefore, Islamic banks must anticipate the withdrawal of funds from Islamic bank depositors by reducing DCR through profit equalization reserve and Investment Risk Reserve (Touri et al., 2020). First, an Islamic Bank must reserve some liquidity through profit equalization reserve (PER). PER is the profit of the non-PLS contract (Murabaha), which is distributed to increase the yield rate of PLS contracts (Mudharaba and Musyaraka). Second, Islamic banks must share the cost to all depositors by creating Investment Risk Reserve (IRR) to cover future losses from the PLS contract. Furthermore, the small market share of Islamic banks leads to diseconomies of scale, then causing high operating costs (Hassan et al., 2009; Lassoued, 2018). Therefore, reducing operating costs can narrow the gap between IB deposit rate and CB deposit rate so Islamic banks can provide a competitive cost of funds and high return investment for IB depositors.

## CONCLUSION

CB deposit rate obviously influences IB deposit because IB consumers are rational consumers in the dual banking system. For that reason, this study assesses the asymmetric responses IB deposit rates to CB deposit rate IB in Indonesian Islamic banks. The results documented that IB deposit asymmetrically responds to CB deposit rate. The coefficient of positive CB deposit rate is higher than the coefficient of positive IB deposit rate. An increase in the CB deposit rate reduces the IB deposit, and a rise in IB interest rate increases the IB deposit.

The findings show there is a negative relationship between CD deposit rates and IB deposit rates. This result implies that DCR phenomenon is found in Indonesia applying the dual banking system. DCR is persistent as long as the CB deposit rate is considerably higher than the IB deposit. DCR is one of the most important risks that Islamic banks encounter in the dual banking system and it should manage well to smooth the investment return and guarantee the capital for the depositors. For that reason, DCR can be lessened by issuing PER and IRR regulations for Indonesian Islamic banks to compete with conventional banks. Uncompetitive IB deposit rate may stem from the high operating cost of an Islam bank due to diseconomies of scale as a new player in the dual banking system. Hence, cost efficiency is also the key to success for an Islamic bank in the dual banking environment.


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Writing – reviewing & editing: Agus Widarjono.

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