Widarjono, Agus; Alam, Mahmudul; Rafik, Abdur

Article

The dynamic link between Islamic and conventional deposit rates in a dual banking system

ISRA international journal of islamic finance

Provided in Cooperation with:
International Shariʿah Research Academy for Islamic Finance, Kuala Lumpur

Reference: Widarjono, Agus/Alam, Mahmudul et. al. (2023). The dynamic link between Islamic and conventional deposit rates in a dual banking system. In: ISRA international journal of islamic finance 15 (1), S. 91 - 108. https://journal.inceif.edu.my/index.php/ijif/article/download/487/396. doi:10.55188/ijif.v15i1.487.

THE DYNAMIC LINK BETWEEN ISLAMIC AND CONVENTIONAL DEPOSIT RATES IN A DUAL BANKING SYSTEM

Agus Widarjono
Department of Economics, Universitas Islam Indonesia, Yogyakarta, Indonesia
Md. Mahmudul Alam
Economic and Financial Policy Institute, School of Economics, Finance and Banking, Universiti Utara Malaysia, Kedah, Malaysia
Abdur Rafik
Department of Management, Universitas Islam Indonesia, Yogyakarta, Indonesia

Received
10 August 2021

Revised
18 October 2021
24 April 2022
26 October 2022
9 November 2022

Accepted
10 November 2022

ABSTRACT

Purpose — This study empirically assesses the extent to which the conventional deposit rate (CDR) affects the Islamic deposit rate (IDR) in Indonesia and Malaysia within the dual banking system.

Design/Methodology/Approach — This study uses non-linear autoregressive distributed lag (NARDL) and panel cointegration. Monthly data are employed, but the time period for the two countries examined is different because of data availability. The study thus covers the period 2009:M1 to 2020:M12 for Indonesia and 2000:M1 to 2020:M12 for Malaysia.

Findings — The findings confirm evidence of the long-run link between IDR and CDR, where the IDRs in Indonesia and Malaysia asymmetrically respond to changes in CDRs. In addition, Indonesia's IDRs adjust faster in response to the decline in CDRs compared to increases in CDRs. However, Malaysia's IDRs adapt faster in response to increases in CDRs than their decreases. The panel cointegration results reinforce the asymmetric findings.

Originality/Value — To the best of our knowledge, this paper is the first study to examine the extent to which IDRs asymmetrically respond to CDRs in a dual baking system in Indonesia and Malaysia.

Practical Implications — Islamic banks (IBs) follow CDRs in determining IDRs due to uncompetitive IDRs, implying that IBs suffer from displaced commercial risk. Therefore, IBs may adopt a policy to address liquidity issues through investment risk reserves (IRR) and profit equalization reserves (PER) to reduce the distinctive gap between IDRs and CDRs.

Keywords — Asymmetric relationship, Conventional deposit rates, Displaced commercial risk, Islamic bank, Islamic deposit rates

Article Classification — Research paper

ISRA International Journal of Islamic Finance (IJIF)
Vol. 15 • No. 1 • 2023
pp. 91-108

eISSN:
2289-4365

DOI:
doi.org/10.55188/ijif.v15i1.487

INTRODUCTION

Islamic banks (IBs) are alternative financial intermediaries with different risks from conventional banks (CBs), and they have experienced fast growth since the 1980s. However, the rapid growth of Islamic banking globally is criticised because IBs' practices are, to some extent, similar to those of CBs (Khan, 2010; Hamza, 2016). One of the criticisms relates to IBs declaring that they practise profit-and-loss sharing (PLS) financing through *mushārakah* and *muḍārabah*, nevertheless, these two types of financing combined comprise a much smaller share of total financing than *murābaḥah*, which applies the profit margin contract (Warninda *et al*., 2019). IBs' products are also based on Islamic principles, but they significantly resemble those of CBs (Chong & Liu, 2009). Moreover, IBs may peg to CBs' interest rate as a benchmark in determining their rates (Saraç & Zeren, 2015; Nechi & Smaoui, 2019).

This study explores the response of Islamic deposit rates (IDRs) to conventional deposit rates (CDRs) in Indonesia and Malaysia, which both practice the dual banking system. These countries were selected for some plausible reasons. Indonesia, for example, is the largest Muslim country and started Islamic banking in 1992. After the enactment of Law No. 23 (2008) relating to IBs, Indonesian IBs grew rapidly and performed relatively well as compared to CBs (Sutrisno & Widarjono, 2018). As for Malaysia, it implemented Islamic banking much earlier, following the passage of Islamic Banking Act 1983. This sector substantially grew in terms of the number of IBs and their market share after the Asian economic crisis in 1998 (Chong & Liu, 2009). According to the Islamic Finance Development Report 2021, Malaysia and Indonesia are ranked as the third and tenth largest countries in the global Islamic banking industry, with total assets of USD252 billion and USD39 billion in 2020, respectively (Refinitiv, 2021). However, IBs' market shares are small, with 6 per cent in Indonesia and 23 per cent in Malaysia.

This study is expected to contribute to the existing empirical literature in the following ways:

1. Previous studies applied the symmetric effect of CDRs on IDRs, such as Anuar *et al*. (2014) and Saraç and Zeren (2015). Contrary to the existing studies, this study employs the asymmetric effect of CDRs on IDRs to enhance the previous literature, such as Sukmana and Ibrahim (2017).
2. This study applies panel cointegration to further examine the link between IDRs and CDRs in the dual banking environment. This aims to strengthen the power of the test by applying panel data (Maddala & Wu, 1999).

This study comprises several sections. After the introduction, the second section comprises the literature review. The third section presents the methodology and data, while the fourth section delineates the findings and discussion. Finally, the last section concludes the research and discusses its implications.

REVIEW OF LITERATURE

Islamic and Conventional Deposit Rates

IBs in Muslim-majority countries have been implemented after consumers had grown accustomed to conventional banking services for a long time. Furthermore, IBs, as new participants in the dual banking system, need to compete with CBs. IBs' products and services have thus had a tendency to follow the products and services of CBs, mainly because of the small number of loyal consumers

who wish to avoid interest. Often, therefore, IBs' products and services are similar to those of their conventional counterparts in a dual banking environment (Khan, 2010; Azmat *et al*., 2015). Consequently, IB rates have to follow the interest rate, and as the IB rates deviate from interest, they have to adjust towards the long-run equilibrium interest rates, which are closely pegged (Chong & Liu, 2009).

Some studies have also found that IBs' customers are very responsive to interest rate changes. As CDRs rise, customers tend to take their money back and deposit them in CBs, especially large customers (Aysan *et al.*, 2018). Ismal (2011) also confirmed that IBs' depositors withdraw their funds from Indonesian IBs as CDRs increase. Additionally, some studies affirmed that the interest rate is negatively linked to Islamic bank deposits (Kassim *et al.*, 2009; Kasri & Kassim, 2009; Abduh, 2015).

Some existing studies using the symmetric relationship between IDRs and CDRs found that CDRs are an anchor for the IDRs in Malaysia's Islamic banking industry (Chong & Liu, 2009; Zainol & Kasim, 2010; Anuar *et al.*, 2014; Saeed *et al.*, 2021). Numerous studies also documented that the IDRs mimic the CDRs in Turkey (Ergeç & Arslan, 2013; Ergec & Kaytanci, 2014; Cevik & Charap, 2015; Saraç & Zeren, 2015). Kasri and Kassim (2009) further found that the CDR significantly affects the IDR in Indonesia. Sukmana and Ibrahim (2017) documented that IDRs asymmetrically follow the rise and fall in CDRs in the Malaysian Islamic banking industry, where the IDRs adjust at a slower speed to falling CDRs. Mushafiq and Sehar (2021) found that IB deposit rates are strongly influenced by CB deposit rates in the short run for Pakistani banks.

However, some previous empirical studies found opposite results whereby IDRs are not linked to conventional interest rates. Yusof *et al.* (2015) assessed the relationship between IDRs and CDRs in the Gulf Cooperation Council (GCC) countries. They found that there is no relationship between IDRs and CDRs in the long run. Another study showed that the interaction between IDRs and CDRs is weak for 20 major banks located in some emerging and developed countries (Jawadi *et al*., 2016). By investigating the causal link between IDRs and CDRs in Turkey, Yuksel (2017) found that IBs do not determine their IDRs by pegging to CDRs. Furthermore, CBs set interest rates without any reference to the IDR.

Islamic Interbank and Conventional Interbank Rate

The Islamic interbank rate (IIR) also links with the conventional interbank rate (CIR). Strong co-movement between IIR and CIR has been found to prevail in the Malaysian money market (Bacha, 2008; Ito, 2013) and in five GCC countries (Nechi & Smaoui, 2019). Moreover, in the global money market, there is evidence of the correlation between the Islamic interbank benchmark rate (IIBR) and the London interbank offer rate (LIBOR) for every maturity (Azmat *et al.*, 2020). In contrast, Tlemsani (2020) documented a strong negative correlation between the IIBR and LIBOR.

RESEARCH METHODOLOGY

NARDL Model

Due to downward sticky-prices, asymmetric prices are a common phenomenon. Asymmetric prices also arise since the pace of cost rise is quicker than cost fall, known as the rocket-feather phenomenon (Peltzman, 2000; Tappata, 2009). Numerous existing studies documented that asymmetry exists between different categories of prices. These include oil and consumer prices (Widarjono & Hakim, 2019; Widarjono *et al.*, 2020b), oil and stock prices (Phan *et al*., 2015;

Kumar, 2019), exchange rates and stock prices (Bahmani-Oskooee & Saha, 2018; Sheikh *et al.*, 2020), exchange rates and consumer prices (López-Villavicencio & Mignon, 2017; Baharumshah *et al*., 2017), and deposit and interest rates (Apergis & Cooray, 2015; Holmes *et al*., 2015).

Initially, some studies examined the symmetric link between IDRs and CDRs (Chong & Liu, 2009; Saraç & Zeren, 2015). However, consistent with the banking literature, the possibility of an asymmetrical link between deposit rates and lending rates arises as a result of some factors, such as imperfect markets, collusion behaviour and consumer responses to changes in the interest rate (Nguyen & Islam, 2010; Holmes *et al*., 2015). The premise of an imperfect market claims that banks may capitalise on their market power through monopoly behaviour or collusion to benefit from upward changes in lending rates which adjust faster than upward changes in deposit rates. Meanwhile, consumers tend to refuse high lending rates and low deposit rates. Therefore, deposit rates are likely to be sticky downwards while lending rates are naturally sticky upwards.

Accordingly, the link between the IDR and the CDR may be asymmetric (Sukmana & Ibrahim, 2017). Therefore, this study can express the long-run asymmetric relationship between those rates in the following regression equation:

$$id_t = \sigma_0 + \sigma_1 cd_t^+ + \sigma_2 cd_t^- + \mu_t \quad (1)$$

where id is IDR and cd is CDR. Variables cd_{t-1}^+ and cd_{t-1}^- indicate an increase and reduction in cd_t, showing the asymmetric response of the IDR to a rise and fall in the CDR.

Several conditions may arise from the asymmetric relationship between the IDR and the CDR. Firstly, the consumer determines the behaviour of IBs in line with the consumer reaction theory ($\sigma_1 > \sigma_2$). Secondly, the IB establishes its rate following the market concentration theory ($\sigma_1 < \sigma_2$). Thirdly, the Islamic rate does not follow the interest rate.

The non-linear autoregressive distributed lag (NARDL) is applied to examine the asymmetric effect of CDRs on IDRs because the symmetric model generates a biased estimation that ignores such asymmetric relationships (Shin *et al*., 2014). As the asymmetric effect occurs, the IDRs respond differently to changes in the CDRs depending on the level of increase or decrease in the CDRs.

Variables cd_{t-1}^+ and cd_{t-1}^- are partial sums of a rise and fall in cd_t. They are computed as follows:

$$cd_t^+ = \sum_{t=1}^{p} \Delta cd_{t-1}^+ = \sum_{t=1}^{p} \max(cd_t, 0) \quad (2)$$

$$cd_t^- = \sum_{t=1}^{q} \Delta cb_{t-1}^- = \sum_{t=1}^{q} \min(cd_t, 0) \quad (3)$$

The NARDL model of equation (1) is as follows:

$$\Delta id_t = \varphi_0 + \varphi_1 id_{t-1} + \varphi_2 cd_{t-1}^+ + \varphi_3 cd_{t-1}^- + \sum_{i=1}^{l} \delta_{1i} \Delta id_{t-1} + \sum_{i=0}^{m} \delta_{2i} \Delta cd_{t-1}^+ + \sum_{i=0}^{n} \delta_{3i} \Delta cd_{t-1}^- + \epsilon_t \quad (4)$$

From equation (4), then, the long-run asymmetric effects of an increase and decrease in CDRs on IDRs are computed as $\gamma_1 = -\frac{\varphi_2}{\varphi_1}$ and $\gamma_2 = -\frac{\varphi_3}{\varphi_1}$, respectively. The short-run asymmetric impacts of a rise and fall in CDRs on IDRs are computed as $\theta_1 = \sum_{i=0}^{m} \delta_{2i} \Delta cd_{t-1}^+$ and $\theta_2 = \sum_{i=0}^{n} \delta_{3i} \Delta cd_{t-1}^-$, respectively. Some steps are applied to estimate the NARDL model, as follows:

1. This study applies the ordinary least squares (OLS) method and uses the general-to-specific method by sequentially dropping insignificant lags to arrive at the final model.
2. It tests the long-run link between CDRs and IDRs using two cointegration tests. The first cointegration method tests the null hypothesis $\varphi_1 = 0$ following t_{BDM} statistic test (Banerjee *et al.*, 1998). Meanwhile, the second cointegration method checks the null hypothesis $\varphi_1 = \varphi_2 = 0$ following the F_{PSS} statistic test (Pesaran *et al*., 2001).
3. When cointegration exists, then this paper assesses the asymmetric response of IDRs to CDRs. The null hypotheses of the short-run and long-run asymmetric response of IDRs to CDRs are $\theta_1 = \theta_2$ and $\gamma_1 = \gamma_2$, respectively.
4. This study calculates the asymmetric dynamic multiplier effect for percentage change in the conventional deposit rate (Δcd_{t-1}^{+}, Δcb_{t-1}^{-}) on IDRs by applying the formula provided by Shin *et al*. (2014):
   $\omega_k^+ = \sum_{j=0}^{k} \frac{\partial id_{t+j}}{\partial cd_{t-1}^+}$, $\omega_k^- = \sum_{j=0}^{k} \frac{\partial id_{t+j}}{\partial cd_{t-1}^-}$ $k = 0, 1, 2, \ldots$ (5)
   where $\omega_k^+ \rightarrow \sigma_1$, $\omega_k^- \rightarrow \sigma_2$ and $k \rightarrow \infty$.

Panel Cointegration

Due to similar Islamic banking practices in Indonesia and Malaysia, this study employs the panel method to examine the response of IDRs to CDRs in both countries. The panel cointegration method is applied to further explore the effect of CDRs on IDRs. Some steps are carried out to estimate the panel cointegration, as follows:

1. This study tests the stationarity of panel variables by following Levin *et al.* (2002) and Im *et al.* (2003).
2. Subsequently, after the integration order of the variables is established, the existence of cointegration between the variables is examined using Pedroni (1999).
3. This study then assesses the impact of CDR on IDR using Fully-modified OLS (FMOLS) and Dynamic OLS (DOLS).

Data

The data are obtained from the Indonesian Financial Services Authority and the Central Bank of Malaysia, and the IDRs and CDRs are associated with each maturity. The time deposit rates of IBs and CBs encompass 1-, 3-, 6- and 12-month maturities. This study uses monthly data, but the time is different across the two countries due to the data availability, covering the periods 2009:M1 to 2020:M12 and 2000:M1 to 2020:M12 for Indonesia and Malaysia, respectively.

RESULTS AND DISCUSSION

Table 1 shows the descriptive statistics as a preliminary analysis of the data. Several interesting findings emerge from these descriptive statistics. Overall, the average CDRs are found to be higher than the IDRs in both countries. However, the standard deviation of the CDRs is higher than the IDRs. These findings clearly indicate that the IDR is less variable than the CDR. Also, the correlations of each maturity between IDRs and CDRs are relatively high. These findings support some previous literature on Malaysian IBs (Chong & Liu, 2009; Sukmana & Ibrahim, 2017). These preliminary results may imply that IDRs likely follow CDRs.

NARDL Results: Indonesian Islamic Deposit Rates

Before estimating NARDL, this study checks the stationary data to guarantee that they fit the model. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests are employed to decide on the variable stationarity. **Table 2** reveals the findings, which report that several variables are stationary while some are not. Nevertheless, the first difference data are stationary for all variables, implying that the NARDL is an appropriate model.

This study focused on the NARDL results to examine the asymmetric response of IDRs to CDRs. **Table 3** reveals the NARDL findings of the Indonesian IDRs with optimal lag order up to 12. This study reports the results and diagnostic tests at the top of the table. The test of cointegration is presented in the middle part of the table, employing both t_{BDM} and F_{PSS} statistic tests. All null hypotheses for all maturity rates are rejected, meaning that that the long-run link between IDRs and CDRs exists. The next row exhibits the long-run asymmetric test using the F-test statistic. The null hypothesis for all maturities is rejected. These findings conclude that the IDRs asymmetrically respond to changes in the corresponding CDRs.

The long-run asymmetric coefficients of positive CDR (cb^+) and negative CDR (cb^-) are presented in the bottom part of **Table 3.** All coefficients of cb^+ and cb^- are significant at 1 per cent. For example, the long-run asymmetric coefficients of cb^+ and cb^- for the 1-month maturity rate are 0.801 and 0.901, respectively. These findings show that a 1 per cent rise in CDR increases IDR by 0.801 per cent. Meanwhile, a fall in the CDR by 1 per cent is associated with a fall in the IDR by 0.901 per cent. Overall, the asymmetric pricing behaviour of the IDRs grows weaker for longer maturities, but the difference is wider. Interestingly, the CDR pass-through to the IDR is larger for cb^- as compared to cb^+ for all maturities. The results may suggest that the IB establishes its rate due to market concentration. The Indonesian Islamic banking market is imperfect and close to the tight oligopoly market with concentration ratio of the four largest IBs (CR-4) of 68.86 per cent and 49.31 per cent in 2010 and 2020, respectively (Widarjono *et al.*, 2020a).

Lastly, this study exhibits asymmetric cumulative dynamic multipliers for both deposit and financing rates. The Indonesian Islamic-conventional deposit rate dynamic multiplier over the 80-month horizon, with a 90 per cent confidence interval for the different maturities (i.e., 1-month, 3-month, 6-month and 12-month), is reported in **Figure 1**. These graphs indicate that IDRs respond to CDRs for all maturities. A rise (fall) in the IDRs likely responds to an increase (fall) in CDRs.

Table 1: Descriptive Statistics

	IDR		CDR		Correlation
Maturity	**Average**	**Std. Dev**	**Average**	**Std. Dev**	
Indonesia					
1-month	6.271	0.985	6.651	1.077	0.721
3-month	6.549	1.092	7.126	1.286	0.776
6-month	6.336	0.976	7.323	1.162	0.611
12-month	6.292	1.255	7.345	1.051	0.642
Malaysia					
1-month	2.832	0.298	2.915	0.377	0.772
3-month	2.970	0.313	2.957	0.375	0.700
6-month	3.129	0.315	3.013	0.386	0.712
12-month	3.374	0.319	3.372	0.509	0.651

Source: Authors' own

Table 2: ADF and PP Tests

	Level				First difference			
	ADF		PP		ADF		PP	
Variable	**Trend**	**No Trend**	**Trend**	**No trend**	**Trend**	**No trend**	**Trend**	**No Trend**
Indonesia								
$idr1$	-3.45**	-2.95**	-3.06	-2.95**	-15.88***	-15.93***	-16.46***	-16.52***
$idr3$	-3.09	-2.75*	-3.02	-2.68*	-13.21***	-13.25***	-13.35***	-13.39***
$idr6$	-3.52**	-1.93	-6.16***	-3.71***	-13.89***	-13.94***	-18.42***	-18.47***
$idr12$	-2.60	-1.36	-16.33***	-1.96	-13.75***	-13.80***	-16.33***	-16.40***
$cdr1$	-2.18	-1.93	-3.01	-3.00**	-4.82***	-4.89***	-7.64***	-7.68***
$cdr3$	-3.08	-2.84*	-2.80	-2.77*	-3.60**	-3.64***	-3.48**	-3.52***
$cdr6$	-3.27*	-3.08**	-2.41	-2.40	-3.79**	-3.80***	-5.14***	-5.14***
$cdr12$	-3.17	-2.85*	-2.56	-2.69*	-3.44*	-3.65***	-9.26***	-9.20***
Malaysia								
$idr1$	-1.90	-1.90	-2.05	-2.07	-17.75***	-17.76***	-17.66***	-17.66***
$idr3$	-1.20	-1.30	-2.01	-2.08	-14.72***	-14.72***	-15.11***	-15.12***
$idr6$	-1.79	-1.84	-2.21	-2.25	-17.37***	-17.39***	-17.35***	-17.37***
$idr12$	-2.69	-2.57	-3.55**	-3.31**	-23.26***	-23.31***	-24.58***	-24.63***
$cdr1$	-2.07	-1.51	-1.47	-0.87	-7.42***	-7.36***	-14.10***	-14.06***
$cdr3$	-2.12	-1.65	-1.49	-0.99	-7.26***	-7.20***	-13.51***	-13.49***
$cdr6$	-2.32	-1.91	-1.67	-1.26	-7.12***	-7.07***	-13.01***	-12.99***
$cdr12$	-2.30	-0.84	-1.80	-0.42	-7.57***	-7.51***	-13.34***	-13.30***

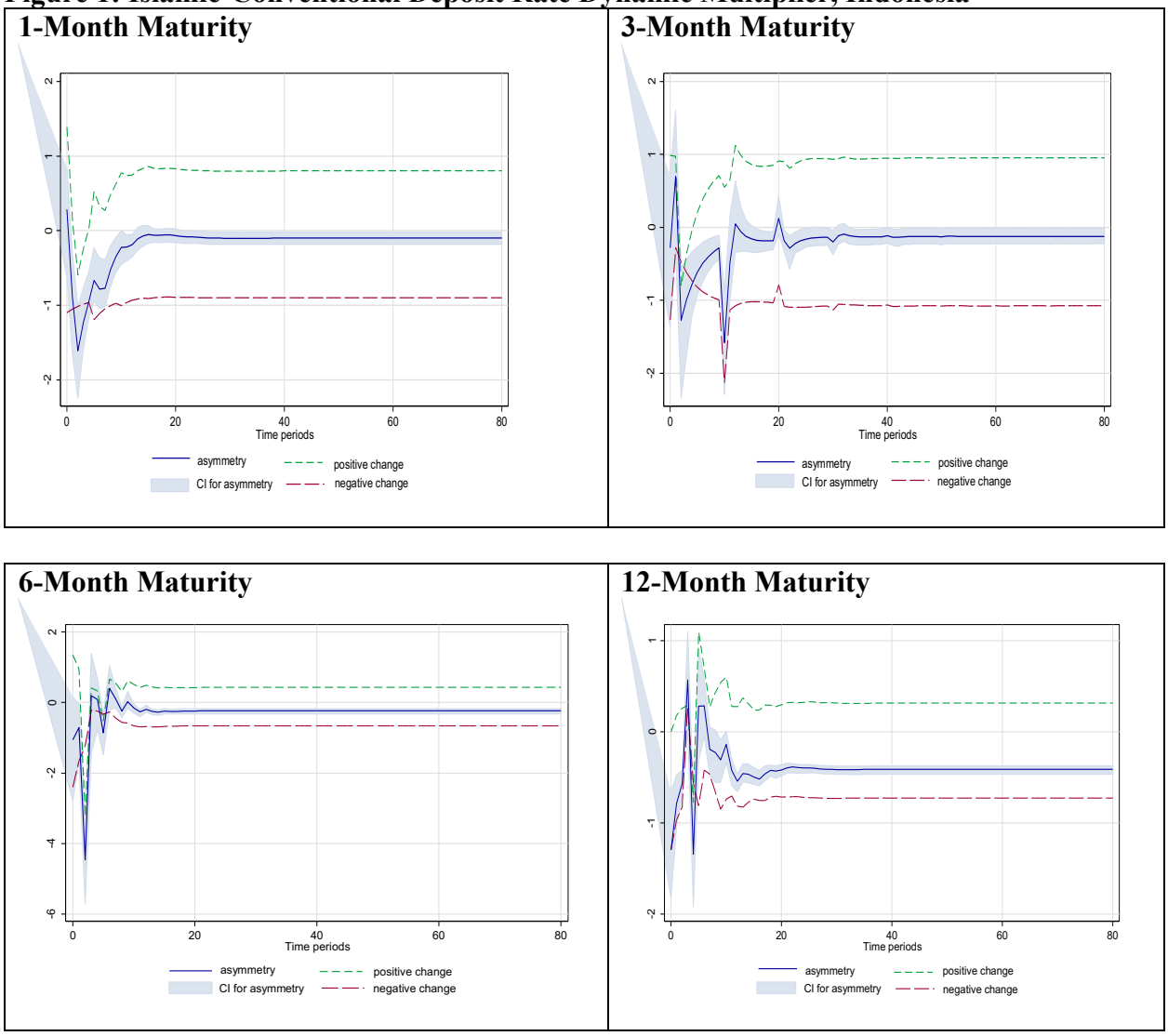
Notes: *** is significant at 1%, ** is significant at 5% and * is significant at 10%, respectively.
Source: Authors' own

Table 3: NARDL: Indonesian Islamic Deposit Rates

	Maturity							
	1-month		3-month		6-month		12-month	
Variable	Coef.	Std.err	Coef.	Std.err	Coef.	Std.err	Coef.	Std.err
Constant	2.624***	0.559	2.917***	0.663	4.064***	0.606	5.730***	0.757
idr_{t-1}	-0.252***	0.056	-0.247***	0.062	-0.431***	0.065	-0.580***	0.071
cdr^{+}_{t-1}	0.202***	0.051	0.235***	0.049	0.184***	0.044	0.183***	0.047
cdr^{-}_{t-1}	0.227***	0.054	0.265***	0.055	0.287***	0.050	0.421***	0.070
Δidr_{t-3}	-	-	-	-	0.215***	0.063	0.215***	0.066
Δidr_{t-4}	-	-	-	-	-	-	0.256***	0.064
Δidr_{t-5}	0.222***	0.070	-	-	-	-	0.205***	0.065
Δidr_{t-10}	-	-	-0.225***	0.078	-	-	-	-
Δcdr^{+}_{t}	1.390***	0.362	0.985*	0.518	1.340*	0.685	-	-
Δcdr^{+}_{t-1}	-1.074***	0.328	-	-	-	-	-	-
Δcdr^{+}_{t-2}	-0.927***	0.339	-1.771***	0.503	-3.947***	0.789	-	-
Δcdr^{+}_{t-3}	-	-	-	-	1.774**	0.816	-	-
Δcdr^{+}_{t-4}	-	-	-	-	-	-	-1.119***	0.337
Δcdr^{+}_{t-5}	-	-	-	-	-	-	1.171***	0.341
Δcdr^{-}_{t}	1.101***	0.250	1.266***	0.453	2.401***	0.357	1.297***	0.363
Δcdr^{-}_{t-1}	-	-	-0.943**	0.444	-	-	-	-
Δcdr^{-}_{t-3}	-	-	-	-	-1.286***	0.363	-1.324***	0.349
Δcdr^{-}_{t-10}	-	-	1.401***	0.445	-	-	-	-
Δcdr^{-}_{t-11}	-	-	-0.958**	0.428	-	-	-	-
R^2	0.388		0.369		0.545		0.527	
Diagnostic								
LM	0.381	(0.537)	1.233	(0.267)	1.287	(0.257)	3.173	(0.075)
$ARCHLM$	14.312	(0.000)	1.279	(0.258)	10.183	(0.001)	0.334	(0.563)
Cointegration								
t_{BDM}	-4.490***		-3.981***		-6.585***		-8.160***	
F_{PSS}	7.264**		7.863***		15.417***		23.426***	
Asymmetric								
Long-run	3.390*	(0.068)	3.763*	(0.055)	38.340***	(0.000)	201.00***	(0.000)
LR coefficient								
cdr^{+}	0.801***	0.155	0.953***	0.167	0.427***	0.095	0.315***	0.065
cdr^{-}	0.901***	0.146	1.076***	0.154	0.666***	0.086	0.726***	0.065

Notes: *** is significant at 1%, ** is significant at 5% and * is significant at 10%, respectively. Parentheses report the p-value. The critical values at 10%, 5% and 1% for the t_{BDM} statistic are 2.91, 3.22 and 3.82 respectively and for the F_{PSS} statistic are 4.78, 5.73 and 7.84, respectively.
Source: Authors' own

Figure 1: Islamic-Conventional Deposit Rate Dynamic Multiplier, Indonesia



Source: Authors' own

NARDL Results: Malaysian Islamic Deposit Rates

The results of NARDL for the Malaysian IDRs with optimal lag order up to 12 are exhibited in **Table 4**. According to t_{BDM} and F_{PSS} statistics, this study rejects the null hypothesis for all maturity periods, implying that a long-run link between IDRs and CDRs exists. The null hypothesis of no long-run asymmetric effect for all maturities is rejected. The results show the asymmetric effect of the CDRs on IDRs for all maturities. The null hypothesis of no short-run asymmetric effect is also rejected, except for the 1-month maturity rate.

All coefficients of $cd^{+}$and cd^{-} are significant, for instance, the coefficients of $cd^{+}$and cd^{-} are 0.850 and 0.660 for the 1-month maturity rate, respectively. These results suggest that a 1 per cent rise in the CDR generates roughly 0.850 per cent increase in the IDR. Also, a 1 per cent reduction in the CDR results in approximately 0.600 per cent decrease in the IDR. The asymmetric

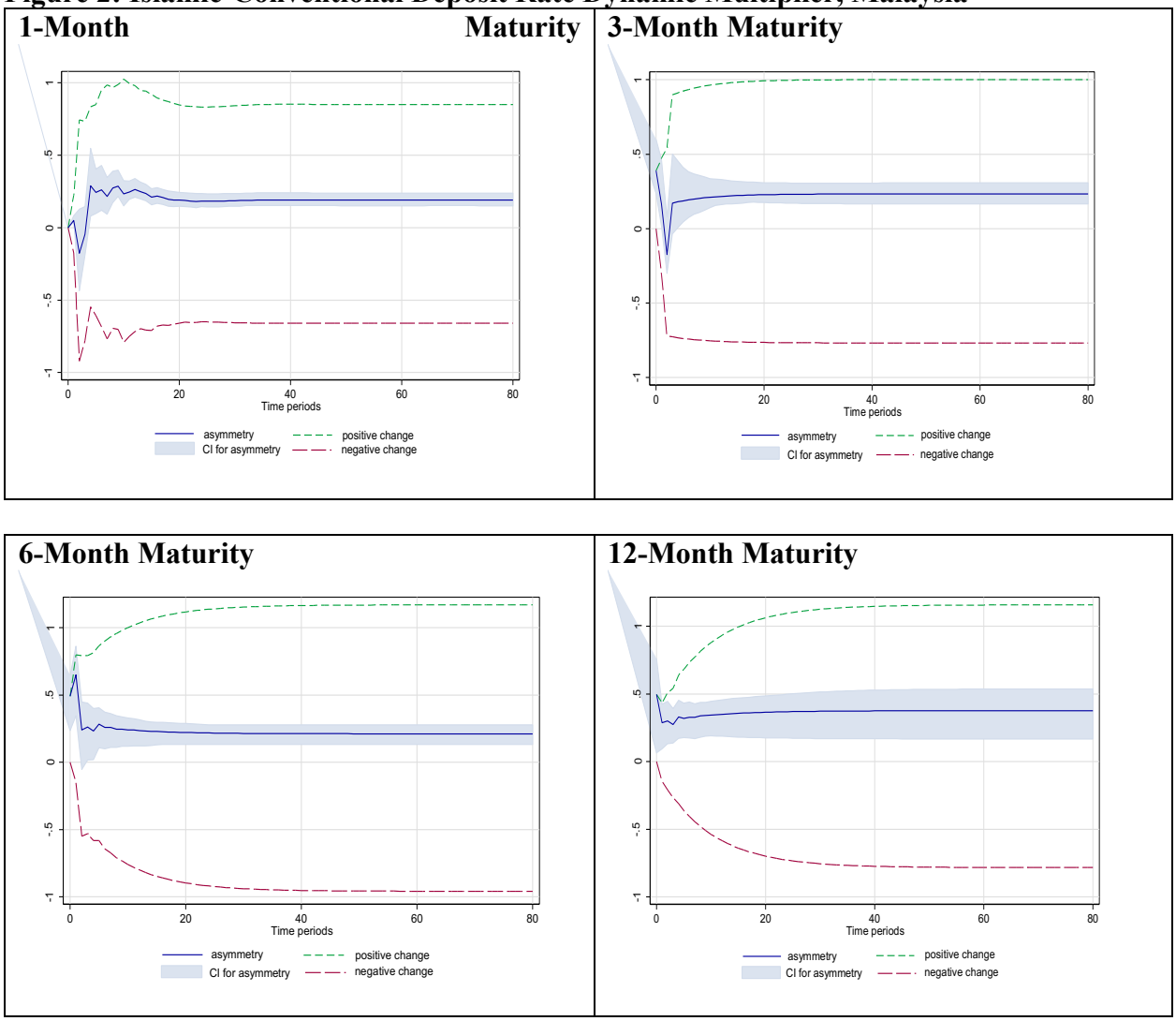
pricing behaviour of the IDR tends to be stronger for longer maturities, and the CDR pass-through to the IDR is larger for cb^+ than for cb^- for all maturities. The results may imply that the IDRs in Malaysia are related to the consumer reaction hypothesis, confirming the previous study by Sukmana and Ibrahim (2017). The Malaysian Islamic-conventional deposit rate dynamic multipliers over the 80-month horizon, with a 90 per cent confidence interval for all maturity periods (i.e., 1-month, 3-month, 6-month and 12-month), are presented in **Figure 2**. The figure indicates that IDRs asymmetrically respond to the CDRs for all maturities. Therefore, a rise (fall) in the IDRs is associated with a rise (fall) in the CDRs.

Table 4: NARDL: Malaysian Islamic Deposit Rates

	Maturity							
	1-month		**3-month**		**6-month**		**12-month**	
Variable	**Coef.**	**Std.err**	**Coef.**	**Std.err**	**Coef.**	**Std.err**	**Coef.**	**Std.err**
Constant	0.747***	0.121	0.409***	0.097	0.501***	0.099	0.629***	0.130
idr_{t-1}	-0.263***	0.042	-0.137***	0.032	-0.154***	0.031	-0.184***	0.037
cdr^+_{t-1}	0.224***	0.042	0.137***	0.037	0.181***	0.032	0.214***	0.044
cdr^-_{t-1}	0.174***	0.033	0.105***	0.029	0.148***	0.026	0.144***	0.028
Δidr_{t-1}	-0.126**	0.057	-	-	-0.207***	0.059	-0.374***	0.063
Δidr_{t-2}	0.132**	0.060	-	-	-	-	-0.163**	0.066
Δidr_{t-3}	-	-	-	-	-0.119**	0.057	-0.139**	0.061
Δidr_{t-4}	0.108**	0.054	-	-	-	-	-	-
Δidr_{t-5}	0.142**	0.055	-	-	-	-	-	-
Δidr_{t-6}	0.128**	0.054	-	-	-	-	-	-
Δcdr^+_t	-	-	0.390***	0.124	0.492***	0.138	0.496**	0.230
Δcdr^+_{t-1}	-	-	-	-	0.302**	0.137	-	-
Δcdr^+_{t-2}	0.383***	0.144	-	-	-	-	-	-
Δcdr^+_{t-3}	-	-	0.290**	0.120	-	-	-	-
Δcdr^-_t	-	-	-	-	-	-		
Δcdr^-_{t-1}	-	-	0.204***	0.078	-	-	-	-
Δcdr^-_{t-2}	0.641***	0.091	0.349***	0.076	0.308***	0.089	-	-
Δcdr^-_{t-4}	-0.319***	0.095	-	-	-	-	-	-
R^2	0.411		0.318		0.295	-	0.269	-
Diagnostic								
LM	0.470	(0.493)	5.169	(0.023)	0.088	(0.767)	0.198	(0.656)
$ARCHLM$	17.371	(0.000)	8.895	(0.003)	9.361	(0.002)	10.796	(0.001)
Cointegration								
t_{BDM}	-6.193***		-4.225***		-5.026***		-4.978***	
F_{PSS}	12.819***		5.960**		10.891***		10.466***	
Asymmetric								
Long-run	36.810***	(0.000)	25.790***	(0.000)	20.810***	(0.000)	11.290***	(0.001)
LR coefficient								
cdr^+	0.850***	0.079	1.001***	0.118	1.170***	0.134	1.159***	0.218
cdr^-	0.660***	0.065	0.768***	0.099	0.958***	0.114	0.783***	0.125

Notes: *** is significant at 1%, ** is significant at 5% and * is significant at 10%, respectively. Parentheses report the p-value. The critical values at 10%, 5%, and 1% for the t_{BDM} statistic are 2.91, 3.22 and 3.82, respectively and for the F_{PSS} statistics are 4.78, 5.73 and 7.84, respectively.
Source: Authors' own

Figure 2: Islamic-Conventional Deposit Rate Dynamic Multiplier, Malaysia



Source: Authors' own

Panel Cointegration Results

This study starts by checking the stationarity of panel data employing both the Levin, Lin and Chu (LCC) and Im, Pesaran and Shin (IPS) tests, with no trend and with a trend. **Table 5** presents the results and shows that IDRs and CDRs are stationary at the first difference for all maturities. The cointegration among the variables is examined using the Pedroni test with seven statistic tests. **Table 6** provides the panel cointegration test for all maturities. The findings indicate that a long-run relationship exists between the IDRs and the associated CDRs.

Table 5: Panel Unit Root

	LCC				IPS			
	Level		Difference		Level		Difference	
Variable	Trend	No Trend	Trend	No trend	Trend	No trend	Trend	No trend
idr1	2.67	0.28	0.60	1.08	0.75	-0.97	-4.57***	-4.76***
idr3	3.67	0.37	-1.50*	-0.28	1.18	-0.78	-4.77***	-4.85***
idr6	4.60	1.05	10.53	8.54	0.29	-0.65	-5.91***	-5.91***
idr12	3.35	0.04	1.48	1.25	-0.27	-1.19	-5.15***	-5.44***
cdr1	1.34	0.63	3.52	2.23	0.89	-0.65	-3.45***	-3.53***
cdr3	1.05	0.75	-0.40	-0.43	1.02	-0.39	-2.92***	-3.07***
cdr6	-0.19	-0.55	3.80	2.45	0.25	-1.26	-2.79***	-2.95***
cdr12	0.46	0.14	2.85	1.60	0.81	-0.70	-2.27***	-2.68***

Notes: *** is significant at 1%, ** is significant at 5% and * is significant at 10%, respectively.
Source: Authors' own

Table 6: Panel Cointegration Test

	Maturity							
Panel	1-month		3-month		6-month		12-month	
Statistics	No Trend	Trend	No Trend	Trend	No Trend	Trend	No Trend	Trend
Panel								
v	3.22***	1.92**	2.64***	1.42*	7.51***	10.03***	1.63*	5.49***
rho	-4.95***	-4.92***	-4.53***	-4.26***	-8.82***	-14.95***	-2.69***	-14.47***
PP	-3.07***	-3.62***	-2.77***	-3.09***	-4.61***	-8.78***	-1.88**	-8.27***
ADF	-2.36***	-2.57***	-2.02**	-2.03**	-2.74***	-6.00***	-0.95	-5.52***
Group								
Rho	-2.87***	-4.15***	-2.20**	-3.26***	-4.96***	-8.61***	-0.92	-7.35***
PP	-2.50***	-3.87***	-1.97**	-3.30***	-3.60***	-6.64***	-1.09	-5.61***
ADF	-1.36*	-1.66**	-0.82	-1.04	-1.61*	-3.51***	-0.02	-2.95***

Notes: *** is significant at 1%, ** is significant at 5% and * is significant at 10%, respectively.
Source: Authors' own

Having established that the two variables are cointegrated, this study then estimates the impact of CDRs on IDRs, employing FMOLS and DOLS. The dependent variable is IDRs (id_t), and the explanatory variables are an increase and a decrease in conventional rates (cd_t^+, cd_t^-). **Table 7** reports the FMOLS and DOLS model, indicating that, as expected, the coefficients are statistically significant. Moreover, the two methods result in coefficients that are clearly very close. For example, for the 1-month rate, the coefficients of cd_t^+ and cd_t^- are 0.647 and 0.749 for the DOLS model, and 0.616 and 0.704 for the FMOLS model, respectively.

The results from the DOLS model imply that a 1 per cent rise in the 1-month CDR leads to a 0.647 per cent rise in IDR. Also, a 1 per cent decrease in the 1-month CDR leads to a 0.749 per cent reduction in IDR. The findings from the FMOLS model suggest that a 0.616 per cent increase in the 1-month IDR is related to a 1 per cent increase in CDR. Furthermore, a 0.704 per cent increase in the 1-month IDR is linked to a 1 per cent increase in CDR. In general, the results from the panel cointegration method reinforce these findings from the country-by-country NARDL method.

Table 7: Panel Cointegration

	Maturity							
	1-month		3-month		6-month		12-month	
Var.	DOLS	FMOLS	DOLS	FMOLS	DOLS	FMOLS	DOLS	FMOLS
cd_t^+	0.647***	0.616***	0.604***	0.572***	0.320***	0.318***	0.331***	0.299***
	(0.071)	(0.068)	(0.062)	(0.061)	(0.064)	(0.063)	(0.063)	(0.064)
cd_t^-	0.749***	0.704***	0.709***	0.661***	0.564***	0.538***	0.724***	0.680***
	(0.066)	(0.061)	(0.056)	(0.052)	(0.058)	(0.055)	(0.059)	(0.055)
R^2	0.946	0.929	0.953	0.930	0.943	0.928	0.952	0.940

Notes: *** is significant at 1%, ** is significant at 5% and * is significant at 10%, respectively. The Akaike Info Criterion (AIC) method is applied to select the number of leads and lags.
Source: Authors' own

DISCUSSION

These results document that the IDRs strictly follow the CDRs, confirming the existing empirical studies such as Chong and Liu (2009), Cevik and Charap (2015), and Sukmana and Ibrahim (2017). As IBs could not attain the yield offered in the PLS rates, IBs may peg their PLS rates to interest rates (Hamza, 2016). Furthermore, IBs may have less experience in monitoring equity-financed projects based on PLS contracts that generate high financing risk due to the agency problem (Mushafiq & Sehar, 2021; Al-Harbi, 2022). Accordingly, they prefer the use of the *murābaḥah* (mark-up) contract, which is the most common form of IB financing (Widarjono *et al.*, 2022).
This result appears to be in line with the consumer theory of Islamic deposit products (Sukmana & Ibrahim, 2017). Within a dual banking system, IB depositors have two choices in investing their funds to yield the highest return. Indeed, religiosity is not the main factor for IB depositors to save their money in IBs in a dual banking system (Azmat *et al.*, 2020; Utomo *et al.*, 2021). Consequently, IBs need to follow CDRs in determining the IDRs, especially as interest rates rise. When this is not done, IB depositors will tend to withdraw their funds from IBs.

Numerous studies found that internal and external factors affect customers' withdrawal of funds from IBs. The internal factors result from uncompetitive IDRs when CBs give higher rates for any maturity (Ismal, 2011). Accordingly, several studies reported that a negative link exists between IDRs and CDRs, which is known as displaced commercial risk (Kasri & Kassim, 2009; Kassim *et al*., 2009; Abduh, 2015). Therefore, to withstand displaced commercial risk, IBs need to remain competitive and counter commercial pressures to prevent customers from switching to their conventional competitors.

The displaced commercial risk can be reduced by applying the investment risk reserve (IRR) and profit equalization reserve (PER) policy (Toumi *et al.*, 2019; Touri *et al.*, 2020). The IRR is a portion of an investor's income that is appropriated by the IB, after allocating the *muḍarīb*'s share, to cover for future losses on investments financed by *muḍārabah*, *mushārakah* and *murābaḥah* contracts. Meanwhile, PER is a portion of the gross income from the *murābaḥah* contract that is appropriated by the IB before its allocation to the depositor to provide a more equitable return to the *muḍarīb*. Both policies obviously increase the return of Islamic deposits and lower the distinct gap between IDRs and CDRs.

CONCLUSION

As a new sector in the banking industry within the dual banking system, IBs have so far been unable to contend with CBs. Therefore, the determination of the PLS rates for IBs' deposit rates is suspected to follow the interest rate of CBs. This present study assesses the asymmetric response of the IDRs to the CDRs in Indonesia and Malaysia within a dual banking environment. This study affirms a strong co-movement between the IDRs and CDRs in the long run, and found that the IDRs asymmetrically respond to the CDRs. The asymmetric pricing behaviour of the IDRs strictly follows the CDRs.

IDRs are pegged to the CDRs due to tight competition between IBs and CBs in a dual banking system in both of the countries examined in this study, Indonesia and Malaysia. These findings imply that IBs suffer from displaced commercial risk in their business. IB depositors will move their funds away whenever IBs provide uncompetitive IDRs. IBs therefore need to anticipate the withdrawal of funds from consumers because of displaced commercial risk. Reserving some liquidity through PER and IRR can reduce displaced commercial risk. This risk should be addressed through regulations on the obligation of IBs to have PER and IRR in order to narrow the gap between IDRs and their counterpart CDRs. These policies may help IBs in both countries to compete with CBs.

ACKNOWLEDGMENTS

This work was fully funded by the Directorate of Research and Community Service, Universitas Islam Indonesia, Yogyakarta, Indonesia, under Grant number: 004/Dir/DPPM/70/Pen.Unggulan/PI/IV/2019.

REFERENCES

Abduh, M. (2015), 'Determinants of Islamic banking deposit: empirical evidence from Indonesia', *Middle East J. of Management*, Vol. 2 No. 3, pp. 240–251, https://doi.org/10.1504/mejm.2015.072462.

Al-Harbi, A. (2022), 'Risk-taking behaviour of Islamic banks: a panel study', *International Journal of Economics, Finance and Management Sciences*, Vol. 10 No. 1, pp. 28–36, https://doi.org/10.11648/j.ijefm.20221001.13.

Anuar, K., Mohamad, S. & Shah, M.E. (2014), 'Are deposit and investment accounts in Islamic banks in Malaysia interest free?', *Journal of King Abdulaziz University, Islamic Economics*, Vol. 27 No. 2, pp. 27–55, https://doi.org/10.4197/Islec.27-2.2.

Apergis, N. & Cooray, A. (2015), 'Asymmetric interest rate pass-through in the U.S., the U.K. and Australia: new evidence from selected individual banks', *Journal of Macroeconomics*, Vol. 45, pp. 155–172, https://doi.org/10.1016/j.jmacro.2015.04.010.

Aysan, A.F., Disli, M., Duygun, M. & Ozturk, H. (2018), 'Religiosity versus rationality: depositor behavior in Islamic and conventional banks', *Journal of Comparative Economics*, Vol. 46 No. 1, pp. 1–19, https://doi.org/10.1016/j.jce.2017.03.001.

Azmat, S., Azad, A.S., Bhatti, M.I. & Ghaffar, H. (2020), 'Islamic banking, costly religiosity, and competition', *Journal of Financial Research*, Vol. 43 No. 2, pp. 263–303, https://doi.org/10.1111/jfir.12207.

Azmat, S., Skully, M. & Brown, K. (2015), 'Can Islamic banking ever become Islamic?', *Pacific Basin Finance Journal*, Vol. 34, pp. 253–272, https://doi.org/10.1016/j.pacfin.2015.03.001.

Bacha, O.I. (2008), 'The Islamic inter bank money market and a dual banking system: the Malaysian experience', *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 1 No. 3, pp. 210–226, https://doi.org/10.1108/17538390810901140.

Baharumshah, A.Z., Sirag, A. & Soon, S.V. (2017), 'Asymmetric exchange rate pass-through in an emerging market economy: the case of Mexico', *Research in International Business and Finance*, Vol. 41, pp. 247–259, https://doi.org/10.1016/j.ribaf.2017.04.034.

Bahmani-Oskooee, M. & Saha, S. (2018), 'On the relation between exchange rates and stock prices: a non-linear ARDL approach and asymmetry analysis', *Journal of Economics and Finance*, Vol. 42 No. 1, pp. 112–137, https://doi.org/10.1007/s12197-017-9388-8.

Banerjee, A., Dolado, J.J. & Mestre, R. (1998), 'Error-correction mechanism tests for cointegration in a single-equation framework', *Journal of Time Series Analysis*, Vol. 19 No. 3, pp. 267–283, https://doi.org/10.1111/1467-9892.00091.

Cevik, S. & Charap, J. (2015), 'The behavior of conventional and Islamic bank deposit returns in Malaysia and Turkey', *International Journal of Economics and Financial Issues*, Vol. 5 No. 1, pp. 111–124, https://doi.org/10.5089/9781455293704.001.

Chong, S. & Liu, M. (2009), 'Islamic banking: interest-free or interest-based ?', *Pacific-Basin Finance Journal*, Vol. 17 No. 1, pp. 125–144, https://doi.org/10.1016/j.pacfin.2007.12.003.

Ergeç E.H. & Arslan, B.G. (2013), 'Impact of interest rates on Islamic and conventional banks', *Applied Economics*, Vol. 45 No. 17, pp. 2381–2388, https://doi.org/10.1080/00036846.2012.665598.

Ergec, E.H. & Kaytanci, B.G. (2014), 'The causality between returns of interest-based banks and Islamic banks: the case of Turkey', *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 7 No. 4, pp. 443–456, https://doi.org/10.1108/IMEFM-07-2014-0072.

Hamza, H. (2016), 'Does investment deposit return in Islamic banks reflect PLS principle?', *Borsa Istanbul Review*, Vol. 16 No. 1, pp. 32–42, https://doi.org/10.1016/j.bir.2015.12.001.

Holmes, M.J., Iregui, A.M. & Otero, J. (2015), 'Interest rate pass through and asymmetries in retail deposit and lending rates: an analysis using data from Colombian banks', *Economic Modelling*, Vol. 49, pp. 270–277, https://doi.org/10.1016/j.econmod.2015.04.015.

Im, K.S., Pesaran, M.H. & Shin, Y. (2003), 'Testing for unit roots in heterogeneous panels', *Journal of Econometrics*, Vol. 115 No. 1, pp. 53–74, https://doi.org/10.1016/S0304-4076(03)00092-7.

Ismal, R. (2011), 'Depositors' withdrawal behavior in Islamic banking: case of Indonesia', *Humanomics*, Vol. 27 No. 1, pp. 61–76, https://doi.org/10.1108/08288661111110187.

Ito, T. (2013), 'Islamic rates of return and conventional interest rates in the Malaysian deposit market', *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 6 No. 4, pp. 290–303, https://doi.org/10.1108/IMEFM-11-2012-0113.

Jawadi, F., Cheffou, A.I. & Jawadi, N. (2016), 'Do Islamic and conventional banks really differ? A panel data statistical analysis', *Open Economies Review*, Vol. 27 No. 2, pp. 293–302, https://doi.org/10.1007/s11079-015-9373-9.

Kasri, R. & Kassim, S. (2009), 'Empirical determinants of saving in the Islamic banks: evidence from Indonesia', *Journal of King Abdulaziz University-Islamic Economics*, Vol. 22 No. 2, pp. 181–201, https://doi.org/10.4197/islec.22-2.7.

Kassim, S.H., Shabri, M., Majid, A. & Yusof, R.M. (2009), 'Impact of monetary policy shocks on the conventional and Islamic banks in a dual banking system: evidence from Malaysia', *Journal of Economic Cooperation and Development*, Vol. 30 No. 1, pp. 41–58.

Khan, F. (2010), 'How "Islamic" is Islamic banking?', *Journal of Economic Behavior and Organization*, Vol. 76 No. 3, pp. 805–820, https://doi.org/10.1016/j.jebo.2010.09.015.

Kumar, S. (2019), 'Asymmetric impact of oil prices on exchange rate and stock prices', *Quarterly Review of Economics and Finance*, Vol. 72, pp. 41–51, https://doi.org/10.1016/j.qref.2018.12.009.

Levin, A., Lin, C. & Chu, C.J. (2002), 'Unit root tests in panel data: asymptotic and finite-sample properties', *Journal of Econometrics*, Vol. 108 No. 1, pp. 1–24.

López-Villavicencio, A. & Mignon, V. (2017), 'Exchange rate pass-through in emerging countries: do the inflation environment, monetary policy regime and central bank behavior matter?', *Journal of International Money and Finance*, Vol. 79, pp. 20–38, https://doi.org/10.1016/j.jimonfin.2017.09.004.

Maddala, G.S. & Wu, S. (1999), 'A comparative study of unit root tests with panel data and a new simple test', *Oxford Bulletin of Economics and Statistics*, Vol. 61 No. S1, pp. 631–652.

Mushafiq, M. & Sehar, T. (2021), 'Reality of short-term causality of Islamic and conventional banking term deposit rates in Pakistan', *Asian Journal of Economics and Banking*, Vol. 5 No. 1, pp. 66–78, https://doi.org/10.1108/ajeb-10-2020-0072.

Nechi, S. & Smaoui, H.E. (2019), 'Interbank offered rates in Islamic countries: is the Islamic benchmark different from the conventional benchmarks?', *Quarterly Review of Economics and Finance*, Vol. 74, pp. 75–84, https://doi.org/10.1016/j.qref.2018.05.003.

Nguyen, C.V. & Islam, A.M. (2010), 'Asymmetries in the Thai lending-deposit rate spread: an econometric analysis', *Applied Economics Letters*, Vol. 17 No. 13, pp. 1229–1236, https://doi.org/10.1080/00036840902902201.

Pedroni, P. (1999), 'Critical values for cointegration tests in heterogeneous panels with multiple regressors', *Oxford Bulletin of Economics and Statistics*, Vol. 61 No. 1, pp. 653–670.

Peltzman, S. (2000), 'Prices rise faster than they fall', *Journal of Political Economy*, Vol. 108 No. 3, pp. 466–502.

Pesaran, M.H., Shin, Y. & Smith, R.J. (2001), 'Bounds testing approaches to the analysis of level relationships', *Journal of Applied Econometrics*, Vol. 16 No. 3, pp. 289–326, https://doi.org/10.1002/jae.616.

Phan, D.H.B., Sharma, S.S. & Narayan, P.K. (2015), 'Oil price and stock returns of consumers and producers of crude oil', *Journal of International Financial Markets, Institutions and Money*, Vol. 34, pp. 245–262, https://doi.org/10.1016/j.intfin.2014.11.010.

Refinitiv (2021), 'Islamic finance development report 2021: advancing economies', available at: https://www.refinitiv.com/en/resources/special-report/islamic-finance-development-report (accessed 21 January 2022).

Saeed, S.M., Adjeljawad, I., Hassan, M.K. & Rashid, M. (2021), 'Dependency of Islamic bank rates on conventional rates in a dual banking system: a trade-off between religious and economic fundamentals', *International Review of Economics & Finance*, forthcoming, https://doi.org/10.1016/j.iref.2021.09.013.

Saraç, M. & Zeren, F. (2015), 'The dependency of Islamic bank rates on conventional bank interest rates: further evidence from Turkey', *Applied Economics*, Vol. 47 No. 7, pp. 669–679, https://doi.org/10.1080/00036846.2014.978076.

Sheikh, U.A., Asad, M., Ahmed, Z. & Mukhtar, U. (2020), 'Asymmetrical relationship between oil prices, gold prices, exchange rate, and stock prices during global financial crisis 2008: evidence from Pakistan', *Cogent Economics and Finance*, Vol. 8 No. 1, pp. 1–20, https://doi.org/10.1080/23322039.2020.1757802.

Shin, Y., Yu, B. & Greenwood-nimmo, M. (2014), 'Modelling asymmetric cointegration and dynamic multipliers in a nonlinear ARDL framework', in Sickels, R. & Horrace, W. (Eds.), *Festschrift in Honor of Peter Schmidt: Econometric Methods and Applications*, Springer, New York, pp. 281–314, https://doi.org/10.1007/978-1-4899-8008-3.

Sukmana, R. & Ibrahim, M.H. (2017), 'How Islamic are Islamic banks? A non-linear assessment of Islamic rate–conventional rate relations', *Economic Modelling*, Vol. 64, pp. 443–448, https://doi.org/10.1016/j.econmod.2017.02.025.

Sutrisno, S. & Widarjono, A. (2018), 'Maqasid Sharia index, banking risk and performance cases in Indonesian Islamic banks', *Asian Economic and Financial Review*, Vol. 8 No. 9, pp. 1175–1184, https://doi.org/10.18488/journal.aefr.2018.89.1175.1184.

Tappata, M. (2009), 'Rockets and feathers: understanding asymmetric pricing', *The Rand Journal of Economics*, Vol. 40 No. 4, pp. 673–687.

Tlemsani, I. (2020), 'Evaluation of the Islamic interbank benchmark rate', *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 13 No. 2, pp. 249–262, https://doi.org/10.1108/IMEFM-06-2018-0203.

Toumi, K., Viviani, J.L. & Chayeh, Z. (2019), 'Measurement of the displaced commercial risk in Islamic banks', *Quarterly Review of Economics and Finance*, Vol. 74, pp. 18–31, https://doi.org/10.1016/j.qref.2018.03.001.

Touri, O., Ahroum, R. & Achchab, B. (2020), 'Management and monitoring of the displaced commercial risk: a prescriptive approach', *International Journal of Emerging Market*, Vol. ahead-of-print No. ahead-of-print, https://doi.org/10.1108/IJOEM-07-2018-0407.

Utomo, S.B., Sekaryuni, R., Widarjono, A., Tohirin, A. & Sudarsono, H. (2021), 'Promoting Islamic financial ecosystem to improve halal industry performance in Indonesia: a demand and supply analysis', *Journal of Islamic Marketing*, Vol. 12 No. 5, pp. 992–1011, https://doi.org/10.1108/JIMA-12-2019-0259.

Warninda, T.D., Ekaputra, I.A. & Rokhim, R. (2019), 'Do *mudarabah* and *musharakah* financing impact Islamic bank credit risk differently?', *Research in International Business and Finance*, Vol. 49, pp. 166–175, https://doi.org/10.1016/j.ribaf.2019.03.002.

Widarjono, A. & Hakim, A. (2019), 'Asymmetric oil price pass-through to disaggregate consumer prices in emerging market: evidence from Indonesia', *International Journal of Energy Economics and Policy*, Vol. 9 No. 6, pp. 310–317.

Widarjono, A., Mifrahi, M.N. & Perdana, A.R.A. (2020a), 'Determinants of Indonesian Islamic rural banks' profitability: collusive or non-collusive behavior ?', *The Journal of Asian Finance, Economics and Business*, Vol. 7 No. 11, pp. 657–668, https://doi.org/10.13106/jafeb.2020.vol7.no11.657.

Widarjono, A., Susantun, I., Ruchba, S.M. & Rudatin, A. (2020b), 'Oil and food prices for a net oil importing-country: how are related in Indonesia?', *International Journal of Energy Economics and Policy*, Vol. 10 No. 5, pp. 255–263.

Widarjono, A., Wijayanti, D. & Suharto, S. (2022), 'Funding liquidity risk and asset risk of Indonesian Islamic rural banks', *Cogent Economics & Finance*, Vol. 10 No. 1, pp.1–14, https://doi.org/10.1080/23322039.2022.2059911.

Yuksel, S. (2017), 'The causality between returns of interest-based banks and Islamic banks: the case of Turkey', *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 10 No. 4, pp. 519–535, https://doi.org/10.1108/IMEFM-12-2013-0133.

Yusof, R.M., Bahlous, M. & Tursunov, H. (2015), 'Are profit sharing rates of *mudharabah* account linked to interest rates? An investigation on Islamic banks in GCC countries', *Jurnal Ekonomi Malaysia*, Vol. 49 No. 2, pp. 77–86, https://doi.org/10.17576/JEM-2015-4902-07.

Zainol, Z. & Kasim, S.H. (2010), 'An analysis of Islamic banks' exposure to rate of return risk', *Journal of Economic Cooperation and Development*, Vol. 1, pp. 59–84.

ABOUT THE AUTHORS

Agus Widarjono, PhD, is a professor at the Department of Economics, Faculty of Business and Economics, Universitas Islam Indonesia, Yogyakarta, Indonesia. He obtained his PhD from Oklahoma State University, USA. He is the corresponding author and can be contacted at: agus.widarjono@uii.ac.id

Md. Mahmudul Alam, PhD, is a fellow of the Economic and Financial Policy Institute and an Associate Professor of Finance at the School of Economics, Finance & Banking, Universiti Utara Malaysia, Sintok, Malaysia. He is also an Associate Fellow of the Accounting Research Institute, University Teknologi MARA, Shah Alam, Malaysia.

Abdur Rafik is a lecturer at the Department of Management, Faculty of Business and Economics, Universitas Islam Indonesia, Yogyakarta, Indonesia. His research interests include finance, and Islamic banking and finance.