

THE RESPONSE OF DEPOSITS IN THE BANKING SYSTEM TO SHOCKS IN THE MACROECONOMY

Veliana Theola¹⁾, Regi Muzio Ponziani^{2,*})

^{1, 2)}Trisakti School of Management, Jakarta

e-mail: meponzie@gmail.com

ABSTRACT

This study aims at determining the response of deposits (third party funds) in the commercial banks and rural banks to the shocks occurring to inflation, money supply, and USD/IDR exchange rate. So far previous study has mainly focused on only Islamic banks. The data collected were monthly data extending from January 2015 until December 2023. All the data were available on Bank Indonesia and OJK's websites. The research method used was impulse response function (IRF) that was preceded by vector error correction model (VECM). Upon first examination, it was found out that the data were not stationary. Therefore, they need to be first-differenced for further testing. There was cointegration in the data and therefore we could conclude that banks deposit has a long-term relationship with inflation, money supply, and exchange rate. Impulse response function showed that deposits in the banking system will decrease whenever there is a shock on inflation. This shows how people in the rural and urban areas will hold more cash in the midst of high uncertainty in the economy. Moreover, when there are shocks happening to money supply and exchange rate, the deposits in the rural and commercial banks are very likely to decline. Again, this corroborates the evidence for the tendency of the population to hold more cash in hands to be prepared in times of high uncertainty in money supply and exchange rate.

Keywords: Impulse Response Function; Third Party Funds; Rural Banks; Cointegration

1. Introduction

Banking sector represents a pivotal industry that can determine how well-functioning an economy is. Banks organize funding from parts of society that have excess liquidity and distribute them to other parts that are deficient. Banks must conduct good risk management practice to ascertain that the credits are allocated to the productive sectors that have the capacity for repayment. This way, banks have enabled the efficient allocation of resources that later contribute to the well-functioning of the aggregate economy. The better the banks perform their functions, the more economic growth can be realized from the flow of goods, services, and capital (Nguyen, 2022; Irawan, Kusuma, & Irawan, 2021; Zeqiraj et al, 2020). On the other hand, banking instability will disrupt and impede the capital movement within a country that can harm economic growth and the welfare of the people (Shahriar et al., 2023; Hac, 2021). We can see that the main operation of the banking industry relies on the incoming deposits from depositors and disbursing those deposits to the borrowers in the form of loans or credits (Soehaditama, 2023). In order to be able to attract deposits from depositors, banks need trust from them (Burhanudin, 2022; Fungacova, Kerola, & Weill, 2022). The deposits are the banks' liability to the depositors and they will be used to finance entities or individuals in needs of liquidity. Since deposits are important for the banks' ability to spur economic growth and maintaining trust within the economy, they have to be protected by deposit insurance (Nikolaj, Drazenovic, & Buterin, 2022). From this operation banks will gain interest spread. This will accrue to the banks profit and enhance their profitability. Accordingly, banks will be very much

influenced by interest rate (Angori, Aristei, & Gallo, 2019; Adao et al., 2022; Rathnayake et al., 2022; Segev, et al., 2022). An increase in interest rate might persuade depositors to deposit more money within the banking system. This happens because they want to maximize their returns from the increase in interest rate. Consequently, money in the economy will decrease and money in the banking system will increase. This increase in interest enable banks to charge the lenders more. Hence, banks will gain more interest rate. However, lenders may be reluctant to borrow from the banks since the cost of the loan is high during interest rate increase. Increase in interest may also prompt banks to accumulate more capital buffers to withstand the increasing rate of delinquency. On the other hand, a decrease in interest rate will make it cheap to borrow from banks while also makes savings uninteresting. The interest rate is influenced by the regulator, in this case central banks, through the conduct of its monetary policy to stabilize many macroeconomic indicators (Ozili, 2023; Arintoko & Kadarwati, 2022; Handayani & Kacaribu, 2021; Mentari, Hayati, & A. G., 2018). Since deposits render a bank liquid and able to distribute loans, and hence gain profits (Duong, Le, & Le, 2023; Nguyen & Nguyen, 2022), we would like to investigate what factors affect the level of deposits in a bank itself. Literature is still very scant in this area. Maulayati et al. (2020) used Islamic commercial banks sample in Indonesia and employed VECM model. They found that exchange rate affected deposits in the short-term, while exchange rate, inflation, and Industrial Production Index (IPI) also affect deposits in the long-term. In this research, we investigate the influence of exchange rate, inflation, money supply, and IPI on the deposits within commercial banks and rural banks in Indonesia. No known research has investigated the response of deposits in rural banks against macroeconomic factors.

2. Research Method

The data used in this research extend from January 2015 until December 2023. These are monthly data covering the total third party funds (as an indicator of deposits) in commercial banks and rural banks, inflation rate, money supply, and exchange rate of USD /IDR. The data were collected from Bank Indonesia and OJK's websites. In this research, we will use vector error correction model and impulse response function to analyze how third party funds in the banking system will react to the shocks that impose macroeconomic indicators. As we know, VECM and IRF require data to be stationary. Therefore, we will conduct stationarity test to find out whether the variables are stationary or not. Each variable will be tested for stationarity. The equation for stationarity test will be:

$$\Delta y_t = \alpha + \Upsilon y_{t-1} + \lambda_t + v_t$$

$$\Delta y_t = \alpha + \Upsilon y_{t-1} + v_t$$

$$\Delta y_t = \Upsilon y_{t-1} + v_t$$

In the above equations, y_t denotes the variable tested for stationarity. The stationarity equation involves stationarity test with constant and trend, stationarity test with only constant, and stationarity test without constant and trend. The equation used will depend on the visual inspection of the data. Subsequent to stationarity test, we will conduct lag length determination. The lag length determination will use the Schwarz Information Criterion (SIC). SIC has an advantage over other criterion such as Akaike Information Criterion (AIC) in that it punishes longer lags. Subsequent to lag length determination, we will perform cointegration test.

Cointegration test will determine whether there exists long-term causal relationship among independent variables and dependent variable. The equation for cointegration test is:

$$\Delta e_t = \gamma e_{t-1} + v_t$$

In the above equation, e_t is the residual derived from the regression that involves third party funds (TPF) as the dependent variable and inflation (INF), money supply (MS), and exchange rate (EXR) as the independent variables. However, the regressions of the dependent and independent variables may use a constant, a constant and a trend, or no constant and no trend (depending on the visual inspection). Therefore, the equations to derive residuals are:

$$e_t = TPF_t - b_1 INF - b_2 MS - b_3 EXR$$

$$e_t = TPF_t - \alpha - b_1 INF - b_2 MS - b_3 EXR$$

$$e_t = TPF_t - \alpha - b_1 INF - b_2 MS - b_3 EXR - \delta_t$$

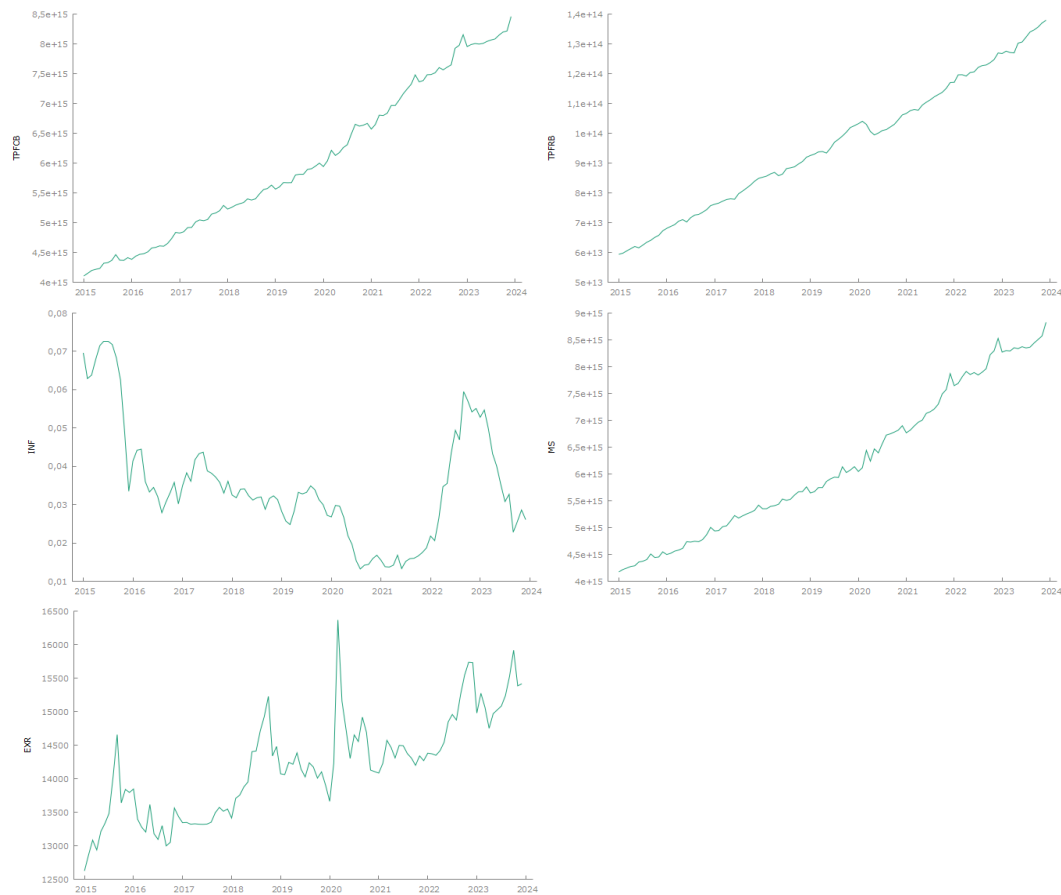
Finally, we construct VECM. The VECM model (assuming that the variables are nonstationary and cointegrated) is:

$$\Delta TPF_t = \alpha + \delta(TPF_{t-1} - b_1 INF_{t-1} - b_2 MS_{t-1} - b_3 EXR_{t-1})$$

3. Results and Discussion

Firstly, we will conduct visual inspection on each variable. We plot each variable according to time on x axis and total volume (value) on y axis. Figure 1 below displays the time-series plots of each variable.

Figure 1. Time-Series Plot of Research Variables



The first graph on the top leftmost panel shows the movement of third party funds in the commercial banks in Indonesia. The amount of third party funds is steadily increasing. In the beginning of the research period, the amount of third party funds in the commercial banking system is around IDR 4,100 trillion. At the end of research period it amounts to IDR 8,400 trillion. The plot of third party funds shows only a little volatility along the way. For the stationarity test, third party funds for commercial banks will include a constant and a trend. The second graph on the uppermost part of figure 1 displays the plot of third party funds at rural banks (Bank Perkreditan Rakyat/BPR). It steadily increases overtime. Very minor volatility is emergent in the time-series movement of third party funds at rural banks. Just like third party funds in the commercial banks, the stationarity test will include a constant and a trend. The third graph on the middle left part of figure 1 represents the plot for inflation. Inflation is quite high in the beginning of the research period in which it can reach up to 7%. However, at the end, the inflation falls down to almost 3%. The movement itself is almost erratic in which there is no trend or any seasonal pattern. From 2015-2021, inflation shows a decreasing trend. From 2021-2023, it begins to rise sharply although afterwards it declines again. The stationarity test for inflation will include only a constant. The fourth graph on the right middle part is about money supply. This shows how much money outstanding in the economy. For the most part, it has been a steady increase in money supply. It begins with IDR 4,000 trillion in 2015 and peaks around IDR 8,700 trillion in 2023. At the end of 2023, the amount of money supply was approaching IDR 9,000 trillion. Based on the visual inspection, the stationarity test for money supply will include a constant and a trend. The last graph at the

bottom part of figure 1 shows the plot for exchange rate of USD/IDR. The rate has always been increasing. The volatility is high and obvious. The rate begins with IDR 12,600 per USD. In the midst of 2015 and 2018, the exchange rate surges and reaches IDR 14,600 and IDR 15,100 per USD. After this surge, rapid decline follows. In the early part of 2020, the exchange rate abruptly rises again. This marks the beginning of the pandemic. In the midst of 2022 and 2023 there are again sudden increases in the exchange rate. The plot itself shows an increasing trend despite the volatility. Therefore, the stationarity test will involve a constant and a trend. Next, we conduct a stationarity test. The table below shows the results of the test.

Table 1. Stationarity Test

	At Level		At First Difference	
	Coefficient	P-Value	Coefficient	P-Value
TPFCB	-0.0725608	0.7447	-1.13919	0.0000***
TPFRB	-0.1805970	0.2388	-1.20209	0.0826*
INF	-0.0626836	0.4113	-1.00305	0.0002***
MS	-0.0748070	0.8283	-1.27502	0.0000***
EXR	-0.3516270	0.0005***	-1.58618	0.0000***

***significant at 0.01

**significant at 0.05

*significant at 0.1

Source: Processed Data, 2024

Table 1 above shows the results of stationarity test. At level, all variables are nonstationary except for EXR (exchange rate). EXR has a p-value lower than 0.05 that it indicates its stationarity at level. Subsequently, all the variables are first-differenced. After differencing, the variables are tested again for stationarity. This time almost all variables are stationary at first difference. One variable, namely TPFRB (third party funds of rural banks), is only moderately stationary (significant at 0.1). However, upon further examination using modified Augmented Dickey-Fuller method (ADF-GLS), it is found that the TPFRB is stationary at 0.01 significance level. Hence, all the variables are first-differenced for the subsequent tests.

Table 2. Lag Length Determination

Lags	AIC	SIC	HQC
1	196,528512*	197,457531*	196,904162*
2	196,663148	198,255753	197,307119
3	196,938575	199,194765	197,850868
4	197,216729	200,136505	198,397344
5	197,290043	200,873403	198,738978
6	196,804877	201,051823	198,522134
7	196,772818	201,683349	198,758396
8	197,017294	202,591411	199,271194
9	196,749556	202,987258	199,271777
10	196,653643	203,554930	199,444185

Source: Processed Data, 2024

Table 2 above shows the results of lag length determination. All the criteria used appoint to one lag length as the most optimal lag length in the VECM. AIC (Akaike Information

Criterion), SIC (Schwarz Information Criterion) and HQC (Hannan-Quinn Criterion) agree on lag length 1. Therefore, the lag length used for VECM is 1. Next, we move to cointegration test.

Table 3. Cointegration Test for TPFCB

Rank	Eigen Value	Trace Test	p-value
0	0,61606	267,07	0.0000***
1	0.58949	165.60	0.0000***
2	0.39729	71.228	0.0000***
3	0.15265	17.558	0.0000***

***significant at 0.01

**significant at 0.05

*significant at 0.1

Source: Processed Data, 2024

Table 3 above shows the cointegration test for TPFCB, INF, MS, and EXR. The table shows that the hypothesis of no cointegrating relationship is rejected. In fact, there are even four cointegrations exist that involve each variable. Therefore, there is a long-run relationship between TPFCB, INF, MS, and EXR. The next table shows cointegration test involving TPFRB.

Table 4. Cointegration Test for TPFRB

Rank	Eigen Value	Trace Test	p-value
0	0,61531	251,36	0.0000***
1	0.45227	150.10	0.0000***
2	0.42515	86.291	0.0000***
3	0.22927	27.604	0.0000***

***significant at 0.01

**significant at 0.05

*significant at 0.1

Source: Processed Data, 2024

Table 4 above shows the cointegration test for TPFRB, INF, MS, and EXR. We can see that, just like the case of TPFCB, all the variables in the model have a cointegrating relationship. Therefore, there is a long-run causal relationship among them.

Next is the impulse response function of TPFCB on the shocks happening to INF, MS, and EXR.

Figure 2. Response of TPFCB to Shocks on INF, MS, and EXR

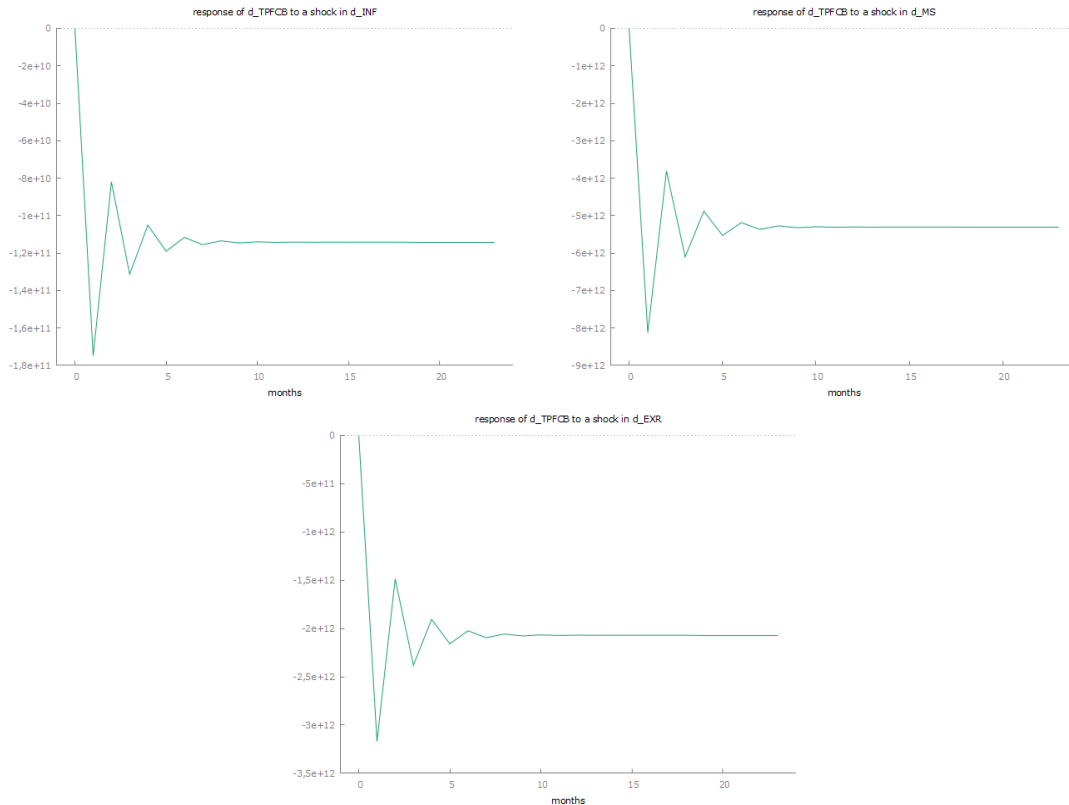
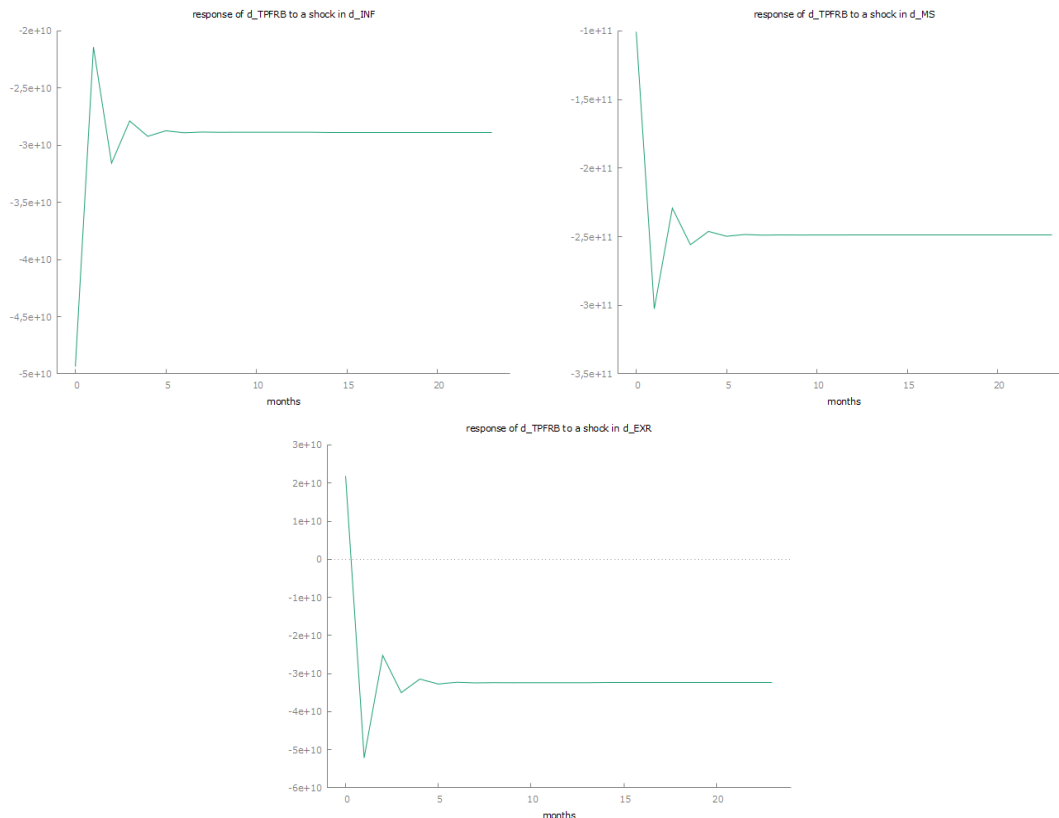


Figure 2 above shows the response of TPFCB on the shocks happening to INF, MS, and EXR. The first graph on the top left shows how TPFCB reacts to shocks that happen to inflation. A shock happening to inflation will cause a massive withdrawal of the funds deposited within the commercial banks. The decrease in the deposits amount will continue for the first two months. However, there will be a slowdown in the decrease for a while before it gets stabilized from the month 5 onward. Basically people will have more money with them just in case they need it in the midst of highly uncertain inflation. Depositors might choose to spend wisely in order to be able to save later. This way they will be more able to cope with uncertainty in inflation. The panel to the right of inflation graph shows the response of TPFCB on shocks happening to money supply. Funds deposited within the commercial banking system will immediately decrease in a short time period, should a shock happen to the money supply. Depositors will withdraw from the banking system and be more prepared to spend their money. This will shrink the assets owned by banks because of the decrease in the source of funds. However, the funds deposited within the commercial banking system will become stable just after 3 periods. Basically it does not take long for the response of the deposits in the banking system to react to the shocks in the money supply. The last graph shows the response of the deposits to the shocks happening to the exchange rate. The funds in the commercial banks react exactly like how it responds to the shocks in the money supply. Shocks in the exchange rate will cause

funds to be withdrawn from the banking system. People are more likely to increase their cash on hand in this regard. Indonesia is a country in which its import is still predominant in the economy. Therefore, shock in the exchange rate will have unfavorable consequences to the economy that make people want to hold more cash on hand.

The figure below shows the response of TPFRB on the shocks happening to INF, MS, and EXR.

Figure 3. Response of TPFRB to Shocks on INF, MS, and EXR



The response of TPFRB to shocks on INF shows that there will be a decline in deposits in the rural banking system. This decline, however, will not persist for long. There will be a slowdown in the decline and this will be going on for about a month. Following that, a mild volatility will occur before deposit stabilize beginning from month 5. The response of TPFRB to shocks in MS and EXR are very similar. There is a sudden drop in the rural banks when shocks happen to inflation and exchange rate. This denotes how people withdraw their money from the rural banks. They try to be prepared for the uncertainty happening to inflation and exchange rate. More cash in hand means more flexibility financially. However, in less than 5 periods the deposits in the rural banking system will stabilize and reacts no more to the shocks. Shocks on the money supply on the other hand will also cause decline in the rural banks. However, in the first month, the response will still be located in the positive zone. This means it could still encourage people to save more. However, in an instance, the deposits will drop to the negative zone and stabilize just after 3 months. This shows how people in the rural area are still very

much dependent on their cash holding. They will quickly withdraw their funds from the banks just in case any shocks happen to the macroeconomic indicator.

Overall, uncertainty in macroeconomics factors will result in the depletion of liquidity in the banking system. This means that banks will have to deal with liquidity risk since their cash holding is diminished (Kuncoro & Ashsifa, 2023; Anis & Hamdi, 2022). In turn, liquidity risk has an impact on banks profitability and stability (Chandra & Maretha, 2024; Febiyanni & Hermanto, 2023; Ekadjaja et al., 2020; Saleh & Afifa, 2020). Therefore, regulators and government have to ensure that the volatility of macroeconomics factors is still within acceptable range so that it will not induce a feeling of economic uncertainty that may affect banks performance and stability.

4. Conclusion

This research attempts to investigate the response of deposits in the commercial banks and rural banks on shocks happening to inflation, money supply, and exchange rate. The result shows that, in the case of shocks happening to inflation, deposits in the commercial banks respond differently from the deposits in the rural banks. Deposits in the commercial banks will increase while deposits in the rural banks will decrease. This shows different attitude shown by rural and urban people. People in the rural areas prefer to hold more cash in hand while people in the urban areas will save more during uncertainty in inflation. Therefore, rural banks should provide more cash in the case of shocks happening to inflation. On the other hand, the responses of deposit in both banks are almost similar to shocks happening to money supply and exchange rate. There will be a sudden drop in the funds deposited within the banking system. This happens very fast and abruptly. However, beginning from the period 3, the response will stabilize. Basically, third party funds will respond very quickly to any shocks on macroeconomic indicators. This means the money serves as a security function in which in times of economic uncertainty people will tend to hold more cash in order to be able to meet their basic and required needs. Future research may endeavor to segregate among various kind of banks, for example foreign banks or state-owned banks and investigate the response of funds deposited within it to shocks.

REFERENCES

- Adao, L. F., Silveira, D., Ely, R. A., & Cajueiro, D. O. (2022). The Impacts of Interest Rates on Bank's loan portfolio risk-taking. *Journal of Economic Dynamics and Control*, 144. doi:<https://doi.org/10.1016/j.jedc.2022.104521>

- Angori, G., Aristei, D., & Gallo, M. (2019). Determinants of Banks' Net Interest Margin: Evidence from the Euro Area During the Crisis and Post-Crisis Period. *Sustainability*, 11(14). doi:<https://doi.org/10.3390/su11143785>
- Anis, M., & Hamdi, B. (2022). Liquidity Risk in Economic Uncertainty: Evidence from Indonesian Islamic Banks. *Jurnal Ekonomi dan Keuangan Islam*, 8(1), 32-46. doi:<https://doi.org/10.20885/JEKI.vol8.iss1.art3>
- Arintoko, A., & Kadarwati, N. (2022). Does Monetary Policy Respond to Macroeconomic Shocks? Evidence from Indonesia. *Jurnal Ekonomi & Studi Pembangunan*, 23(2), 171-188. doi:<https://journal.umy.ac.id/index.php/esp/article/view/14881>
- Burhanudin, B. (2022). Examining the Effect of Service Value and Reputation on Customer Loyalty with Trust and Electronic Word of Mouth as Mediation. *JAM: Jurnal Aplikasi Manajemen*, 20(3), 514-527. doi: <http://dx.doi.org/10.21776/ub.jam.2022.020.03.05>
- Chandra, J. L., & Maretha, E. L. (2024). The Effect of Credit Risk, Liquidity Risk, and Bank Capital on Bank Profitability During the COVID-19. *Journal of Management and Business Environment*, 5(2), 183-196. doi:<http://dx.doi.org/10.24167/jmbe.v5i2.10204>
- Duong, K. D., Le, H. V., & Le, A. N. (2023). Do Bank Funding Diversity and Bank Lending Affect Net Interest Margins? Evidence from Asia Markets Before and During the COVID-19 Pandemic. *SAGE Open*, 13(4). doi:<https://doi.org/10.1177/21582440231214044>
- Ekadjaja, M., Siswanto, H. P., A, E., & Rorlen, R. (2020). The Effects of Capital Adequacy, Credit Risk, and Liquidity Risk on Banks' Financial Distress in Indonesia. *The 9th International Conference on Entrepreneurship and Business Management (ICEBM 2020)* (pp. 393-399). Jakarta: Atlantic Press B. V.
- Febiyanni, F., & Hermanto, H. (2023). The Influence of Capital Risk, Liquidity Risk, and Credit Risk on Profitability with Macroprudential Intermediation Ratio as a Moderating Variable. *Enrichment: Journal of Management*, 13(3), 1984-1992. doi:10.35335/enrichment.v13i3.1397
- Fungacova, Z., Kerola, E., & Weill, L. (2022). Does Experience of Banking Crises Affect Trust in Banks. *Journal of Financial Services Research*, 62, 61-90. doi:doi.org/10.1007/s10693-021-00365-w
- Hac, L. D. (2021). Bank Concentration and Banking Stability: Evidence from EAGLE Group. *JAM: Jurnal Aplikasi Manajemen*, 19(4), 703-714. doi:[dx.doi.org/10.21776/ub.jam.2021.019.04.01](https://doi.org/10.21776/ub.jam.2021.019.04.01)
- Handayani, F. A., & Kacaribu, F. (2021). Asymmetric Transmission of Monetary Policy to Interest Rates: Empirical Evidence from Indonesia. *Bulletin of Monetary Economics and Banking*, 24(1), 119-150. doi:<https://doi.org/10.21098/bemp.v24i1.1201>
- Irawan, I., Kusuma, R. D., & Irawan, K. C. (2021). Commercial Bank Stimulus on Economic Growth and Labour Absorption in Indonesia. *Journal of Economic Education*, 10(2), 142-148. doi:<https://doi.org/10.15294/jeec.v10i2.52207>
- Kuncoro, M. T., & Ashsifa, I. (2023). How Does Economic Uncertainty Impact the Banking Sector Performance? Evidence from ASEAN. *AKUNTABILITAS*, 17(2), 275-292. doi:<https://doi.org/10.29259/ja.v17i2.22383>

- Maulayati, R. R., Bahril, M. A., Najiatun, N., & Herianingrum, S. (2020). Effect of Macroeconomic Variables on Third-Party Funds in Islamic Commercial Banks in Indonesia. *Journal of Islamic Economics Lariba*, 6(1), 19-40. doi:10.20885/jielariba.vol6.iss1.art2
- Mentari, R. N., B, H., & A. G., E. Y. (2019). Effectiveness of Monetary Policy Transmission Mechanism in Indonesia. *JEJAK: Jurnal Ekonomi dan Kebijakan*, 11(1), 189-206. doi:https://doi.org/10.15294/jejak
- Nguyen, P. T. (2022). The Impact of Banking Sector Development on Economic Growth: The Case of Vietnam's Transitional Economy. *Journal of Risk and Financial Management*, 15(8). doi:https://doi.org/10.3390/jrfm15080358
- Nguyen, Y., & L, N. (2022). Funding Liquidity, Bank Capital, and Lending Growth in a Developing Country. *Cogent Economics & Finance*, 10. doi:doi.org/10.1080/23322039.2022.2122958
- Nikolaj, S. S., Drazenovic, B. O., & Buterin, V. (2022). Deposit Insurance, Banking Stability, and Banking Indicators. *Economic Research-Ekonomiska Istrazivanja*, 35(1). doi:https://doi.org/10.1080/1331677X.2022.2033130
- Ozili, P. K. (2023). Impact of Monetary Policy on Financial Inclusion in Emerging Markets. *Journal of Risk and Financial Management*, 16(7). doi:https://www.mdpi.com/1911-8074/16/7/303#
- Rathnayake, D. N., Yang, B., Louembe, P. A., & Li, Q. (2022). Interest Rate Liberalization and Commercial Bank Performance: New Evidence from Chinese A-Share Banks. *SAGE Open*, 1-12. doi:10.1177/21582440221096648
- Saleh, I., & Afifa, M. A. (2020). The Effect of Credit Risk, Liquidity Risk and Bank Capital on Bank Profitability: Evidence from an Emerging Market. *Cogent Economics & Finance*, 8(1). doi:https://doi.org/10.1080/23322039.2020.1814509
- Segev, N., Ribon, S., Kahn, M., & De Haan, J. (2022). Low Interest Rates and Banks' Interest Margins: Does Deposit Market Concentration Matter? *Journal of Financial Services Research*. doi:https://doi.org/10.1007/s10693-022-00393-0
- Shahriar, A., Mehzabin, S., Ahmed, Z., S, D. E., & K, A. M. (2023). Bank Stability, Performance, and Efficiency: An Experience from West Asian Countries. *IIM Ranchi Journal of Management Studies*, 2(1), 31-47. doi:https://doi.org/10.1108/IRJMS-02-2022-0017
- Soehaditama, J. P. (2023). Sustainability in Bank: Deposits, Investment, and Interest Rate. *Formosa Journal of Sustainable Research (FJSR)*, 2(5), 1069-1078. doi:https://doi.org/10.55927/fjsr.v2i5.3912
- Zequiraj, V., Hammoudeh, S., Iskenderoglu, O., & Tiwari, A. K. (2020). Banking Sector Performance and Economic Growth: Evidence from Southeast European Countries. *Post-Communist Economies*, 32(2), 267-284. doi:https://doi.org/10.1080/14631377.2019.1640988