

MACROPRUDENTIAL POLICY IN THE INDONESIAN ISLAMIC BANKING: A Proposed Reserve Requirement (RR) – Financing to Deposit (FDR)

Rifki Ismal, Ph.D

Assistant Director, Bank Indonesia

Sutan Emir Hidayat, Ph.D

Director of the MBA Program, University College of Bahrain

Abstract

Reserve requirement (RR) is one of the most effective macroprudential instruments to manage banking liquidity. While a loan to deposit ratio (LDR) based reserve requirement (RR) has been applied to conventional banks, there is no such a similar rule applied to Islamic banks. Therefore, this paper attempts to find the ideal RR-FDR ratio for Islamic banking industry in Indonesia by deriving the ideal quantitative formula of the ideal RR-FDR and conducting simulations to identify its impact to each Islamic bank. Data of 11 out of 12 total Islamic banks in Indonesia was collected from monthly banking report. Then, simulations on the financial ratios related to calculating RR-FDR were conducted per bank after finding optimal mathematics formulas for such ratio which was developed based on the bank profit maximization model and the bank balance sheet approach. Based on the simulations, it is found that the macroprudential policy for Islamic banks namely RR-FDR is recommended to have FDR range between 77%-109% with 5% RR. However, liquidity reserve position of each Islamic bank per January 2014 has shown that there were 5 Islamic banks having minimal liquidity reserve under 5% RR and there were 7 Islamic banks having minimum liquidity reserve under 8% RR. It means Islamic banking industry in Indonesia does not have an enough liquidity reserve to mitigate short term and long term liquidity mismatch leading to liquidity pressure. Hence, the optimal FDR considering RR in Islamic banking industry is highly recommended to be considered by the banking regulators.

Keywords: Macroprudential Policy, Indonesian Islamic Banking, Reserve Requirement, Financing to Deposit Ratio

1. Introduction

The decreasing performance of the Indonesian economy in 2013-2014 fortunately did give much impact to the Islamic banking industry. In fact, it still showed a growing pattern of the banking indicators such as third party funds and financing. The third party funds increased 24.41% (yoy) to become IDR 183.53 trillion, while financing was up 24.81% (yoy) to become IDR 184.12 trillion (Bank Indonesia 2013). Such Islamic banking performances require a robust

liquidity management particularly to manage depositors withdrawals and real sector financing to achieve a well expected business return. From the regulators, one of the policies to manage Islamic banking liquidity is reserve requirement (RR) which is an obligatory macroprudential policy to all banks unexceptionally Islamic banks.

In order to maintain financial system stability by considering banking liquidity condition, Bank Indonesia applies a loan to deposit ratio (LDR) based reserve requirement (RR) namely RR-LDR to optimize financial intermediary function and liquidity adequacy. RR-LDR is an extra RR for banks to be placed in the central bank account in addition to the primary RR. In this case, a bank should locate extra reserves in the central bank depending on its LDR ratio and in relation to this, Bank Indonesia announced Bank Indonesia Regulation (PBI) Number 15/15/PBI/2013 on Reserve Requirement including the RR-LDR regulation. The PBI stipulates RR-LDR for conventional banks which is 78%-92% range of Loan to Deposit (LDR) ratio. It means that if the conventional banks LDR is lower than 78% or higher than 92%, RR-LDR is applied or the banks should pay extra RR in the central bank.

Such a PBI rules the conventional bank and is not applicable for Islamic banks. In fact, the growing Islamic bank financing has raised its financing to deposit (FDR) ratio to exceed 100% ratio (an average of 102,25% in the last 2 years). Hence, eventhough the PBI targets the conventional banks, it is very essential to asses its application in Islamic banks due to its liquidity risk potential. This paper attempts to find the ideal RR-FDR ratio for Islamic banking industry by conducting a simulation to identify its impact to each Islamic bank.

2. Literature Review

Reserve requirement (RR) has been proven to be one of the most effective macroprudential instruments to manage banking liquidity as it influences banking cost of funds and credit activities (Tovar et al. 2012). Particularly, RR impacts: (i) the banking structure of funding, (ii) degree of banking development and (iii) regulators decision on RR ratio. In a simple assessment, the impact of RR can be assessed from the bargaining power of banks in the financial market. First of all, RR determines the banking competitiveness in extending credit with a competitive credit rate. Secondly, RR determines the successfulness of banks to collect third party funds (TPF) or deposits especially the deposit rate.

In Indonesia, Bank Indonesia (the central bank) classifies RR as RR Rupiah and foreign exchange in the PBI number 15/15/PBI/2013 and RR Rupiah is composed of primary RR, secondary RR and RR-LDR. The detailed of the regulation is in the following:

- a. Primary Reserve Requirement is minimum 8% of the TPF in Rupiah, maintained in each bank account in the central bank.
- b. Secondary Reserve Requirement is stipulated 4% of the TPF in Rupiah and it can be in the forms of certificate of Bank Indonesia (SBI), deposit certificate of Bank Indonesia (SDBI), government bond (SBN), and banking excess reserves.
- c. RR-FDR is counted based on the range of maximum and minimum of the actual and target of LDR taken into account the bank's CAR.

However, RR for Islamic banking is ruled in PBI number 15/16/PBI/2013 on RR for Islamic banks and Islamic banking unit. In the article 2, it is mentioned that:

- A. Reserve Requirement in Rupiah is minimum 5% of the TPF in Rupiah.
- B. An Islamic bank having a less than 80% FDR and;
 - i. TPF in Rupiah between IDR 1 trillion and less than IDR10 trillion should have an excess RR with the ratio of 1% of the TPF in Rupiah;
 - ii. TPF in Rupiah between IDR10 trillion and IDR50 trillion should have an excess RR with the ratio of 2% of the TPF in Rupiah, or
 - iii. TPF in Rupiah of more than IDR50 trillion should have an excess RR with the ratio of 3% of the TPF in Rupiah.
- C. An Islamic bank having:
 - i. more than 80% FDR and;
 - ii. TPF in Rupiah up to IDR1 trillion, is not obliged to add more excess RR.

Another way to compare banking performance is to look at its financial ratio which is evaluating the relation between financial ratios (Ross *et al.*, 2010). However, one problem in comparing financial ratio is the different in the sources of financial ratio may lead to different patterns and outputs of the analysis. Thus, similar financial ratio calculation is a must to avoid such a misleading. In this case, the paper analyses: (i) *Financing to Deposit Ratio* (FDR); (ii) *Capital Adequacy Ratio* (CAR) and (iii) *Liquidity Ratio*.

- A. ***Financing to Deposit Ratio (FDR)*** is the ratio of total extended bank financing *to the total bank deposits* or:

$$FDR = \frac{\text{Financing}}{\text{Deposit}} \times 100\% \quad (1)$$

B. **Capital Adequacy Ratio (CAR)** is a ratio of total bank capital to the risk weighted assets or:

$$CAR = \frac{\text{capital}}{\text{risk weighted assets}} \times 100\% \quad (2)$$

C. **Liquidity Ratio** shows the stock of bank reserves or:

$$\text{Liquidity ratio} = \frac{\text{Primary liquid asset}}{\text{Short term deposits}} \times 100\% \quad (3)$$

The primary liquid assets are composed of:

- a. Cash;
- b. Placement in Bank Indonesia in the form of FTO (*Fine Tune Operation*), Bank Indonesia Facility (FASBI), and others;
- c. Securities available for sale;
- d. All of government securities matured less than one year.

Meanwhile, the short term deposits are the volatile deposits during the favorable or unfavorable financial conditions, for examples:

- a. Third party funds;
- b. All interbank transactions;
- c. All bank borrowing.

3. Analyses and Finding

3.1. Scope of the Analysis

The paper analyses 11 Islamic banks in Indonesia, out of total 12 Islamic banks namely:

1. Bank BNI Syariah
2. Bank Mega Syariah
3. Bank Muamalat Indonesia
4. Bank Syariah Mandiri
5. Bank BCA Syariah
6. Bank Brisyariah
7. Bank Jabar Banten Syariah

8. Bank Panin Syariah
9. Bank Syariah Bukopin
10. Bank Victoria Syariah
11. Bank Maybank Indonesia Syariah

These Islamic banks represent nearly 100% market share with total assets of IDR180 trillion. The data is secondary data from monthly banking report coming from the central bank website (<http://www.bi.go.id>). Then simulations on the financial ratios related to calculating RR-FDR are occupied per bank after finding optimal mathematics formula for such ratio. However, for the sake of confidentiality, the paper randomly determines each bank above as bank A, B, C and so on.

3.2. Optimal FDR Formula for Islamic Banks

First of all, the analysis constructs formula of lower level of FDR which shows the effectiveness of Islamic bank financing as well as its financial intermediary function. Based on the common ultimate target of bank financing which is maximum profit, a model of a bank profit (π) maximization is (Freixas and Rochet 2008):

$$\pi = r_L L + rM - r_D D - C(D, F) \quad (4)$$

where r_L is rate of return of bank financing, L is bank loan, r is rate of return from money market, M is liquidity placed in money market, r_D is rate of deposit, D is total deposits and $C(D,F)$ is cost related to deposits and financing activities. From the standard formula (4) above, the modification of the model is below (assuming $L = l$, $M = liq$, d is ratio of deposits, r_K is rate of capital and k is the ratio of bank capital):

$$\text{Max } \pi, \quad \pi = r_L l + r liq - r_D d - r_K k \quad (5)$$

$$\text{s.t.} \quad d + k = 1 \quad (6)$$

$$l + liq + RR = 1 \quad (7)$$

$$\text{and } \frac{k}{l} = \Omega, \text{ thus } d + l\Omega = 1 \quad (8)$$

Assuming $RR = \rho d$, in which ρ is the RR ratio stipulated by the central bank, then $\rho = \rho_0 + \rho_1 \frac{d}{l}$, where ρ_0 is the primary RR and ρ_1 is the secondary RR. Inserting formulas (6),

(7) and (8), we find $l + liq + \rho_0 + \rho_1 \frac{d}{l} = 0$. By using *Lagrange Multiplier*, the optimal formula is derived below:

$$\mathcal{L} = r_L l + r liq - r_D d - r_K l \Omega + \lambda_1 [d + l \Omega - 1] + \lambda_2 [l + liq + \rho_0 d + \rho_1 \frac{d^2}{l} - 1] \quad (9)$$

with the *First Order Condition* (F.O.C.) as:

$$\frac{\partial \mathcal{L}}{\partial l} = r_L - r_K \Omega + \lambda_1 \Omega + \lambda_2 \left[1 - \rho_1 \frac{d^2}{l^2}\right] = 0 \quad (10)$$

$$\frac{\partial \mathcal{L}}{\partial liq} = r + \lambda_2 = 0 \quad (11)$$

$$\frac{\partial \mathcal{L}}{\partial d} = -r_D + \lambda_1 + \lambda_2 [\rho_0 + 2\rho_1 \frac{d}{l}] = 0 \quad (12)$$

$$\frac{\partial \mathcal{L}}{\partial \lambda_1} = d + l \Omega - 1 = 0 \quad (13)$$

$$\frac{\partial \mathcal{L}}{\partial \lambda_2} = l + liq + \rho_0 d + \rho_1 \frac{d^2}{l} \quad (14)$$

By substituting and recomputing formulas (10)-(14), the optimal FDR is found below:

$$l = \left[\frac{r \rho_1}{r(1 - \rho_0 \Omega + \rho_1 \Omega^2) - r_L + \Omega(r_K - r_D)} \right]^{1/2} \quad (15)$$

Formula (15) is proven by changing formula (11) to become $\lambda_2 = -r$, and formula (12) to be $\lambda_1 = r_D + r[\rho_0 + 2\rho_1 \frac{d}{l}] = 0$, and then substituting them to formula (14) followed by derivating it in order to have:

$$r_L - r_K \Omega + \left[r_D + r \left(\rho_0 + 2\rho_1 \frac{d}{l} \right) \right] \Omega - r \left[1 - \rho_1 \frac{d^2}{l^2} \right] = 0 \quad (16)$$

$$r_L - r_K \Omega + \left[r_D + r \rho_0 + 2r \rho_1 \frac{d}{l} \right] \Omega - r + r \rho_1 \frac{d^2}{l^2} = 0 \quad (17)$$

$$r_L - r_K \Omega + r_D \Omega + r \rho_0 \Omega + 2r \rho_1 \Omega \frac{d}{l} - r + r \rho_1 \frac{d^2}{l^2} = 0 \quad (18)$$

After that, formula (13) is changed to become $d = 1 - l \Omega$, in order to be derived as below:

$$r_L - r_K\Omega + r_D\Omega + r\rho_0\Omega + 2r\rho_1\Omega \frac{1-l\Omega}{l} - r + r\rho_1 \frac{(1-l\Omega)^2}{l^2} = 0 \quad (19)$$

$$r_L - r_K\Omega + r_D\Omega + r\rho_0\Omega + \frac{2r\rho_1\Omega}{l} - \frac{2r\rho_1l\Omega^2}{l} - r + r\rho_1 \frac{(1-2l\Omega+l^2\Omega^2)}{l^2} = 0 \quad (20)$$

$$r_L - r_K\Omega + r_D\Omega + r\rho_0\Omega + \frac{2r\rho_1\Omega}{l} - 2r\rho_1\Omega^2 - r + \frac{r\rho_1}{l^2} - \frac{2r\rho_1l\Omega}{l^2} + \frac{r\rho_1l^2\Omega^2}{l^2} = 0 \quad (21)$$

$$r_L - r_K\Omega + r_D\Omega + r\rho_0\Omega + \frac{2r\rho_1\Omega}{l} - 2r\rho_1\Omega^2 - r + \frac{r\rho_1}{l^2} - \frac{2r\rho_1\Omega}{l} + r\rho_1\Omega^2 = 0 \quad (22)$$

$$r_L - r_K\Omega + r_D\Omega + r\rho_0\Omega - r\rho_1\Omega^2 - r + \frac{r\rho_1}{l^2} = 0 \quad (23)$$

$$\frac{r\rho_1}{l^2} = r - r_L + r_K\Omega - r_D\Omega - r\rho_0\Omega + r\rho_1\Omega^2 \quad (24)$$

$$l^2 = \frac{r\rho_1}{r - r_L + r_K\Omega - r_D\Omega - r\rho_0\Omega + r\rho_1\Omega^2} \quad (25)$$

$$l^2 = \frac{r\rho_1}{r - r\rho_0\Omega + r\rho_1\Omega^2 - r_L + r_K\Omega - r_D\Omega} \quad (26)$$

$$l^* = \left[\frac{r\rho_1}{r(1 - \rho_0\Omega + \rho_1\Omega^2) - r_L + \Omega(r_K - r_D)} \right]^{1/2} \quad (27)$$

Formula (27) is the optimal FDR for Islamic banks and becomes benchmark to simulate its impact to the Islamic banking industry. The following part is the simulation with a 78% lower level of FDR as Bank Indonesia macroprudential policy to maintain a robust banking operation.

3.3. Determining the Upper Level of FDR for Islamic Banks

After finding the optimum FDR for Islamic banks, the paper determines the upper level of such FDR for Islamic banks. Basically, assets are formulated as a function of total liability and capital as shown below:

$$\text{Assets} = \text{Liability} + \text{Capital} \quad (28)$$

Assets and liability sides of the Islamic banks are divided into some parts to find the optimum level of FDR by taking into account liquidity behavior of each Islamic bank. As such, formula (28) is modified into formula to show the banking intermediary function as below:

$$F + AL + I + RR + Cash + O = D + D' + K \quad (29)$$

Box 1. Detail of Formulas

<p>D = Third party funds</p> <p>D' = Other liabilities</p> <p>RR = Reserve requirement = $\rho (D + D')$</p> <p>Cash = $c (D + D')$</p> <p>AL = Current assets = $\theta (D + D')$</p> <p>F = Bank financing (Credit)</p> <p>I = Other investment (placement)</p> <p>O = Other Assets = $\vartheta (D + D' + K)$</p> <p>α = CAR (Capital Adequacy Ratio) = $\frac{k}{\omega_L L + \omega_I I}$</p> <p>K = Bank capital = $\alpha (\omega_L L + \omega_I I)$</p>

By substituting equations in the box to the formula (29) above, the extended formula (29) is found as below:

$$F + \theta(D + D') + I + \rho(D + D') + c(D + D') + \vartheta(D + D' + K) = D + D' + \alpha(\omega_L L + \omega_I I) \quad (30)$$

$$F + \theta(D + D') + I + \rho(D + D') + c(D + D') + \vartheta(D + D') = D + D' + (1 - \vartheta)(\alpha\omega_L L + \alpha\omega_I I) \quad (31)$$

$$F + I - (1 - \vartheta)(\alpha\omega_L L + \alpha\omega_I I) = D + D' - \theta(D + D') - \rho(D + D') - c(D + D') - \vartheta(D + D') \quad (32)$$

$$F(1 - \alpha\omega_L + \alpha\omega_L\vartheta) + I(1 - \alpha\omega_I + \alpha\omega_I\vartheta) = D(1 - \theta - \rho - c - \vartheta) + D'(1 - \theta - \rho - c - \vartheta) \quad (33)$$

$$F[1 - \alpha\omega_L(1 - \vartheta)] + I[1 - \alpha\omega_I(1 - \vartheta)] = D(1 - \theta - \rho - c - \vartheta) + D'(1 - \theta - \rho - c - \vartheta) \quad (34)$$

$$F[1 - \alpha\omega_L(1 - \vartheta)] = D(1 - \theta - \rho - c - \vartheta) + D'(1 - \theta - \rho - c - \vartheta) - I[1 - \alpha\omega_I(1 - \vartheta)] \quad (35)$$

$$\frac{F}{D} = \frac{D(1-\theta-\rho-c-\vartheta)+D'(1-\theta-\rho-c-\vartheta)-I[1-\alpha\omega_I(1-\vartheta)]}{D[1-\alpha\omega_L(1-\vartheta)]} \quad (36)$$

$$\frac{F}{D} = \frac{(1-\theta-\rho-c-\vartheta)}{[1-\alpha\omega_L(1-\vartheta)]} + \frac{D'(1-\theta-\rho-c-\vartheta)}{D[1-\alpha\omega_L(1-\vartheta)]} - \frac{I[1-\alpha\omega_I(1-\vartheta)]}{D[1-\alpha\omega_L(1-\vartheta)]} \quad (37)$$

Formula (37) represent the ideal FDR formula for each Islamic banks (based on bank balance sheet approach – formula 28) by considering: (i) ratio of cash and TPF; (ii) ratio of RR and TPF stipulated by the central bank; (iii) ratio primary liquid asset and TPF; (iv) ratio of other assets and TPF, liability and capital; (v) CAR (capital adequacy ratio); and (vi) placement in other banks. Then, formula (37) is employed to assess optimal FDR of each Islamic bank. Nevertheless, prior to assessing each Islamic bank, formula (37) is further modified to be more applicable in the bank balance as shown below:

$$FDR\ Potential = ((K1/K2) \times (1 + K3)) - K4 \quad (38)$$

$$\text{where: } K1 = 1 - \theta - \rho - c - \vartheta; \quad (39)$$

$$K2 = 1 - CAR \times (1 - \vartheta); \quad (40)$$

$$K3 = D'/D; \text{ and} \quad (41)$$

$$K4 = I/D \quad (42)$$

Referring to the individual Islamic bank data (11 Islamic banks above) per January 2014, the average actual FDR was 93% which was similar to the average potential FDR of the banking industry (assuming 8% RR). However, with 5% RR, the average FDR reached 96%. It means that, per January 2014, the maximum average FDR was 96% due to the minimum RR of 5%. Nonetheless, not all Islamic banks might stand on 96% FDR since some of them had lower and higher FDR than the average 96% FDR (see table 1).

By looking at the numbers in potential FDR in table 1, the potential FDR for Islamic banks is between 77% - 109% with 5% RR, whilst, it is between 73%-105% with 8% RR. As such, macroprudential policy for Islamic banks namely RR-FDR is recommended to have FDR range between 77%-109% with 5% RR. However, liquidity reserve position of each Islamic bank per January 2014 has shown that there were 5 Islamic banks having minimal liquidity reserve under 5% RR and there were 7 Islamic banks having minimum liquidity reserve under 8% RR.

Table 1. Simulation of the Optimal FDR for Islamic Banks

RR	K1		K2	K3 D'/D	K4 I/D	FDR Potential		Actual FDR	excess		
	P5	P8				P5	P8		P5	P8	
0.05	0.08	0.80	0.77	0.84	0.17	0.03	1.09	1.05	0.97	0.12	0.08
0.05	0.08	0.82	0.79	0.86	0.02	0.00	0.97	0.94	0.93	0.05	0.01
0.05	0.08	0.76	0.73	0.82	0.13	0.01	1.04	1.00	0.94	0.10	0.06
0.05	0.08	0.77	0.74	0.85	0.06	0.00	0.95	0.92	0.88	0.07	0.04
0.05	0.08	0.76	0.73	0.78	0.02	0.08	0.92	0.88	0.86	0.05	0.01
0.05	0.08	0.77	0.74	0.86	0.09	0.01	0.97	0.93	0.95	0.02	-0.02
0.05	0.08	0.70	0.67	0.80	0.08	0.02	0.91	0.87	0.90	0.01	-0.03
0.05	0.08	0.61	0.58	0.80	0.01	0.00	0.77	0.73	0.97	-0.20	-0.24
0.05	0.08	0.82	0.79	0.88	0.22	0.11	1.02	0.98	0.97	0.05	0.01
0.05	0.08	0.72	0.69	0.81	0.12	0.00	1.00	0.96	0.93	0.07	0.03
0.05	0.08	0.48	0.45	0.38	0.54	0.10	1.86	1.74	2.18	-0.32	-0.44
0.05	0.08	0.75	0.72	0.83	0.09	0.03	0.96	0.93	0.93	0.03	-0.01

Name of Islamic Bank	Bank A	Bank B	Bank C	Bank D	Bank E	Bank F	Bank G	Bank H	Bank I	Bank J	Bank K	Islamic banking industry
No	1	2	3	4	5	6	7	8	9	10	11	

Table 2. Liquidity Reserve of Islamic Banks

No	Nama of Islamic Bank	RR Primary		(AL-RR)/TPF	
		5%	8%	5%	8%
1	Bank A	0.05	0.08	5.47%	2.47%
2	Bank B	0.05	0.08	3.15%	0.15%
3	Bank C	0.05	0.08	8.38%	5.38%
4	Bank D	0.05	0.08	13.83%	10.83%
5	Bank E	0.05	0.08	20.27%	17.27%
6	Bank F	0.05	0.08	16.52%	13.52%
7	Bank G	0.05	0.08	22.75%	19.75%
8	Bank H	0.05	0.08	29.90%	26.90%
9	Bank I	0.05	0.08	16.81%	13.81%
10	Bank J	0.05	0.08	6.08%	3.08%
11	Bank K	0.05	0.08	62.89%	59.89%
Islamic banking industry		0.05	0.08	14.32%	11.32%

4. Conclusion and Recommendations

- The on going FDR of Islamic banks is relatively high which is around 100% from 2000-2013 while the LDR is only between 85%-91%. It reveals that Islamic banking industry in Indonesia is in growing pattern. Nevertheless, unfortunately, it does not have an enough liquidity reserve to mitigate short term and long term liquidity mismatch leading to liquidity pressure. It is proven in a FDR ratio while liquidity reserves in some Islamic banks are not appropriate. Hence, the output of the paper namely the optimal FDR considering RR in Islamic banking industry is highly recommended to be considered by the regulators.

- Analysis of the paper suggests the lower level of FDR is 78% in order to be in line with the macroprudential policy of Bank Indonesia to maintain the financial intermediary function of banks. Meanwhile, the upper level of FDR is suggested 93%, 1% higher than the conventional one. It is considering composition of Islamic banking TPF to total assets which is lower than the conventional one, while having a higher FDR than LDR.
- The paper finally recommends liquidity management for Islamic banking industry in Indonesia by applying RR-FDR as being applied to the conventional counterparts. This may lead Islamic banks to comply with the macroprudential policy of the central bank.

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